BASIC ASSESSMENT REPORT & ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

MINING PERMIT APPLICATION FOR COAL ON PORTION OF PORTION 2 OF THE FARM DRIEHOEK 273 IS, SITUATED IN THE MAGISTERIAL DISTRICT OF MSUKALIGWA IN MPUMALANGA PROVINCE.DMRE REF: MP 30/5/1/1/3/13557 MP

PREPARED ON BEHALF OF:

PREPARED BY:

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COMPETENT AUTHORITY:

mineral resources & energy
Department: Minerals Resources and Energy
REPUBLIC OF SOUTH AFRICA

Department of Minerals and Resources & Energy
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BASIC ASSESSMENT REPORT

AND

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

PROPONENT:

Proponent	Contact details
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FILE REFERENCE NO. MP 30/5/1/1/3/13557 MP

DOCUMENT CONTROL

Document Title: Basic Assessment Report and Environmental Management Programme report for Coal within **Portion of portion 2** of the Farm **Driehoek 273 IS**, situated in the Magisterial District of Msukaligwa in Mpumalanga Province **DMRE REF: MP 30/5/1/1/3/13557 MP.**

Version 1: Draft Basic Assessment Report and Environmental Management Programme

QUALITY CONTROL			
	Compiled By	**1st Reviewer**	**2nd Reviewer**
Name	T Rakuambo	R Shonisani	Dr NK Singo
Designation	EAP	EAP	Principal EAP

DISCLAIMER

The opinions expressed in this Report have been based on the information sourced by Singo consulting through desktop studies, Previous studies and the local knowledge of land occupiers/ landowners. Opinions presented in this report apply to the site conditions and features as they existed at the time of Singo Consulting's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which Singo Consulting had no prior knowledge nor had the opportunity to evaluate.

1 IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining permit if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

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

In terms of Section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of Section (17)1)(c) the Competent Authority must check whether the application has considered any minimum requirements applicable, or instructions or guidance provided by the Competent Authority to the submission of applications.

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

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

OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic assessment process is to, through a consultative process-

a) Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context.
b) Identify the alternatives considered, including the activity, location, and technology alternatives.
c) Describe the need and desirability of the proposed alternatives.
d) Through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and the technology alternatives on these aspects to determine:

    i. The nature, significance, consequence, extent, duration, and probability of the impacts occurring; and

    ii. The degree to which these impacts
        (aa) Can be reversed.
        (ba) May cause irreplaceable loss of resources.
        (ca) Can be managed, avoided or mitigated.

e) Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to –

    i. Identify and motivate a preferred site, activity and technology alternative.
    ii. Identify suitable measures to manage, avoid or mitigate identified impacts.
    iii. Identify residual risks that need to be managed and monitored.

This report has been designed to meet the requirements for a Basic Assessment Report and Environmental Management Programme as stipulated in the 2014 Environmental Impact Assessment Regulations (as amended) promulgated under the National Environmental Management Act, 1998 (Act 107 of 1998). The adjudicating authority for this application is the Department of Mineral Resources and this report has been compiled in accordance with the applicable Department of Mineral Resources Guidelines and Basic Assessment Report and Environmental Management Programme template.

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EXECUTIVE SUMMARY

Singo Consulting (Pty) Ltd has been appointed as an independent Environmental Consultant by Tornowize (Pty) Ltd to conduct Environmental Impact Assessment (EIA), Compile an Environmental Management Programme report (EMPr) and undertake Public Participation Process (PPP). This is done for processes of acquiring Environmental Authorization for the proposed Coal Mining Permit Application within Portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province (DMRE REF: MP 30/5/1/1/3/13557 MP).

The proposed mining permit application encompasses Portion of portion 2 of the Farm Driehoek 273 IS constituting a total of 5 hectares. The project area is located approximately 27.5 km Southwest of Breyten, approximately 31 km West of Ermelo and approximately 94 km Southeast of Middelburg along N11. New road need to be constructed from gravel road that would provide direct access to the project area. The project area is located 2,13 m away from Msobo mining, 2,05 away from Wesselton Colliery and 509 m away from Qhubeka mining.

The project area is on cultivated land. There are no archaeological or heritage resources identified at the surface on site during site assessment, however, if any heritage resources are identified during any stage of mining, then SAHRA will be informed immediately.

Mining activities will be undertaken over a period of two (2) years. This project will entail an open cast method of excavation. The mine design will be developed according to the dimension of the applied mineral deposit within the project area, but overall mining activities will be limited to an area of 5 Ha as per mining permit requirements. The topsoil will be stockpiled elsewhere on site preferably next to the farm boundary and will be used during rehabilitation period. Once a box cut has been made, the overburden and mineral resources where necessary will be loosened by blasting. The loosened material will then be loaded onto trucks by excavators. A haul road will be situated at the side of the open cast, forming a ramp up which trucks can drive, carrying ore and waste rock. Waste rock will be piled up at the surface, near the edge of the open cast (waste dump). The waste dump will be tiered and stepped, to minimize degradation. All the activities will be guided by the project’s EMPr such that the project does not impact the environment negatively.

Tornowize lodged an application to mine coal on portion of portion 2 of the farm Driehoek 273 IS, situated in the magisterial district of Msukaligwa in Mpumalanga. The farm belongs to Republic of South Africa as per titled deed, Consultation email has been sent to H Netshakhuma shearing BID no issue raised yet.

The proposed mining permit application encompasses Portion of portion 2 of the Farm Driehoek 273 IS constituting a total of 5 hectares. The area is located approximately 27.5 km Southwest of Breyten, approximately 31 km West of Ermelo and approximately 94 km Southeast of Middelburg along N11. New road need to be constructed to access the site.

The land cover of the proposed area includes cultivated land. The most dominant vegetation type in the area is Moist Clay / Moist Cool Highveld Grassland. maize cultivation are the most dominant farming activities in this area.

The project infrastructure and activities will include:

- Site clearance.
- Removal of topsoil and overburden and stockpiling.
- Site establishment, including the establishment of an access route, mobilization of equipment and preparation of area for mining.
- Excavation of a box cut.
- Ripping (Blasting for hard rock)
- Loading zone.
- Dust control.
- Crushing and screening of ore.
- Hauling and transporting of ore.
- Ablution facilities and waste storage area.
- Rehabilitation of site

List of abbreviations

AEL	: Air Emissions License
APPA	: Atmospheric Pollution Prevention Act
BAR	: Basic Assessment Report
BID	: Background Information Document
DMRE	: Department of Mineral Resources & Energy
DEDET	: Department of Economic Development, Environment and Tourism
DWS	: Department of Water and Sanitation
DWAF	: Department of Water Affairs and Forestry
DEA	: Department of Environmental Affairs
DRDLR	: Department of Rural Development and Land Reform
EA	: Environmental Authorisation
EAP	: Environmental Assessment Practitioner
EIA	: Environmental Impact Assessment
EIMS	: Environmental Impact Management Services
EMPr	: Environmental Management Programme report
ECA	: Environmental Conservation Act
EHS	: Environmental, Health, and Safety
FPA	: Fire Protection Agency
GIS	: Geographic Information System
I&AP	: Interest and Affected Party
IWULA	: Integrated Water Use License Application
IWWMP	: Integrated Water and Waste Management Plan
MP	: Mining Permit
MPRDA	: Mineral and Petroleum Resources Development Act
NEMA	: National Environmental Management Act
NEMWA	: National Environmental Management Waste Act
NWA	: National Water Act
NEMAQA	: National Environmental Management Air Quality Act
PPP	: Public Participation Process
PRA	: Prospecting Right Application
PWP	: Prospecting Works Programme
IDP	: Integrated Development Plan
RSIP	: Rehabilitation Strategy and Implementation Plan
SDF	: Spatial Development Framework
SHE	: Safety, Health and Environmental
SAWQG	: South African Water Quality Guidelines
TOPS	: Threatened and Protected Species
WML	: Waste Management License

PART A:

SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

1.1 Details of the Environmental Assessment Practitioner

Singo Consulting (Pty) Ltd was appointed by Tornowize (Pty) Ltd as an independent EAP to compile this report. The contact details of the consultants who compiled this report are as follows:

Table 1: Details of the EAP that compiled the report.

Name of the Practitioner	**T Rakuambo**
Designation	EAP
Tel No.	+27 13 692 0041
Cell No.	+27 82 767 4011
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Email	*takalani@singoconsulting.co.za*

Table 2: Details of the 1st EAP who reviewed the report.

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Table 3: Details of the 2nd EAP who reviewed the report.

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1.2 Expertise of the EAP

1.2.1 Summary of EAP's Past Experience

Singo Consulting (Pty) Ltd is a private independent research, consultancy and advisory company based in Emalahleni (Witbank). It was established in 2008, since then this company is growing rapidly, and it is making itself known within the length and breadth of the Republic of South Africa. We take pride in the outstanding quality of our services driven by our core values which are due diligence, integrity, and honestly (independency).

1.2.2 Qualifications of the EAP

For carried out Environmental Impact Assessments: See attached CV. Due to the Protection of Personal Information Act, 2013 the CVs will not be disclosed in this report.

1.3 Location of the Activity

The proposed mining permit application encompasses Portion of portion 2 of the Farm Driehoek 273 IS constituting a total of 5 hectares. The area is located approximately 27.5 km Southwest of Breyten, approximately 31 km West of Ermelo and approximately 94 km Southeast of Middelburg along N11 of Msukaligwa Local Municipality.

Table 4: Locality details

Farm Name	Portion of portion 2 of the Farm Driehoek 273 IS
Application Area (Ha)	Approximately 5 hectares (ha)
Magisterial District	Magisterial District of Msukaligwa
Local Municipality	Msukaligwa Local Municipality
Distance and direction from nearest town	Approximately 27.5 km Southwest of Breyten Approximately 31 km West of Ermelo Approximately 94 km Southeast of Middelburg
21-digit Surveyor General Code for each Portion	Portion of portion 2 ; T0IS00000000027300002
Coordinates	A 29.883289 -26.415964 B 29.884912 -26.415257

	C 29.886113 -26.417439 D 29.884490 -26.418146 A 29.883289 -26.415964
Locality map	See Figure 1 - 3 below

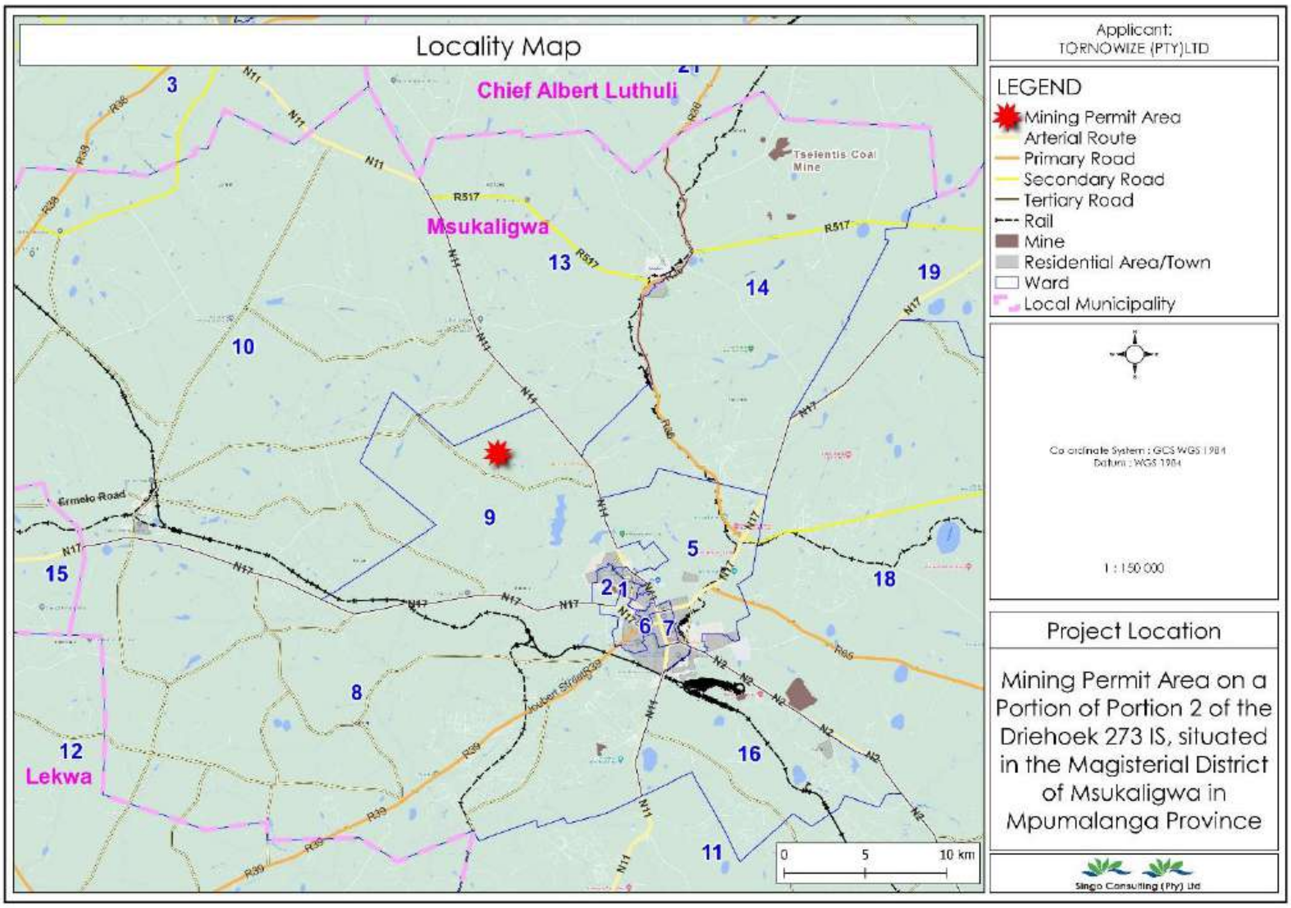


Figure 1: Locality map of the proposed project area (Singo Consulting GIS Team, 2023)

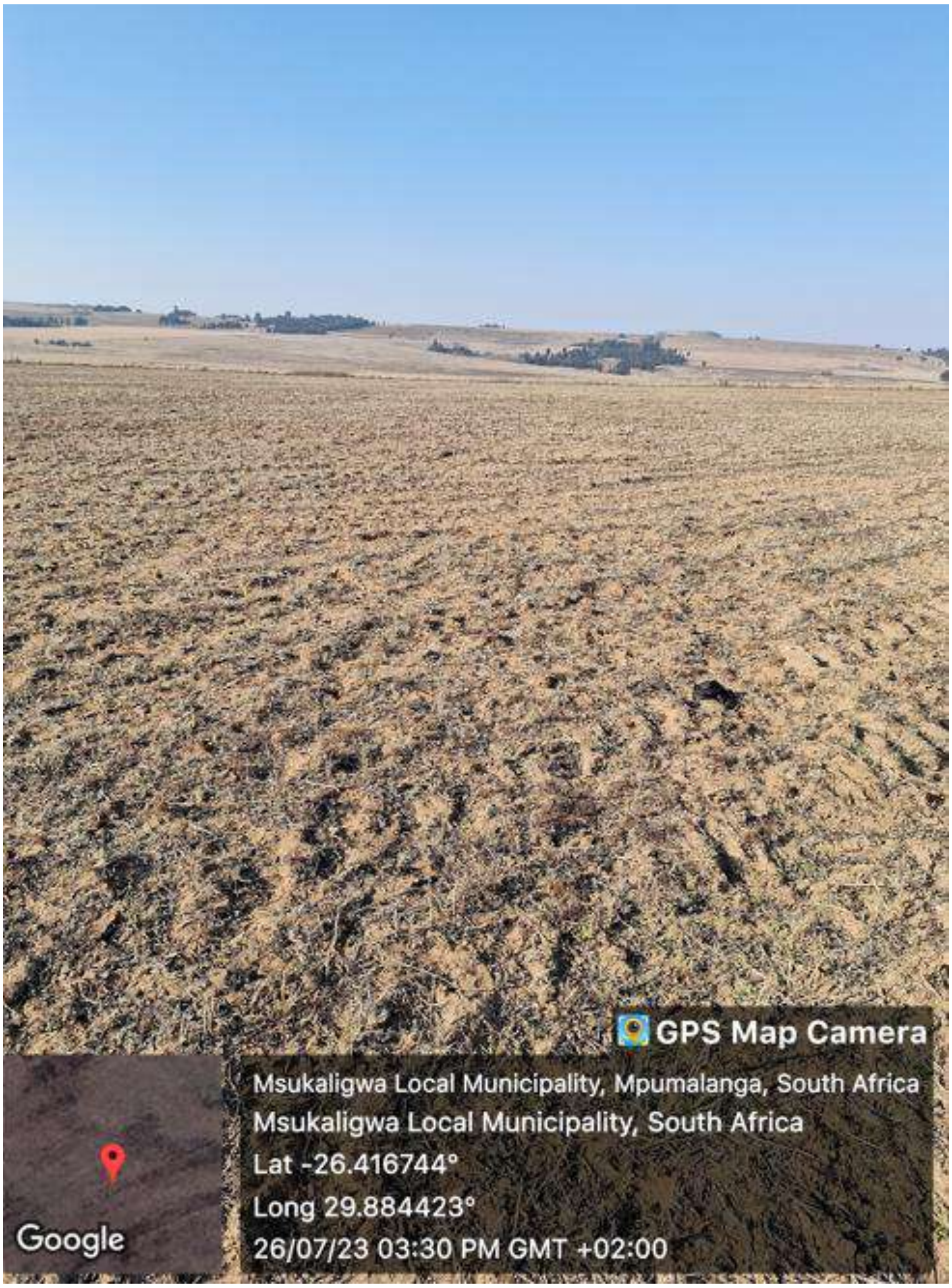


Figure 2: Overview of the project area (Site Visit, 2023)

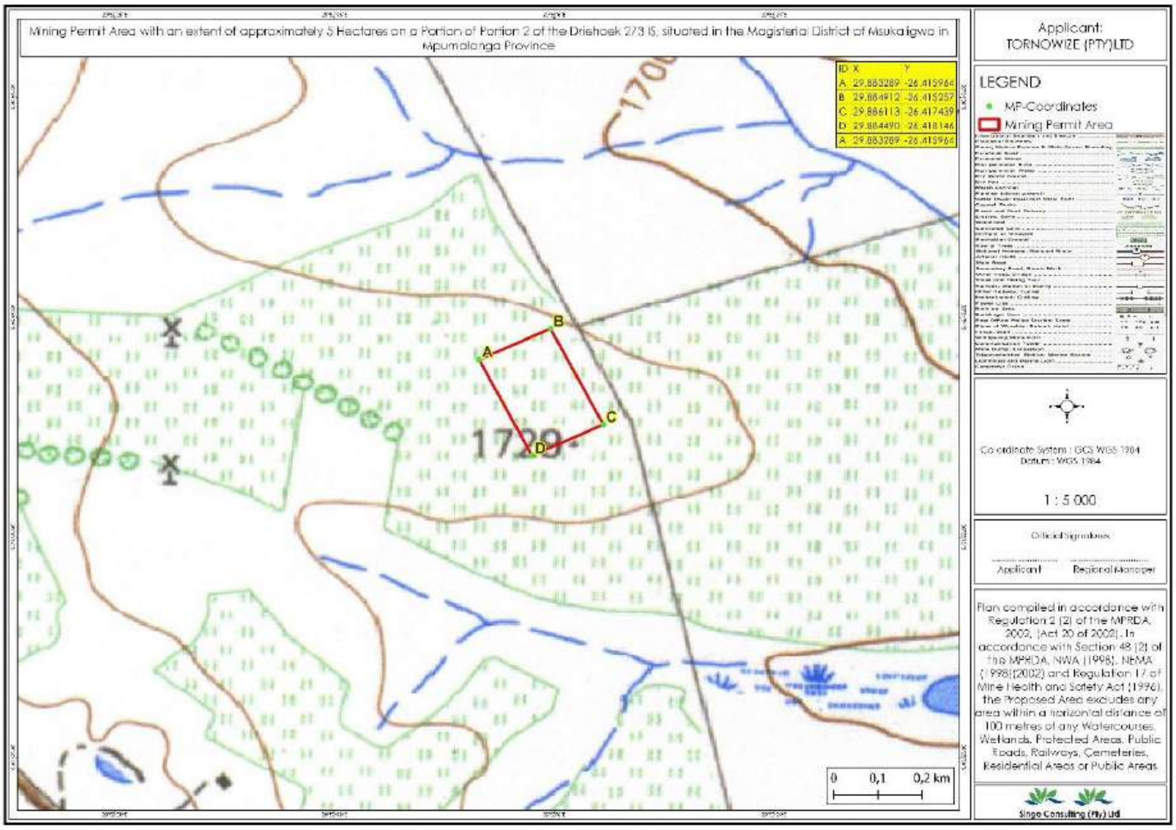


Figure 3: Reg 2.2 map (Singo Consulting GIS Team, 2023)

2 DESCRIPTION AND SCOPE OF THE PROPOSED ACTIVITY

The technology that will be adopted is a very simple sort of open cast mining, and a 5-ha area will be delimited for mining activities. Blasting and subsequent mining of the orebody utilizing a truck and shovel operation will be done (see Figure 4). The mined ore will be processed and screened in a mobile crushing and screening machine that will be established within the boundaries of the mining area. A front-end loader will be utilized to load the material into haulage trucks. The mine will operate for a two (2) year permit period with an option to renew for three (3) periods of which may not exceed one year. The coal will be stockpiled and transported to clients via trucks and trailers. All activities will be contained within the boundaries of the mining site.

The project infrastructure and activities will include the following:

- Site clearance.
- Removal of topsoil and overburden and stockpiling.
- Site establishment, including the establishment of an access route, mobilisation of equipment and preparation of area for mining.
- Excavation of an open pit.
- Blasting.
- Loading zone.
- Dust control.

- Crushing and screening.
- Hauling and transporting of ore.
- Ablution facilities and waste storage area.
- Rehabilitation of site and Monitoring.

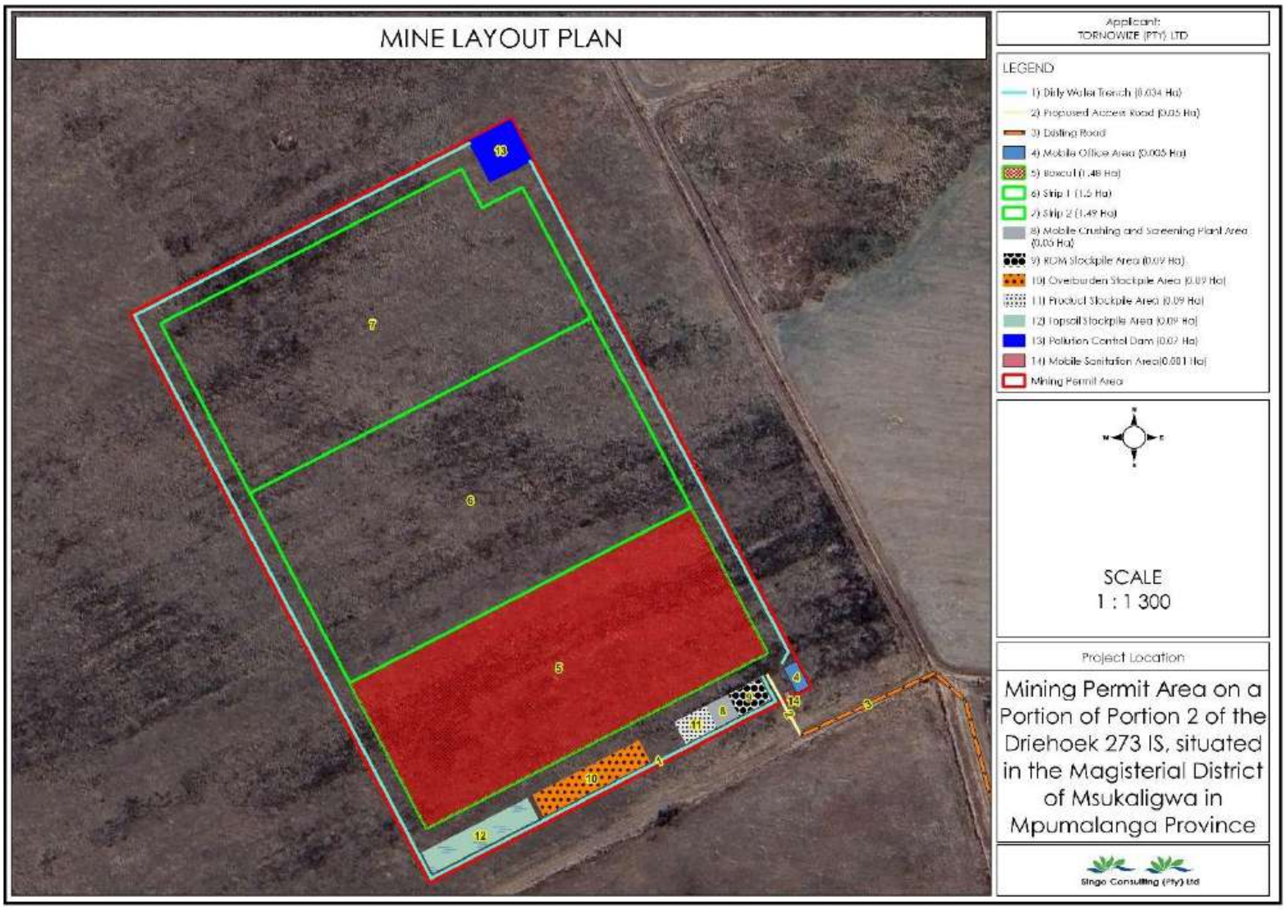


Figure 4: Proposed Mining Layout (Singo Consulting GIS Team, 2023)

2.1 Listed and Specified Activities

The legal requirement for Environmental Authorisation for a Mining Permit came into effect after the promulgation of the NEMA 2014 EIA Regulations on the 08th of December 2014. Prior to this, Mining Permits were subjected to the provisions of the MPRDA (2002). In this regard, a Mining Permit and Environmental Authorisation are required in terms of the MPRDA (2002) and NEMA 2014 EIA Regulations (as amended), respectively. The applicable NEMA listed activities anticipated to be triggered by this project are outlined below.

Table 5:Listed and specified activities.

NAME OF ACTIVITY E.g. for prospecting: drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office and access route; and for mining: excavations, blasting, stockpiles, discard dumps/ dams, loading, hauling, transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines and conveyors.	Aerial extent of the activity Ha or m²	Listed activity Mark with X where applicable	Applicable listing notice (GN 517/2021)
Open cast mining and crushing to produce coal specs required by clients	4.99 Ha	X	GN 517/2021, Listing notices 1 activity 21: Any activity including the operation of that activity which requires a mining permit in terms of section 27 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 to exercise the mining permit.
A closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	5 Ha		Not listed
Vegetation Clearance	4.99 Ha	X	GN 517/2021, Listing Notice 1 activity 27: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where

			such clearance of indigenous vegetation is required for - (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Access Road	0.05Ha		Not listed
Overburden stockpile	0.09Ha		Not listed
Topsoil stockpile	0.09Ha		Not listed
ROM stockpile area	0.09Ha		Not listed
Product Stockpile	0.09Ha		Not listed
Dirty water Trench	0.034Ha		Not listed
Pollution Control Dam	0.07Ha		Not listed
Mobile offices	0.005Ha		Not listed
Toilets and sanitation	0.001Ha		Not listed
Box cut construction	1.48Ha		Not listed
Coal extraction	4.99Ha		Not listed
Mobile Crushing and Screening Plant Area	0.05Ha		Not listed
Rehabilitation	5 Ha		Not listed

2.2 Description of Activities to be Undertaken

This project will be carried out in terms of National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014 (as amended) read together with regulation 40-43 of the Act. The trigged activities as reflected on Government Notice R983 (as amended) Activity No. will be; LN 1 Activity 21 & 27:

- LN 1 Activity 27: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for -(i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
- Activity 21: The project requires a mining permit in terms of the MPRDA.

LN 1 Activity 27 is about clearing of vegetation and this application seek to be authorised for this activity. Deforestation process is required before commencement of any mining activity if the area is vegetated, this process allows the mining company to gain access to the mining area and locating other required infrastructures. Therefore, land clearance will be the first stage as part of development.

During site establishment, the applicant must demarcate the site boundaries and clear the topsoil and overburden from the extension area to open it for drilling and blasting. Upon stripping, the topsoil and overburden will be stockpiled along the boundaries of the opencast mining for use during the rehabilitation phase. Topsoil stripping will be restricted to the areas to be mined. The complete A-horizon (topsoil – the top 100-200 mm of soil, which is generally darker in colour due to high organic matter content) will be removed. If it is unclear where the topsoil layer ends, the top 300 mm of soil must be stripped.

The topsoil will be stockpiled in the form of a berm alongside the boundary of the mine mining where it will not be driven over, contaminated, flooded or moved during the operational phase. The topsoil berm will measure a maximum of 1.5 m high and indigenous grass species must be planted on it, if vegetation does not naturally establish within 6 months of stockpiling, to prevent soil erosion and discourage weed growth. The roots of the grass will improve soil viability for rehabilitation purposes. The stripped overburden will be stockpiled on a designated area after the topsoil has been removed. The applicant will introduce the mining equipment to the area during the site establishment phase.

2.3 Development -Stripping of overburden

Overburden is waste rock consisting of consolidated and unconsolidated material that must be removed to expose the underlying ore body. It is desirable to remove as little overburden as possible in order to access the ore of interest, but a larger volume of waste rock is excavated when the mineral deposit is deep. The removal techniques that will be employed are cyclical with interruption in the extraction (drilling, blasting and loading) and removal (haulage) phases. This is particularly true for hard rock overburden which must be drilled and blasted first. An exception to this cyclical effect is, dredges used in hydraulic surface mining and some types of loose material mining with bucket wheel excavators. The fraction of waste rock to ore excavated is defined as the stripping ratio. Stripping ratios of 2:1 up to 4:1 is not uncommon in large mining operations. Ratios above 6:1 tend to be less economically viable, depending on the commodity. Once removed, overburden can be used for road and tailings construction or may have non-mining commercial value as fill dirt.

Surface mining is a mine in which the ore lies near the surface and can be extracted by removing the covering layers of rock and soil. Almost all surface mining operations are exposed to the elements and require no roof support. Open cast mining method employ a conventional mining cycle of operations to extract minerals: rock breakage is usually accomplished by drilling and blasting for consolidated materials and by ripping or direct removal by excavators for unconsolidated soil and/or decomposed rock, followed by materials handling and transportation. Open cast mining method was considered based on the geological data, extrapolation of resource from nearby mines, life span of a permit and the closure advantage of open cast mining.

During the development and exploitation stages of mining when natural materials are extracted from the earth, remarkably similar unit operations are normally employed. The unit operations of mining are the basic steps used to produce mineral from the deposit, and the auxiliary operations that are used to support them. The steps contributing directly to mineral extraction are production operations, which constitute the production cycle of operations. The ancillary steps that support the production cycle are termed auxiliary operations. The production cycle employs unit operations that are normally grouped into rock breakage and materials handling. This cyclic operation will be employed to recover coal resources.

Breakage generally consists of drilling and blasting, and materials handling encompasses loading or excavation and haulage (horizontal transport) and sometimes hoisting (vertical or inclined transport). Thus, the basic production cycle consists of these unit operations:

Production cycle=Drill+ Blast + Load+ Haul

Although production operations tend to be separate and cyclic in nature, the trend in modern mining and tunnelling is to eliminate or combine functions and to increase continuity of extraction. For example, in coal and other soft rock mines, continuous miners break and load the mineral to eliminate drilling and blasting; boring machines perform the same tasks in medium-hard rock. The cycle of operations in surface and underground mining differs primarily by the scale of the equipment. Specialized machines have evolved to meet the unique needs of the two regimes.

2.3.1 Blasting Operation

Drilling and blasting can be defined as the controlled use of explosives and other methods such as gas pressure blasting pyrotechnics, to break rock for excavation. It is practiced most often in mining, quarrying and civil engineering such as dam, tunnel or road construction. The result of rock blasting is often known as a rock cut.

Drilling and blasting currently utilizes many different varieties of explosives with different compositions and performance properties. Higher velocity explosives are used for relatively hard rock to shatter and break the rock, while low velocity explosives are used in soft rocks to generate more gas pressure and a greater heaving effect. For instance, an early 20th-century blasting manual compared the effects of black powder to that of a wedge, and dynamite to that of a hammer. The most used explosives in mining today are ANFO based blends due to lower cost than dynamite. This method will only be used for hard rock, ripping is a preferred mining method.

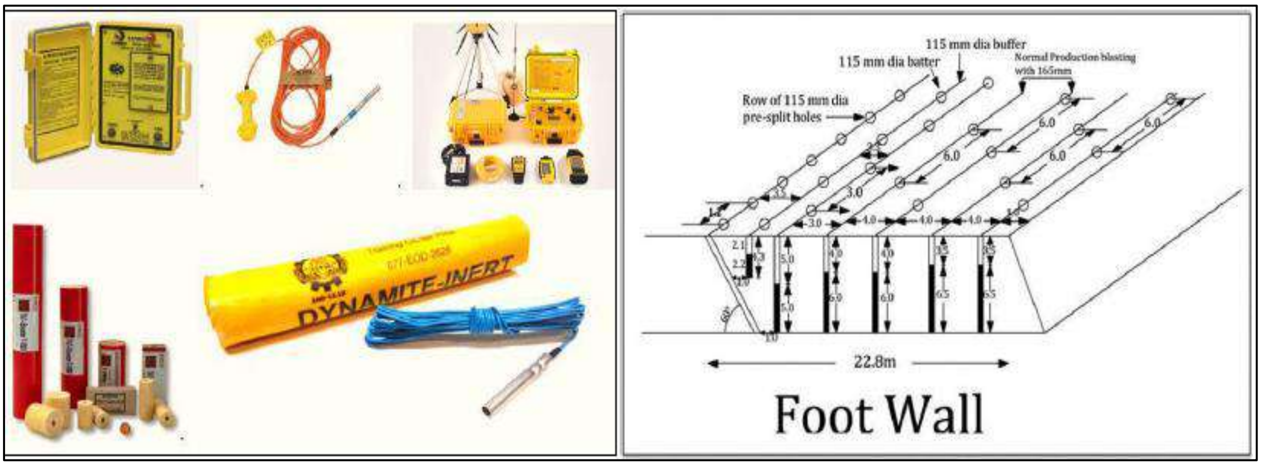


Figure 5: Accessories, Blasting Design, and Planning for Blasting

Figure 6: Typical example of open cast operation

Phase	Activity no	Activity
Construction	1	Site clearing: Removal of topsoil and vegetation
	2	Construction of any surface infrastructure, e.g. Haul roads, pipes, storm water diversion berms (incl. transportation of materials and stockpiling)
	3	Blasting and development of initial box cut for mining
	4	Temporary storage of hazardous products (fuel, explosives) and waste

Operation	5	Removal of overburden and backfilling when possible (incl. drilling/blasting of hard overburden and stockpiling)
	6	Use and maintenance of haul roads.
	7	Extraction of coal (mining process) and run of mine (RoM) coal stockpile
	8	Water use and storage on site
	9	Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, discard)
	10	Concurrent replacement of overburden, topsoil and re-vegetation
Decommissioning	11	Removal of all infrastructure (incl. transportation off site)
	12	Rehabilitation (spreading of soil, re-vegetation and profiling)
	13	Installation of post-closure water infrastructure
	14	Environmental monitoring of decommissioning activities
	15	Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste discard)
Post-closure	16	Post-closure monitoring and rehabilitation

3 POLICY AND LEGISLATIVE CONTEXT

This Mining Permit application requires Authorisation in terms of the following interlinked pieces of legislation:

- The Mineral and Petroleum Resources Development Act, 2002 (MPRDA, Act 28 of 2002), as amended.
- The National Environmental Management Act, 1998 (NEMA, Act 107 of 1998), as amended.

These pieces of core legislation stipulate the required studies, reports and legal processes to be conducted and the results thereof are to be submitted to the relevant authorities for approval prior to commencement. In addition to the above, there are various pieces of legislation which govern certain aspects of the mining operations and these are summarized in Table 3, together with the main legislative requirements mentioned above.

Table 6: Policy and Legislative Context

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the legislation and policy context
A description of the policy and legislative context within which the development is proposed, including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.		E.g. In terms of the National Water Act (NWA)a Water Use License has/has not been applied for.
Minerals and Petroleum Development Resources Act, Act 28 of 2002 (MPRDA) and the MPRDA Amendment Act, Act 49 of 2008	DMRE	The conditions and requirements attached to the granting of the mining permit will apply to the mining activities.
Constitution of South Africa, specifically everyone has the right to: • an environment that is not harmful to their health or wellbeing • have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development	Republic of South Africa	The mining activities will only proceed after effective consultation.

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the legislation and policy context
Environmental Impact Assessment (EIA) regulations	DMRE	This Basic Assessment Report (BAR) is being undertaken in terms of the EIA. Regulations are in place to determine any possible impacts on the environment and propose sufficient mitigation to prevent environmental damage.
National Environmental Management Act, Act 107 of 1998 (as amended) (NEMA)	DMRE	This BAR is being undertaken in terms of the NEMA (No. 107 of 1998), as amended, to determine environmental impact and propose sufficient mitigation to prevent environmental damage. The appropriate environmental authorisation will be obtained before proceeding with any mining activities. No mining activity will be conducted in a sensitive environment. Measures will be implemented to prevent pollution during mining activities. Once mining is complete, the area will be rehabilitated as close as reasonably possible to its pre-mining state.
National Water Act, 1998 (Act 36 of 1998), and GN 704 regulation. Best Practice Guidelines: Series A, G, & H	(S 21 & S 26) Water use & mine water management	Best practice guidelines will be followed for water management, water characterization, water resource protection, water treatment, and the development of the mine water management model

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the legislation and policy context
National Environmental Management: Waste Act, Act 59 of 2008 (NEMWA)NEM: WA	Management measures Environmental awareness plan	All type of waste will be managed as prescribed by the regulation (NEMWA)
National Heritage Resources Act, 25 of 1999 (NHRA)	Management measures	Phase 1 Archaeological and Heritage Impact Assessment has been conducted and recommendations made will be adhered to.
Municipality By-Laws: Waste Management by-law Act 59 of 2008, Air Quality Management By-law Act No 39 of 2008, Noise control by-law, Spatial Planning and Land Use Management act no 16 of 2013 (SPLUMA).	Environmental Management measures awareness plan	Best practice guidelines will be followed for any by-law's management and the development of the mine environmental and other legislative management.

3.1 Listed activities triggered/Other relevant legislation.

Activity	Mining permit area (5 ha)	Activity 21: Listing Notice 1
Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the MPRDA 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks directly related to the extraction of mineral resource, including activities for which an exemption has been issued in terms of section 106 of the MPRDA (2002).		E.g., In terms of the NWA, a Water Use License has/has not been applied for
The clearance of an area of 1 ha or more, but less than 20 ha, of indigenous vegetation, except where such clearance of indigenous vegetation is required for: (i) The undertaking of a linear activity.	Mining permit area (5 ha)	Activity 27: Listing Notice 1

Activity	Mining permit area (5 ha)	Activity 21: Listing Notice 1
(ii) Maintenance purposes undertaken in accordance with a maintenance management plan.		
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Mining activities	The potential impact on important CBAs conservation in the study area, and the management thereof is addressed in this BAR & EMPr.
Msukaligwa Local Municipality (2017- 2022 Final Integrated Development Plan)	Needs, desirability, socio-economic needs	Incorporated under section 4 and 9.1
Gert Sibande District Municipality Spatial Development Framework	Land Use	The applicant acknowledges the need to maximize economic benefit from mining, industrial, business, agricultural and tourism development in the area and promote a climate for economic development in line with the municipal development frameworks
National Environmental Management Air Quality Act (Act No 39 of 2008), National Ambient Air Quality (GN 1210: 2009) Mine Health and Safety Act, Act 29 of 1996 National Dust Control Regulations (GN 827: 2013 as amended)	Air quality & dust control	Standards for particulates and dust used in the Impact Assessment will regulate the concentration of a substance that can be tolerated without environmental deterioration. Exposure to dust and toxic particles (i.e. coal dust) will be managed.
ISO 14001:2015: Principle of Sustainable development	Environmental management system	Development of an integrated environmental management system and measures for responding to environmental conditions (PDCA model).

3.2 Environmental Authorisation Process

3.2.1 Mineral and Petroleum Development Act

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), a Mining Permit must be issued prior to the commencement of any mining activities. As per Section 79(4)(a) and (b) of the MPRDA, the Applicant is required to conduct a Basic Assessment and submit an EMPR for approval as well as to notify in writing and consult with Interested and Affected Parties (I&APs) within 90 days of acceptance of the application. The MPRDA also requires adherence with related legislation, chief amongst them is the National Environmental Management Act (Act 107 of 1998, NEMA) and the National Water Act (Act 36 of 1998, NWA).

Several amendments have been made to the MPRDA. These include, but are not limited to, the amendment of Section 102, concerning amendment of rights, permits, programmes and plans, to requiring the written permission of 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 (as amended), which came into effect on 08th of December 2014.

A Mining Permit is exclusive, transferable, valid for two (2) years and may be renewed for three periods of which may not exceed one year.

3.2.2 National Environmental Management Act

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 Environmental Impact Assessment (EIA) regulations, the proponent is required to appoint an environmental assessment practitioner (EAP) to undertake the EIA 9 as well as the public participation process. In South Africa, EIA became a legal requirement in 1997 with the promulgation of regulations under the Environmental 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 environmental authorisation. On 21 April 2006, the Minister of Environmental Affairs and Tourism promulgated regulations in terms of Chapter 5 of the NEMA.

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

The aim of the EIA process is to identify and assess the potential impacts associated with the proposed project and to develop measures through which potential negative biophysical and socio-economic impacts can be mitigated and positive benefits can be enhanced. The EIA will ensure that all issues are integrated into the lifecycle of the mining operation and its infrastructure. This will occur during the planning, construction, operation and decommissioning and site closure phases.

The Basic Assessment Report and the associated EMPR will indicate how the identified impacts will be avoided, mitigated and/or managed by setting environmental objectives and goals. The EMPR will further outline the implementation programme for the environmental objectives and goals. The EMPR is a legal requirement of the MPRDA and all mines, existing or new, are required to possess an approved EMPR prior to initiating any mining operations. The EMPR is legally binding, and the proponent is required to meet the requirements specified in the document.

The written decision called an Environmental Authorisation, is a legal document setting out the conditions of the Authorisation and the actions required to protect human health and the environment. Any affected party may appeal against the decision contained in an Environmental Authorisation. Appeals must be lodged with the Minister who considers appeals in terms of the relevant provisions of NEMA and the Environmental Regulations.

An important amendment to the NEMA (December 2014) Regulations is that the Department of Mineral Resources has been the responsible authority for approving and issuing of Environmental Authorisations under the NEMA for mining related activities. The Department of Environmental Affairs is the appeal authority for mining related Environmental Authorisations.

3.2.3 National Environmental Management: Waste Amendment Act

The Regulations pertaining to the NEMWA activities were published on 3rd July 2009 in Government Gazette 32368 under GN 718. These were amended in August 2013 in Government Notice Regulation 921. Regulations regarding the planning and management of residue stockpiles and residue deposits were published and commenced on 24 July 2015 in Government Notice Regulation 632 and the List of waste management activities that have or are likely to have a detrimental effect on the environment were amended on the same date by Government Notice Regulation 921. As per this list the following is of important to note:

Category A: (15) The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining permit or mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

On the 2nd of June 2014 the National Environmental Management: Waste Amendment Act came into force.

Of importance for mining activities is that according to this amendment, waste resulting from exploration, mining, quarrying, and physical and chemical treatment of minerals is classified as Hazardous Waste. Waste is accordingly no longer governed by the MPRDA but is subject to all the provisions of the National Environmental Management: Waste Act, 2008 (NEMWA). Section 16 of the NEMWA must also be considered which states as follows:

"A holder of waste must, within the holders power, take all reasonable measures 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 health or the environment or cause a nuisance through noise, odours, or visual impacts.
- Prevent any employee or any person under his or her supervision from contravening the Act.
- Prevent the waste from being used for unauthorized purposes.

These general principles of responsible waste management are incorporated into the requirements in the EMPR to be implemented for this project.

Schedule 3: Defined Wastes have been broken down into two categories: Category A being hazardous wastes and category B being general wastes. Under Category A (hazardous wastes) the act makes allowance for "wastes resulting from exploration, mining, quarrying, and physical and chemical treatment of minerals".

In order to attempt to understand the implications of this it is important to ensure that the definitions of all the relevant terminologies are defined:

- Hazardous waste: means "any waste that contains organic or inorganic elements or compounds that may, owning to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles.
- Residue deposits: means "any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right.
- Residue stockpile: means "any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act.

Various regulations have been drafted in support of the NEMWA, as discussed below:

- Proposed Regulations regarding the planning and management of waste from a prospecting, mining, exploration or production operations (2014):
- Chapter 2, Section 3 states the identification and assessment of any environmental impacts, including those on groundwater, arising from waste must be done as part of the Environmental Impact Assessment (EIA) conducted in terms of the National Environmental Management Act, 1998 (Act No.107 of 1998) (hereafter referred to as the NEMA). The pollution control barrier system shall be defined by the (a) Waste Classification and Management Regulations (2013);(b) National Norms and Standards for the Assessment of Wastes for Landfill Disposal (2013); and (c) National Norms and Standards for Disposal of Waste to Landfill (2013).
- Waste Characterization must be done in terms of physical and chemical composition as well as content. The classification must be done in terms of the health and safety classification and the environmental classification.

Proposed Regulations to exclude a waste stream or a portion of a waste stream from the definition of a waste (2014):

This regulation will give the holder of the right the opportunity to exclude a waste stream, or a portion of a waste stream from the definition of a waste. Chapter 2, Section 4 of this Regulation, Sub-section (1) states that any portion of a waste generated from a source listed in Category A of Schedule 2 of the NEMWA, may be excluded from being defined as hazardous on demonstration that such portion of waste in non-hazardous in accordance with the Waste Management and Classification Regulations of 2013. The application process will be in the form of a prescribed process and application must be made to the Minister. This Regulation is however not yet in force. National Norms and Standards for the assessment of waste for landfill disposal (23 August 2013): These norms and standards prescribe the requirements for the assessment of waste prior to disposal to landfill. The aim of the waste classification tests is to characterise the material to be deposited or stored in terms of the above-mentioned waste classification guidelines set by the Department of Environmental Affairs (DEA).

The outcomes of the tests provide the necessary information in terms of:

- Identification of chemical substances present in the waste.
- Determination of the total concentrations (TC) and leachable concentrations (LC) of the elements and chemical substances that have been identified in the waste and that are specified in Section 6 of the above-mentioned Regulations. The obtained TC and LC values of the waste material will be compared to the threshold limits for total concentrations (TCT limits) and leachable concentrations (LCT limits) specified in Section 6 of the above-mentioned Regulations. Based on the TC and LC values of the elements and chemical substances in the waste exceeding the corresponding TCT and LCT limits respectively, the specific type of waste for disposal to landfill will be determined in terms of Section 7 of the Regulations.

3.2.4 The National Environmental Management: Biodiversity Act

The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004, NEMBA), “provides for: the management and conservation of South Africa’s biodiversity within the framework of the NEMA; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute (SANBI); and for matters conducted therewith”.

In terms of the Biodiversity Act, the applicant has a responsibility for: The conservation of endangered ecosystems and restriction of activities according to categorization of the area (not just by listed activity as specified in the EIA regulations):Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with ecological sustainable development and protection of biodiversity.

Limit further loss of biodiversity and conserve endangered ecosystems.

Regulations published under the NEMBA also provide a list of protected species, according to the Act (GNR 151 dated 23 February 2007, as amended in GNR 1187 dated 14 December 2007). Section 57 of NEMBA identifies restricted activities involving threatened or protected species. Restricted activities include the gathering, collecting, cutting, uprooting, damaging or destroy a listed species.

3.2.5 The National Environmental Management: Protected Areas Act

The National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003) (NEMPAA) serves to: “provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological biodiversity and its natural landscapes and seascape; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; for the continued existence, governance and functions of South African National Parks; and for matters in connection therewith.

The objectives of this Act are –

- To provide, within the framework of the national legislation, including the National Environmental Management Act, for the declaration and management of protected areas.
- To provide for co-operation governance in the declaration and management of protected areas.
- To affect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity.
- To provide for a diverse and representative network of protected areas on state land, private land, communal land and marine water.
- To promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas.

- To promote participation of local communities in the management of protected areas, when appropriate
- To provide for the continued existence of South African National Parks.

3.2.6 National Water Act

The National Water Act, 1998 (Act 36 of 1998) (NWA) makes provision for two types of application for water use licenses, 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 license on the resource quality, and that such assessment be subject to the EIA regulations. 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.
- Authorised by a licensed.

The NWA defines 11 water uses. A water use may only be undertaken if authorised. Water users are required to register certain water uses that actually took place on the date of registration, irrespective of whether the use was lawful or not.

Section 21 of the National Water Act 1998 lists the following 11 water uses which can only be legally undertaken through the water use Authorisation issued by the Department of Water and Sanitation (DWS):

(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.
(k) Using water for recreational purposes.

No Water Use License has been applied for this project. DWS was engaged about this project so they can direct us whether it is viable or not to apply for water use license.

3.2.7 National Heritage Resources Act

The National Heritage Resources Act, 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 utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA and the DFA 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 development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008b).

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 account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 (Fourie, 2008b).

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 National Heritage Resources Act 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, 2008b).

The NHRA identifies 5 activities that require a Heritage Impact Assessment (HIA). An HIA is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon. An Archaeological Impact Assessment (AIA) only looks at archaeological resources.

An HIA must be done under the following circumstances:

(a) The construction of a linear development (road, wall, power line, canal etc.) exceeding 300 m in length.

(b) The construction of a bridge or similar structure exceeding 50 m in length.

(c) Any development or other activity that will change the character of a site and exceed 5 000 m2 or involve three or more existing erven or subdivisions thereof.

(d) Re-zoning of a site exceeding 10 000 m2.

(e) Any other category provided for in the regulations of SAHRA or a provincial heritage authority.

Human remains and burials are commonly found close to archaeological sites; they may be found in abandoned and neglected burial sites or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked on the surface. Archaeological and historical burials are usually identified when they are exposed through erosion, mining and earth moving activities for infrastructure developments such as powerlines and roads. In some instances, packed stones or stones may indicate the presence of informal pre-colonial burials.

The possibility of encountering burial sites is low as the site inspection revealed only modified lands. Furthermore, the community residing on the farm stated there are no graves within the boundaries of the proposed project area.

3.2.8 National Veld and Forest Fire Act 101 of 1998***

The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. The Act provides for a variety of institutions, methods and practices for achieving the purpose.

3.2.9 Conservation of Agricultural Resources Act 43 of 1983

3.2.10 Mpumalanga Nature Conservation Act 10 of 1998

3.2.11 Guideline document on public participation1

4. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

According to the IDP (2017 – 2022), mining contributes at least 11.9 % to the GVA of the municipality. The establishments of coal mines within the Municipality are steadily increasing.

Socio-economic information of the Msukaligwa Local Municipality provides an understanding of the need for economic development which is to further create employment opportunities. The individuals most affected by the proposed project are those who live in the Msukaligwa Local Municipality's rural nodes, which include Ermelo . Despite the presence of economic activities such as small-scale agricultural activities (crop and livestock farming) on adjacent lands, the majority of residents in the aforementioned villages remain unemployed and disadvantaged.

With the current power issues being experienced, this proposed project will supply coal to the local markets, thereby assisting with the alleviation of the shortage of supply given that the project location is in a rural area. The proponent is also looking is targeting Camden power station. The National Development Framework includes, in summary, the need to produce energy to support industry at competitive prices. Furthermore, the proposed Project will contribute to the local economy through job creation and procurement. Increased employment will lead to increased expenditure, tax base and royalties. In addition, the area of interest will have impact on agricultural activities.

The Applicant must firstly employ people from the affected wards. The Applicant will also provide skills development to employees thereby advancing the future employability of these individuals. The project further identifies community development projects from which the surrounding communities will benefit as a result of this project. As stated in the MPRDA, the Government's objective is to maximise the benefit of the nation's mineral resources for the benefit of all South Africans. By establishing a new mining operation, this objective can be accomplished, particularly through job creation. From an environmental perspective, the Applicant is willing to pursue open cast mining on a shallow coal reserve in an effort to reduce the environmental impacts.

From the environmental Impact Assessment, it was found that the proposed area is not utilized for any activity and it is believed that there is coal resource that should be exploited economically. Land capability refers the potential of land to support different land uses, and is determined by the physical, chemical and biological properties of the soils. In nature these qualities develop over millennia and are dependent on the type of underlying parent rock, the geographic locality, and climate. On rehabilitated land, the desired land capability is reinstated by re-creating the key fundamentals of what defines land capability (e.g., soil type, soil depth, soil texture, soil density, soil chemistry, topographic slope, and soil microbiology). Upon Rehabilitation, the land will be transformed to agricultural activities.

4 MOTIVATION FOR THE OVERALL PREFERRED DEVELOPMENT FOOTPRINT

The geology is the primary driver in determining the location for mining. After due consideration and conducting background and desktop studies, it was found that the coalfield lithology essentially comprises sediments of Vryheid Formations of the coal-bearing Ecca Group, Karoo Supergroup, with dolerite intrusions thus providing the ideal geological formation for the presence of the mineral applied for (see Figure 7 for the project geology).

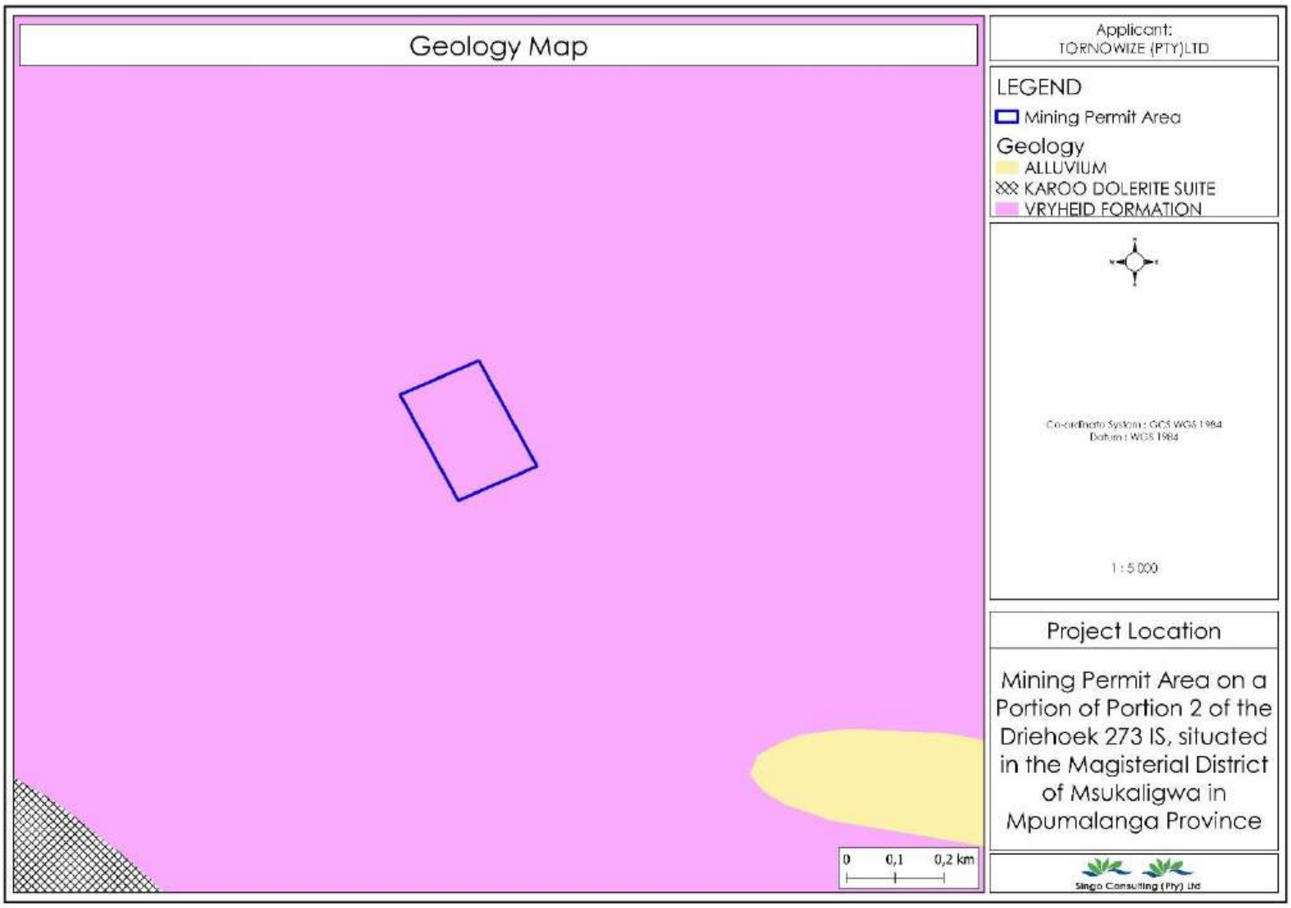


Figure 7: Geology map of the proposed project area (Singo Consulting GIS Team, 2023)

5 FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ALTERNATIVES WITHIN THE SITE

5.1 Details of Development Footprint Alternatives

The development footprint is 5 ha, which is the maximum legislated aerial extent that may be approved for a Mining Permit application in terms of the MPRDA, 2002 (as amended). The geology is the primary driver in determining the location for mining. As such, no assessment of alternative development scenarios was conducted.

5.1.1 Preferred Site

The application area has been selected based on historical and active coal mining operations in the surroundings of the application area along with historical and current data that indicate the economic viability of the Coal mineral to occur.

5.1.2 Type of Activity

The proposed activity is mining. The geology is the primary driver in determining the location for mining. As such, no activity alternative was considered.

5.1.3 Technology Alternatives

The method that will be employed is a very basic form of open cast mining, and a 5-ha area will be demarcated for mining activities. Ripping method will be used for soft material and blasting will only be used when hardrock is encountered. Subsequent mining of the orebody utilizing a truck and shovel operation will be conducted. The mined ore will be crushed and screened utilizing a mobile crushing and screening plant. A front- end loader will be utilized to load the material into haulage trucks. The ore will be processed within the site. Should the proposed mining activities change, this will be indicated in the form of a Section 102 Amendment Application of the MPRDA.

5.1.4 No-Go Alternative

Mining contributes greatly to local economic stimulation through direct employment, business opportunities, royalties and tax revenues. If the Coal reserves on the property are not mined, South Africa and the local communities will forego the benefits of the associated employment, business opportunities, royalties and tax revenues. Furthermore, according to the screening report generated, the area of interest has the area of interest is not utilized for anything and it allows mining activity to be conducted so that the area can be transformed to agricultural uses.

The no-go alternative entails no change to the status quo and should therefore not be considered. From the baseline environmental sensitivity conducted, and the site visit conducted the area would remain untouched and utilised only for grazing.

6 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

The Public Participation is the basis of any EIA process. The Public Participation Process (PPP) seeks to provide the opportunity for all stakeholders including potential players and all applicable I&APs, state departments, state bodies and the competent authority (CA) to register so that they can raise concerns, contribute to local knowledge, comment on the Draft Basic Assessment Report (DBAR) & Environmental Management Programme report (EMPr) but most importantly provide suggestions for enhanced benefits. Comments received during the Public Participation Process will be incorporated into the Final BAR & EMPr to be submitted to the competent Authority being the Department of Mineral Resources & Energy for adjudication.

6.1 Defining Stakeholders

The term public can be taken to mean any individual or group in society, including the government and business sector. Who or what is included in the "public" depends very much on activities under consideration. The term "stakeholder" helps clarify the meaning or "public" in the context of development activities.

A Stakeholder is any person, group of institution that has an interest in an activity, project or program. This includes both intended beneficiaries and intermediaries, those positively affected, and those involved and/or those who are generally excluded from the decision-making process.

Stakeholders can usefully be categorized in five main types:

- Directly affected people (who live or work where the project will be located)
- Indirectly affected people (who live nearby or use resources from the project area)
- Public sector agencies (ministries, provincial or local government, government mandated mass organizations)
- Private developers (private companies with a direct investment in the project) and their subcontractors and financiers
- Others (donors, NGOs with a stake in the project, external advisors, the business sector).

6.2 Objectives of the Public Participation

Main objectives for involving the public are:

- The identification of key issues of concern to the public, addressing public perceptions,
- The provision of local expertise and knowledge,
- The identification of possible alternatives/options,
- Ensuring that affected groups are involved at the very beginning of project design, and
- The critical review of documentation.

The separation of these objectives is somewhat artificial as the achievement of one will often depend upon the achievement of another.

6.3 Regulatory framework

- Chapter 6, regulation 40(2)(3) of EIA Regulations (GNR 326, 7 April 2017) requires that the PPP provides access to all information that may have the potential to influence the decision regarding the applications. It further outlines that the potential interested and affected parties (I&APs) be provided with an opportunity to comment on project reports and plans.
- The Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002) and EIA regulations 2014, published under Government Notice No. 982 in Gazette No. 3822 of 4 December 2014, amended on 7 April 2017.

6.4 Details of the Public Participation Process Followed

The stakeholder engagement process was initiated in July and employed several techniques to establish contact and raise awareness amongst stakeholders regarding the application.

6.4.1 Interested and Affected Parties Identification Procedure

The Interested & Affected Parties for this particular project were identified through telecommuting (via e-mail media communications and telecommunications). Other means of Identification & notification adopted was through the print media in a form of newspaper advert and placement of A2 size notices in prominent spaces.

6.4.2 Newspaper advertisements

A newspaper advertisement was placed and published in the local paper, Highvelder on the 07th of July 2023 to notify all the Interested & Affected Parties of the proposed project.

Plaaslike stoeiers neem deel aan SA's

Wayne van der Walt

Teghan Breytenbach en Du Toit Landman van die Ermelo Stoeiklub het die afgelope naweek aan die Suid-Afrikaanse Stoeikampioenskappe in die Kaap deelgeneem.

Du Toit het 'n brons medalje losgestoei en Teghan het 'n vyfde plek behaal.

Albei seuns het in die o. 17-vryslagafdeling meegeding.

Hul afrigter, Reghardt van Niekerk, het die seuns gelukgewens. "Dankie dat julle Ermelo Stoeiklub se naam hoog hou, julle maak ons trots!"

Lede van die Ermelo Stoeiklub oefen Maandae en Woensdae by die Ermelo Sport Inn.

Vir meer inligting of om aan te sluit, skakel Gisela Bisschoff by 082 551 0026.

Teghan Breytenbach en Du Toit Landman. Foto's | Verskaf

NOTICE OF PUBLIC PARTICIPATION FOR MINING PERMIT AND ENVIRONMENTAL AUTHORISATION APPLICATION

ISIZULU

Isicelo Semvume Yezimayini: **I-Tornowize (Pty) Ltd** ifake isicelo Semvume Yezimayini ku-DMRE Ref: **MP 30/5/1/1/3/13557 MP** ngenhloso yokumba **amalahle engxenyeni 2** yeFarm **Driehoek 273 IS**, endaweni yeMantshi yesiFunda sase-Ermelo esifundazweni saseMpumalanga.

ISIMEMO SOKUPHAWULA NOKUVEZA IMIBONO MAYELANA NALE APPLICATIONI

Isaziso sinikeziwe ngokoMthetho Wokuthuthukiswa KweziMbiwa kanye Nezamafutha (MPRDA) (uMthetho wama-28 ka-2002) kanye nemithethonqubo ye-EIA ka-2014, eshicilelwe ngaphansi kweSaziso Sikahulumeni No. 982 kuGazethi No. ukuthi i-Tornowize (Pty) Ltd ifake isicelo Semvume Yezimayini yale mineral eshiwo ngenhla ene-**DMRE Ref: MP 30/5/1/1/3/13557 MP.**

Njengengxenye yenqubo ye-EIA, ikakhulukazi inqubo yokubamba iqhaza komphakathi kule phrojekthi ehlongozwayo, Abanentshisekelo Nabathintekayo (I&APs) bayamenywa ukuba babhalise futhi bathumele ngomusa noma yikuphi ukuphawula noma ukukhathazeka ukuze kufinyelele **uNksz Takalani Rakuambo.**

Umphakathi uyamenywa futhi ukuthi ubuyekeze futhi uphawule ngoMbiko Owuhlaka Wokuhlola Okuyisisekelo (BAR) kanye nombiko woHlelo Lokuphathwa Kwemvelo (EMPr). Uhlaka lwe-BAR & EMPr luzotholakala ukuthi lubuyekezwe esikhathini sekhalenda lezinsuku ezingu-30 **UMsombuluko zingama-07 ku-Agasti 2023 kuze kube uLwesithathu zingama-06 kuSepthemba 2023 (Ngaphandle Kwamaholide Omphakathi). Lo mbiko uzotholakala kuMasipala Wendawo waseMsukaligwa (Corner Kerk noTaute Street, 2351) nase-Ermelo Library (-26.521709, 29.994143)** futhi ngaphezu kwalokho, amakhophi e-electronic (nge-imeyili; Dropbox link; Google drive; We Transfer, njll.) yenziwe yatholakala ngesicelo esivela kwa-Singo Consulting (Pty) Ltd, kusetshenziswa imininingwane yokuxhumana ye-EAP Miss Takalani Rakuambo ngezansi. **Amazwana nge-DBAR & EMPr kufanele athunyelwe ngaphambi komhla zi-06 ku-September 2023.**

ENGLISH

Application for Mining Permit: **Tornowize (Pty) Ltd** has lodged an application for a Mining Permit with **DMRE Ref: MP 30/5/1/1/3/13557 MP** for the purpose of extracting **Coal** on **portion of portion 2 of the Farm Driehoek 273 IS,** situated in the Magisterial District of Ermelo in Mpumalanga Province.

INVITATION TO COMMENT

Notice is hereby given in terms of the Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002) and EIA regulations 2014, published under Government Notice No. 982 in Gazette No. 3822 of 4 December 2014, amended on 7 April 2017 and by GN 517 on 11 June 2021, that **Tornowize (Pty) Ltd** has applied for a Mining Permit for the above-mentioned mineral with **DMRE Ref: MP 30/5/1/1/3/13557 MP.**

As part of the EIA process, more especially the public participation process for this proposed project, Interested and Affected Parties (I&APs) are invited to register and kindly submit any comments or concerns to reach **Miss Takalani Rakuambo.**

The public is also invited to review and comment on the Draft Basic Assessment Report (BAR) and Environmental Management Programme report (EMPr). The draft BAR & EMPr will be available for review for 30 days calendar period **Monday the 07th of August 2023 until Wednesday the 06th of September 2023 (Excluding Public Holidays). This report will be available at Ermelo Library (-26.521709, 29.994143) and Msukaligwa Local Municipality (Cnr Kerk & Taute Streets, Ermelo, 2350)** and furthermore, electronic copies (via email; Dropbox link; Google drive; We Transfer, etc.) will be made available upon request from Singo Consulting (Pty) Ltd, using the contact details of the EAP Miss Takalani Rakuambo below. **Comments on the DBAR & EMPr must be submitted no later than 06th September 2023.**

EAP DETAILS:

Singo Consulting (Pty) Ltd

Physical Address: Office 870, 5 Balalaika Street, Tasbet Park Ext 2, Witbank, 1040
Contact person: Miss Takalani Rakuambo
Cell No.: +27 82 767 4011
Tel No.: +27 13 6920 041
Fax No.: +27 86 5144 103
Email: takalani@singoconsulting.co.za

APPLICANT DETAILS:

Tornowize PTY (LTD)

Physical address: 50 Toerien Street, Klipfontein, eMalahleni, 1035
Contact person: Sonwabo Debedu
Tel No.: +27 13 692 4378
Email: sonwabo@tornowize.co.za

ERM

NOTIFICATION OF ENVIRONMENTAL AUTHORISATION PROCESS

Notice is hereby given of a Public Participation Process (PPP) to be undertaken in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA, 1998), as amended.
DFFE Reference(s): To Be Confirmed
Development Title: Proposed Cluster Wind Energy Facility (WEF) and associated Infrastructure, between Ermelo and Amsterdam, Mpumalanga Province.
Nature of Activity: The Project Developer, under the Special Purpose Vehicles, namely Rochdale Wind Energy Facility (Pty) Ltd, Sheepmoor Wind Energy Facility (Pty) Ltd, and Emvelo Wind Energy Facility (Pty) Ltd, intend to submit separate applications for Environmental Authorisation (EA) for the proposed Rochdale WEF, Emvelo WEF and Sheepmoor WEF including their associated infrastructure. The proposed WEFs will include between 25 – 45 turbines each with a maximum output capacity of up to 240 MW and an anticipated lifespan of 20 – 25 years. The WEFs will all connect directly into National Eskom Grid via the Eskom Camden Substation. Each WEF will apply for authorisation of a proposed grid connection route to connect to the existing Eskom Camden Substation, via approximately 20 – 31 km long 132 kV overhead transmission lines.
Development Location: The preferred project site (for all 3 WEFs) is approximately up to 150 ha, and is located between 15 - 30 km east of the town of Ermelo in Mpumalanga Province and falls within the Msukaligwa Local Municipality and Gert Sibande District Municipality.
Application Process: The respective applications will follow a full Scoping and EIA (S&EIA) process as the generation capacity will be more than 20 MW and the associated grid connection may be included in the WEF application or be subjected to a separate Basic Assessment process according to the NEMA, 1998, as amended.
Anticipated NEMA Listing Notice Activities for the respective Amsterdam Cluster WEF and Grid Connection Application are:

Listing Notice	Activities
LN 1 GN R327	11(i), 12(ii)(a)(c), 14, 19, 24(ii), 27(i)(ii), 28(ii), 48 (i)(a)(c), 56(ii)
LN 2 GN 325	1, 15
LN 3 GN R324	4 (f)(i)(bb)(ee), 10(f)(i)(bb)(ee), 12 (f)(ii), 14 (ii)(f)(i)(bb) (ff), 18 (f) (i) (bb)(ee), 23 (ii)(a)(c)(f)(ii)(bb)(ee)

In terms of Section 21 of the National Water Act (NWA) (36 of 1998), as amended, the developments may potentially require water use license.
If required, an application for Water Use License will be submitted to the Department of Human Settlement and Water and Sanitation for authorisation.
The EA Applications and respective Reports will be submitted to the competent authority, the Department of Forestry, Fisheries and the Environment (DFFE), for a decision. Notification of submission of the Draft and Final Reports, and any other correspondence required to be included as part of the PPP, will be sent to all registered Interested and Affected Parties (I&APs). The Draft reports will also be made available for public review and comment once completed (exact date and location of availability to be confirmed in notification to all registered I&APs). Should you wish to be registered as an I&AP, please submit your name, interest in the project, email and postal address and telephone number in writing to the below address.

KENNISGEWING VAN OMGEWINGSMAGTIGING-PROSES EN WATERGEBRUIK-LISENSIE AANSOEKPROSESSE

Kennis word hiermee gegee van 'n Openbare Deelname Proses (PPP) wat onderneem moet word ingevolge die Wet op Nasionale Omgewingsbestuur (NEMBA) (Wet Nr. 107 van 1998), soos gewysig.
DFFE Verwysing(s): Moet nog bevestig word
Ontwikkelingstitel: Voorgestelde Loxton Wind Energie Fasiliteit (WEF) en verwante infrastruktuur, tussen Ermelo en Amsterdam, Mpumalanga.
Aard van Aktiwiteit: Die Projek Ontwikkelaar, onder die Spesiale Doelvoertuig, naamlik Rochdale Wind Energie Fasiliteit (Pty) Ltd, Sheep Moor Wind Energie Fasiliteit (Pty) Ltd, en Emvelo Wind Energie Fasiliteit (Pty) Ltd, beaam om aparte aansoeke ter Omgewingsmagtiging (EA) in te dien vir die voorgestelde Rochdale WEF, Emvelo WEF en Sheepmoor WEF en die geassosieerde infrastruktuur. Die WEFs sal tussen 25 – 45 turbines, met 'n maksimum uitset kapasiteit tot 240 MW elk, en 'n verwagte leeftyd van 20 – 25 jaar hê. Die WEFS sal almal direk aansluit by die Nasionale Eskom Netwerk via die Eskom Camden Substasie. Elke WEF sal vir magtiging van 'n voorgestelde netwerkverbinding aansoek doen om to bind met die Eskom Camden Substasie, via ongeveer 20 – 31 km lang 132 kV oorhoofse transmissielyne.
Ontwikkelingsligging: Die voorgekeurde projekligging (vir al 3 WEFs) is ongeveer 150 ha, en geleë tussen 15 – 30 km oos van die dorp Ermelo in Mpumalanga, en val onder die Msukaligwa Plaaslike Munisipaliteit en Gert Sibande Distrik Munisipaliteit.
Aansoekproses: Die onderskeie aansoeke sal 'n volledige Omvangbepaling en EIA (S&EIA) proses volg as die opwekkingkapasiteit meer as 20 MW is, en die geassosieerde netwerkverbinding mag ingesluit word in die WEF aansoek of onderhewig wees aan 'n aparte Basiese Assesseringsproses volgens die NEMA, 1988, soos gewysig.
Verwagte NEMA Noteringskennisgewing Aktiwitieit vir die onderskeie Amsterdam Groeperings WEF en Netwerkverbinding Aansoek is:

Noterings-kennisgewing	Aktiwiteite
LN 1 GN R327	11(i), 12(ii)(a)(c), 14, 19, 24(ii), 27(i)(ii), 28(ii), 48 (i)(a)(c), 56(ii)
LN 2 GN 325	1, 15
LN 3 GN R324	4 (f)(i)(bb)(ee), 10(f)(i)(bb)(ee), 12 (f)(ii), 14 (ii)(f)(i)(bb) (ff), 18 (f) (i) (bb)(ee), 23 (ii)(a)(c)(f)(ii)(bb)(ee)

Ingevolge Artikel 21 van die Nasionale Waterwet (NWA) (Wet 36 van 1998), soos gewysig, kan die ontwikkeling moontlik 'n lisensie vir watergebruik vereis. Indien nodig, sal 'n aansoek om lisensie vir watergebruik aan die Departement van Water en Sanitasie (DWS) ingedien word.
Die Omgewingsmagtigings Aansoek en onderskeie verslae sal aan die bevoegde owerheid, die Departement van Bosbou, Visserye en die Omgewing (DFFE), voorgelê word vir 'n besluit. Kennisgewing van die indiening van die konsep- en finale Verslae, en enige ander korrespondensie wat as deel van die Openbare Deelname Proses (PPP) ingesluit moet word, sal aan alle geregistreerde Belanghebbende en Geaffekteerde Partye (B&GP's) gestuur word. Die Konsep Verslae sal beskikbaar gestel word vir openbare oorweging en kommentaarlewering sodra dit ingedien is (die presiese datum van beskikbaarheid van elke aansoek om bevestig te word in kennisgewing aan alle geregistreerde B&GP's).

Environmental Resource Management Southern Africa (Pty) Ltd
Referance/Verwysing: Amsterdam Cluster WEFs
E-mail/E-pos: erm.arcusamsterdam@erm.com
Post/Pos: Postnet Suite 90, Private Bag X12, Tokai, 7966

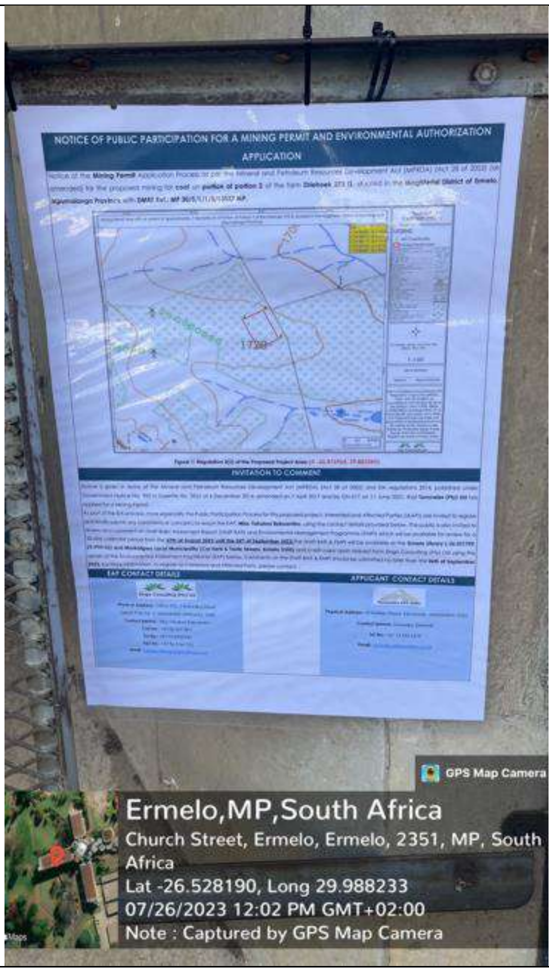
Contact Person / Kontak Persoon: Aneesah Alwie
Telephone / Telefoon: (+27)10 596 3495

Online Registration / Aanlyn Registrasie: https://amsterdamclusterwef.aidaform.com/stakeholder-engagement
Correspondence throughout the Application Processes will only be distributed to Registered I&APs. Registration is possible throughout the Application Processes.
Notice regarding the Protection of Personal Information Act (PoPI Act 4 of 2013, as amended)
If you request to register as an I&AP, your personal information will be made available to the Competent Authority and the Appellant in the case of an appeal, and an applicant/EAP/independent person for purposes of being informed and given access to an audit report.

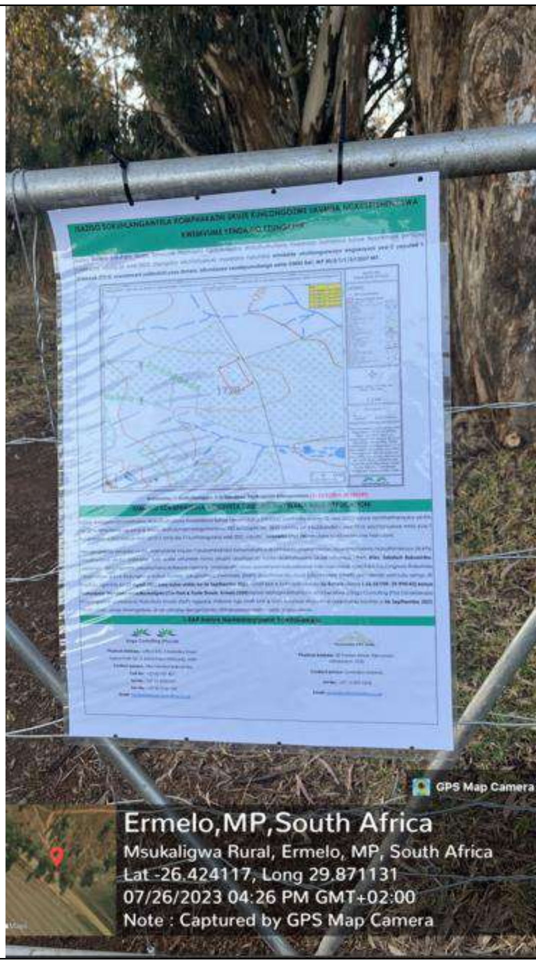
6.4.3 Public Space Notices

A2 size notices were placed in farm Boundaries, adjacent properties and places often frequented by community members such as Msukaligwa Local Municipality, Msukaligwa Public Library & Ermelo Town.

Plugging of notices




GPS Map Camera
Ermelo,MP,South Africa
Church Street, Ermelo, Ermelo, 2351, MP, South Africa
Lat -26.526083, Long 29.986964
07/26/2023 12:39 PM GMT+02:00
Note : Captured by GPS Map Camera


GPS Map Camera
Ermelo,MP,South Africa
Msukaligwa Rural, Ermelo, MP, South Africa
Lat -26.424117, Long 29.871131
07/26/2023 04:26 PM GMT+02:00
Note : Captured by GPS Map Camera

WinDeed Database D/O Property - List

Lexis® WinDeed

IS, 273, MPUMALANGA

SEARCH CRITERIA			
Search Date	2023/06/07 01:30	Farm Number	273
Reference	-	Registration Division	IS
Report Print Date	2023/06/07 01:31	Portion Number	-
Farm Name	Driehoek	Remaining Extent	NO
Deeds Office	Mpumalanga	Search Source	WinDeed Database

PORTION LIST

Portion	Owner	Title Deed	Registration Date	Purchase Price (R)
0	NTIONL GOVERNMENT REPUBLIC OF SOUTH FRIC			
1	FAMHIRST ESTATE PTY LTD			
2	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA			
3	MARMIC TRUST			
4	IAN COCKCROFT TESTAMENTARY TRUST			
5	BOTHMA JAN HENDRIK			
6	NTIONL GOVERNMENT REPUBLIC OF SOUTH FRIC			
7	FAMHIRST ESTATE PTY LTD			
8	BOTHMA JAN HENDRIK			
10	COCKCROFT VINCENT ALLAN			
11	COCKCROFT VINCENT ALLAN			
12	SOUTH AFRICAN NATIONAL ROADS AGENCY LTD			

6.4.4 Conclusion of the consultation process followed.

Background Information Documents (BIDs) will be provided to Governmental Departments, to introduce the project and to invite them to forward views, comments and recommendations about the project. Stakeholder engagement & consultation through BID.

The Draft BAR and EMPR review period will be on the Monday the 07th of August 2023 until Wednesday the 06th of September 2023. The BAR (this report) will be made available to Interested and Affected Parties (I&AP's) for comment for 30 days period. All comments received during this period will be included in the final BAR & EMPr to be submitted to the DMRE for adjudication.

Hard copies of the Draft BAR and EMPr will be submitted to organs of state and relevant authorities i.e Mpumalanga Tourism Parks Agency (MTPA), Department of Agriculture, Land Reform and Rural Development (DALRRD) and South African National Roads Agency Ltd (SANRAL) Additionally, copies will be made available at the following places: Msukaligwa Local Municipality & Msukaligwa Public Library. The electronic copies (via emails; Dropbox link; Google drive; WeTransfer, etc) will be made available upon request from Singo Consulting (Pty) Ltd, using the contact details of the EAP.

6.4.5 The following authorities have been identified and notified of the proposed Mining Permit project:

- Msukaligwa Local Municipality.
- Gert Sibande District Municipality
- Mpumalanga Department of Rural, Environmental and Agricultural Development.
- Mpumalanga Department of Water and Sanitation.
- Mpumalanga Department of Rural Development and Land Reform.
- Mpumalanga Department of Agriculture, Forestry and Fisheries.
- Mpumalanga Department of Mineral Resources and Energy.
- Mpumalanga Tourism Parks Agency
- National Department of Environmental Affairs.
- South African National Roads Agency Ltd (SANRAL).
- South African Heritage Resources Agency.
- Eskom SOC Limited.

6.4.6 Consultation and Correspondence with I & Ap's and Stakeholders

All comments received from I&APs and organs of state and responses sent thus far.

6.5 Summary of issues raised by I&APs

Interested and Affected Parties **List the name of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted**		**Date Comments Received (Call, Fax, emails)**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
AFFECTED PARTIES					
Landowner/s					
National Government of the Republic of South Africa	**X**		No issue raised.	Consultation email was sent with BID (10/07/2023)	Refer to Appendix 5: Stakeholder Consultation
Adjacent Landowner					
Local Municipality:					
	X		No issue raised yet,	BID was shared along with consultation email 07th of July 2023.	Refer to Appendix 5: Stakeholder Consultation

	x		No issue raised yet,	BID was shared along with consultation email 07th July 2023.	Refer to Appendix 5: Stakeholder Consultation
Organs of state (Responsible for infrastructure that may be affected: Roads, Departments, Eskom, Telkom& DWS)					
Eskom	x	(02/08/2023) email	Eskom Distribution services are not affected by this application.	comment will be aligned with the BAR & EMPr.	Refer to Appendix 5: Stakeholder Consultation
TRANSNET	x		No issue raised yet,	BID was shared along with consultation email 07th of July 2023.	Refer to Appendix 5: Stakeholder Consultation
Communities					
Tribal leaders					
There are no tribal leaders					
Dept. of Environmental affairs					
environmental affairs Department: Environmental Affairs REPUBLIC OF SOUTH AFRICA	x		No issue raised yet,	BID was shared along with consultation email 07th of July 2023.	Refer to Appendix 5: Stakeholder Consultation
Dept. Agriculture, land reform & rural development					
agriculture, land reform & rural development Department: Agriculture, Land Reform and Rural Development REPUBLIC OF SOUTH AFRICA	x		No issue raised yet,	BID was shared along with consultation email 07th of July 2023.	Refer to Appendix 5: Stakeholder Consultation

forestry, fisheries & the environment Department: Forestry, Fisheries and the Environment REPUBLIC OF SOUTH AFRICA	**X**		No issue raised yet	BID was shared along with consultation email 26th of July 2023.	Refer to Appendix 5: Stakeholder Consultation
water & sanitation Department: Water and Sanitation REPUBLIC OF SOUTH AFRICA	**X**		No issue raised yet	BID was shared along with consultation email 10th of July 2023.	Refer to Appendix 5: Stakeholder Consultation**Error! Reference source not found.**
Mpumalanga TOURISM AND PARKS AGENCY					
SAHRA					
	X		No issue raised yet,	20/07/2023 Online application was completed on Sahra website.	Refer to Appendix 6**Error! Reference source not found.** for full consultation.
Other Interested & Affected Parties					
Qhubeka Mining	**X**		No issue raised yet,	BID was shared along with consultation face to face 26th of July 2023.	Refer to Appendix 5: Stakeholder Consultation

7 ENVIRONMENTAL ATTRIBUTES AND ASSOCIATED ALTERNATIVES

The environmental attributes described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects.

8 The Baseline Receiving Environment

This section describes the baseline receiving environment of the Mining Permit application area. Information in this section is based on specialist studies undertaken in support of this application, desktop studies and a site visit by the EAP as well as input from the public through the I&AP questionnaire. As such, the descriptions below of environmental features represent a consolidation of relevant information to the application area.

8.1 Socio Economic Environment

Reference to the following section has been made from Msukaligwa Amended Integrated Development Plan 2020-2021.

Msukaligwa local Municipality is located in Gert Sibande District Municipality in Mpumalanga characterized by sensitive natural environment including water catchment areas that supply water to major rivers like, Vaal River, Usutu River and others. Together with Chief Albert Luthuli Local Municipality at the North to Eastern borders of Msukaligwa, both municipalities have been identified in terms of the Mpumalanga Biodiversity Conservation Plan as an important area of Biodiversity and Water resources. According to MBCP, 31% of Msukaligwa and Chief Albert Luthuli Municipal area contributes significantly towards the Biodiversity Conservation targets for the province thus presenting high potential for Tourism Development and growth (IDP 2016).

Figure 8: Locality map of Msukaligwa Local Municipality. Source: ELM IDP 2019/2020.

Population demographics

population pyramids for the year 2011 and 2016 according to age groups. When comparing the 2011 and 2016 population pyramids, it is evident that there is a significant change on the population growth patterns between the age groups 5 to 29 years. The most significant changes appear in the age groups 25 – 29 with a significant increase while age group 5 – 19 shows a decrease. Though the age group 20 – 24 almost remained the same between 2011 and 2016, there is a great increase on both males and females on the age groups 25 - 34 who are the youth population which may suggest in migration for job opportunities as this group forms a larger part of the labour market (IDP 2013/2016).

Educational Levels

Statistics South Africa, 2016 Community Survey data indicates that the population in Msukaligwa aged 20 and above completed grade 12 which is an increased from 33 673 in 2011 to 43 234 (increase of 9 561) in 2016 being an increase of 28.4% for the period under review. Msukaligwa grade 12 pass rates improved from 74.1% in 2011 to 77.8% in 2016, which was the 3rd highest in the District and 7th lowest of the municipal areas of the Province. According to basic education data obtained from the District Municipality's IDP, Grade 12 pass rate for Msukaligwa was 82.3% and 80% in 2017 and 2018 respectively which show a decrease and remains a concern.

Education Indicators	2011	2016
Number of people 15+ with no schooling	12 213	11 030
% Population 15+ with no schooling	8.2%	9.6%
% Population 15+ with matric and post matric qualification (%)	23.6%	39.6%
% Functional Literacy rate (%)	51.4%	42.7%

Figure 9: Statistics South Africa, 2011 and 2016

Educational Facilities

Educational facilities within Msukaligwa municipality and as indicated only one FET College is located within the municipality. Taking into consideration the way in which the municipality is growing and the shortage of skills within communities, there is a need for at least a tertiary institution within the district.

Educational facilities	
Facility	**Number**
No. of Primary Schools	71
No. of High School	6
No. of Combined Schools	12
No. of Secondary Schools	11
No. of Tertiary Education Facilities	0
No. of FET Colleges	1
No. of Training Centres/Adult Education	9
No. of Private Schools	3
Day Care Centres	40

Figure 10: Municipality, Dept of education & dept. of Social Development

Employment Status

labour force comparison within Msukaligwa Municipality for the period 2011 to 2016.Unemployment rate stood at 23.6% in 2016 which is a decreased of 3.2% to 26.8% in 2011. The economically active persons are showing a reduction in 2016 when compared to 2011 which may imply that people are being absorbed by the labour market or retiring shows an increase on those persons that are not economically active. There is still a lot be done in dealing with the unemployment challenge which the local municipality, district municipality, business/private sector and government sectors should collectively work together to develop strategies that will deal with this problem.

Concluding Remarks

The socioeconomic data included in this portion of the study helps readers comprehend the necessity of economic growth in order to further increase the number of job opportunities. The community living close to or surrounding the project area will be the ones most impacted by the proposed project. Although there is agricultural activity as well as natural vegetation and grains.

This project will bring potential of economic growth and Job opportunity.

8.2 Geology

According to the PWP produced for the Driehoek 273 IS, the proposed project area follows under the main Karoo supergroup. The geology of the study site is characterized by Vryheid Formation under Ecca group.

Karoo Supergroup

The sedimentary part of the Karoo Supergroup is subdivided into four main lithostratigraphic units, which from the base up are the Dwyka, Ecca, Beaufort and Stormberg (Molteno, Elliot and Clarens formations) groups (Johnson et al., 1996; SACS, 1980;). These are capped by some 1.4 km of basaltic lavas of the Drakensberg Group (Johnson et al., 1996; Veevers et al., 1994), the extrusion of which is related to the break-up of Gondwana (Cox, 1992). The basement to the Karoo Supergroup fill in both the MKB and in the northern basins is heterogeneous (Bordy et al., 2004a; Hancox, 1998; Rutherford, 2009) and this heterogeneity plays a significant control on the nature of the fill, particularly during the early phases of the deposition of the Karoo Supergroup.

Dwyka Group

The rocks of the Dwyka Group in South Africa are amongst the most important glaciogenic deposits from Gondwana. This Group is named for exposures along the Dwyka River east of Laingsburg and forms the basal succession of the Karoo Supergroup. Dwyka Group strata are mostly contained within bedrock valleys incised into Archean to lower Palaeozoic bedrock (Visser, 1990; Visser and Kingsley, 1982; Von Brunn, 1996). The lithologies in the areas underlying the coalfields of South Africa consist of a heterolithic arrangement of massive and stratified polymictic diamictites, conglomerates, sandstones, and dropstone-bearing varved mudstones. The easily identifiable lithologies form a good marker below the coal bearing Ecca Group. In the distal sector of the MKB these sedimentary strata accumulated largely as ground moraine associated with continental ice sheets and is generally composed of basal lodgement and supraglacial tills. These deposits are generally massive, but crude horizontal bedding occurs in places towards the top (Tankard et al., 1982).

Ecca Group

In the 1970s a number of studies (Cadle, 1974; Hobday, 1973, 1978; Mathew, 1974; Van Vuuren and Cole, 1979) showed that the Ecca Group could be subdivided into several informal units based on the cyclic nature of the sedimentary fills. In 1980 the South African Committee for Stratigraphy (SACS, 1980) introduced a formal lithostratigraphic nomenclature for the Ecca Group in the northern, distal sector of the MKB, which replaced the previously used informal Lower, Middle and Upper subdivisions with the Pietermaritzburg Shale Formation, the Vryheid Formation, and the Volksrust Shale Formation.

Witbank Coalfield

The Witbank Coalfield extends from Brakpan in the west through to Belfast in the east. The northern boundary is a very irregular sub-crop against the pre-Karoo basement rocks of predominantly Waterberg sandstones with the most northerly limit about 15km NW of Witbank, with many “inlets” to the east and west. The south boundary is a prominent pre-Karoo felsite contact called the Smithfield ridge. This basin was first exploited in the late 1800s in the Brakpan (Apex Mines) region and has been the focus of concerted exploration and exploitation ever since. The basin is a multiple seam deposit type with the development of five major seam horizons which may in places be composite seams. The major controls for the development of the coal are proximity to undulations of the “basement” topography, through erosion channelling and sediment influx into swamp beds and finally erosion of the current erosion surface. The primary economic coal seams have been the No. 2 Seam and No. 4 Lower Seam and, in places, the No. 5 Seam. Structurally, the coal horizons are un-deformed with each displaying a very slight dip to the southeast of less than a degree and minor discrete faulting events that have a southwest to northeast trend of graben features and other minor faulting events. The most distinctive post-depositional feature is the intrusion of dolerites related to the Lesotho Basalts that have resulted in a variety of sills and dykes of various ages. The most prominent of the dykes is the Ogies dyke, a 12 to 20m thick essentially vertical intrusion with an east-west strike. The No. 4 Dolerite sill, a 20 to 70m thick multiple flow event, has a preferential intrusion horizon above the No. 5 coal Seam, but in places it transgresses through the coal bearing strata to the pre-Karoo basement and forms in other places a barrier to erosion.

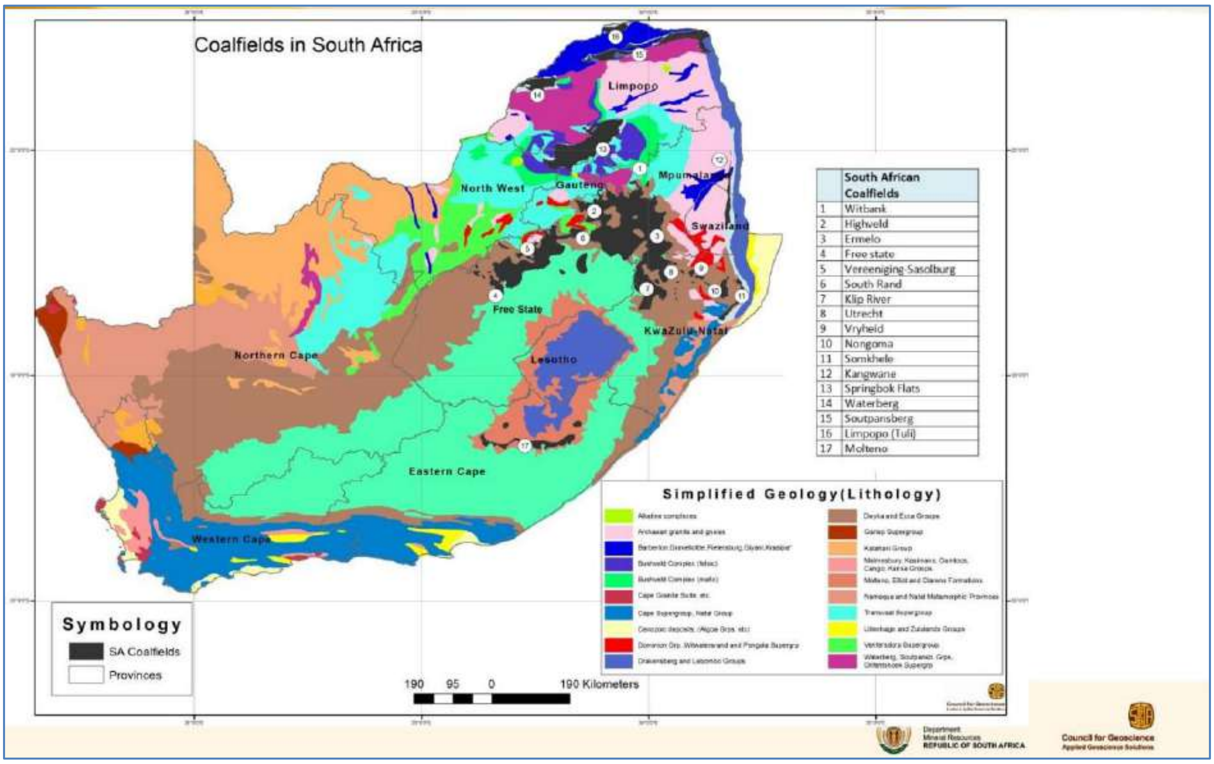


Figure 11: Witbank coalfield (1) (adopted from Hancox and Gotz, 2014).

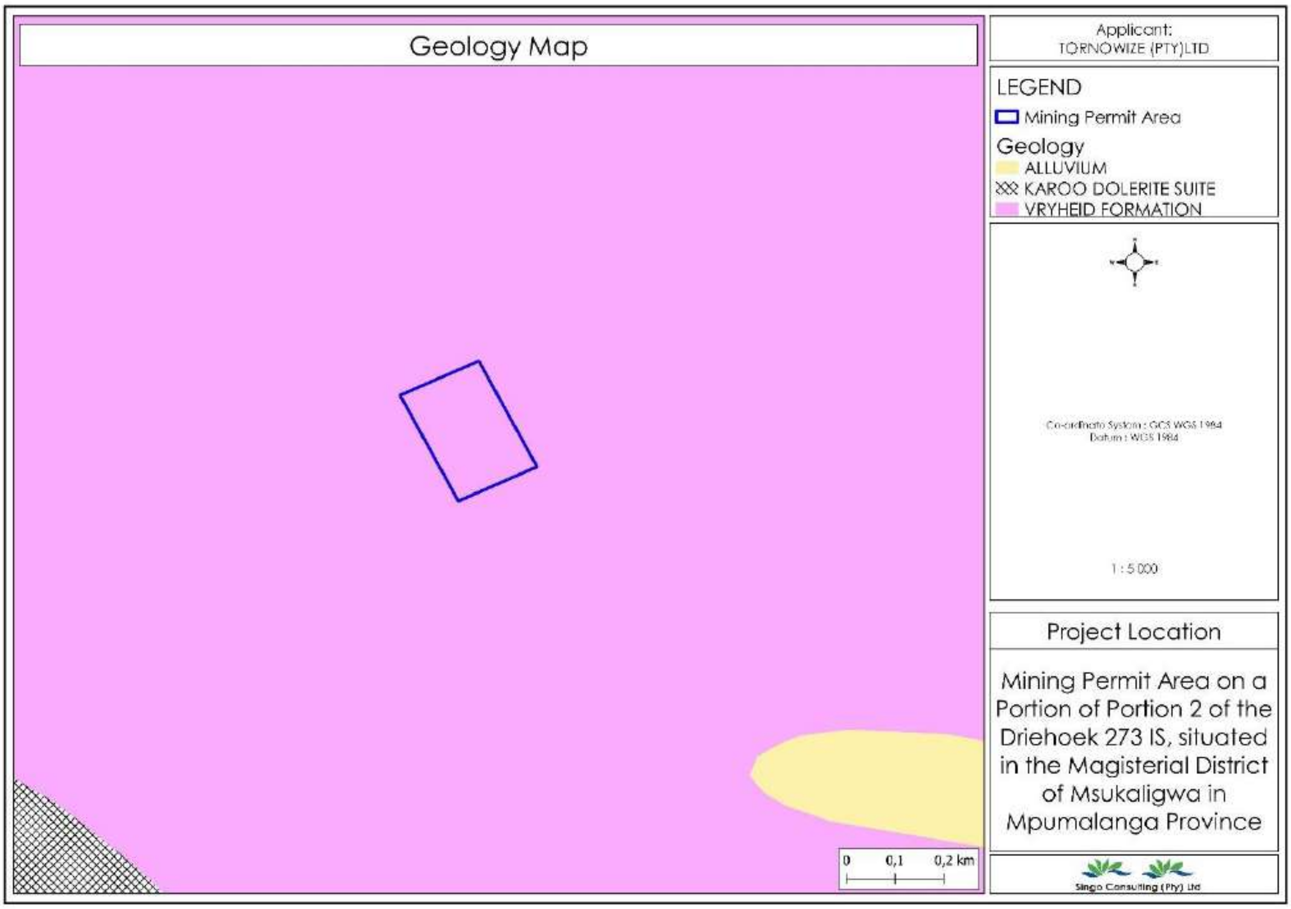


Figure 12: Geology of the proposed project (Singo Consulting GIS Team, 2023).

8.3 Soils

Soil study was undertaken by a specialist at Singo consulting as attached on Appendix. The soil classes map in Figure 13 below, shows that the mining permit area is largely covered Association of Classes 1 to 4: Undifferentiated structureless soils.

Soil class	Favourable properties	Limitations
Association of Classes 1 to 4: Undifferentiated structureless soils	Favourable physical properties	One or more of: low base status, restricted soil depth, excessive or imperfect drainage, high erodibility.

Soil chemical conditions of the study area

The main aim for soil sampling is to identify the soil moisture, colour, consistency, structure, soil type and origin (MCCSSO) of the soil.

Site pictures and description

Site pictures and equipment's	Description
The equipment's used included: • Auger/TLB • plastics, • shovel, • GPS, • Buff tags, • Sampling forms. • Cable ties	Operation of soil Sampling Selecting an acceptable sampling location, then collecting a soil sample with an Auger/ TLB while identifying the different layers of soil in the area are all part of the method. The soil samples are stored in various plastics and recorded before being sent to the lab for analysis. Some of the types of analyses undertaken include pH (alkalinity and acidity), Soil Texture Composition, and Chemical Compositions.
	The Auger was used to remove ground samples and capture the many different strata found underground. Soil samples were collected to determine chemical composition, soil texture, pH level, and soil nutrients.

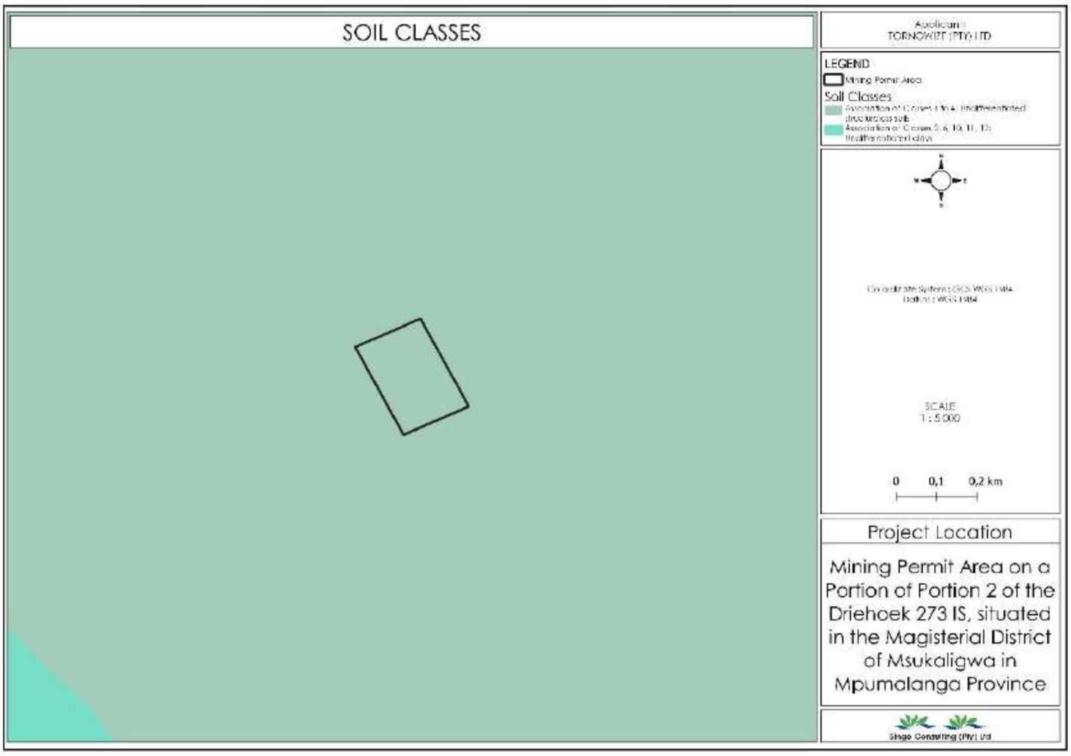


Figure 13: Soil classes map for the project area (Singo Consulting GIS Team, 2023).

8.4 Land Capability

The Land capability classification is one of several interpretation groups that was made for agricultural purposes. As with all the interpretation groups, the land capability classification starts with one soil-mapping unit, which is the building block of the system.

The land capability is classified into grazing, arable and wilderness. In this classification the arable soils are grouped according to their potentialities and limitations for sustained production of the common cultivated crops that do not require specialized site conditioning or site treatment. Nonarable soils (soils unsuitable for long time sustained use for cultivated crops) are grouped according to their potentialities and limitations to produce permanent vegetation and according to their risks of soil damage if mismanaged. The land capability of the proposed area is classified as an arable land and grazing. Arable land is any land capable of being ploughed and used to grow crops.

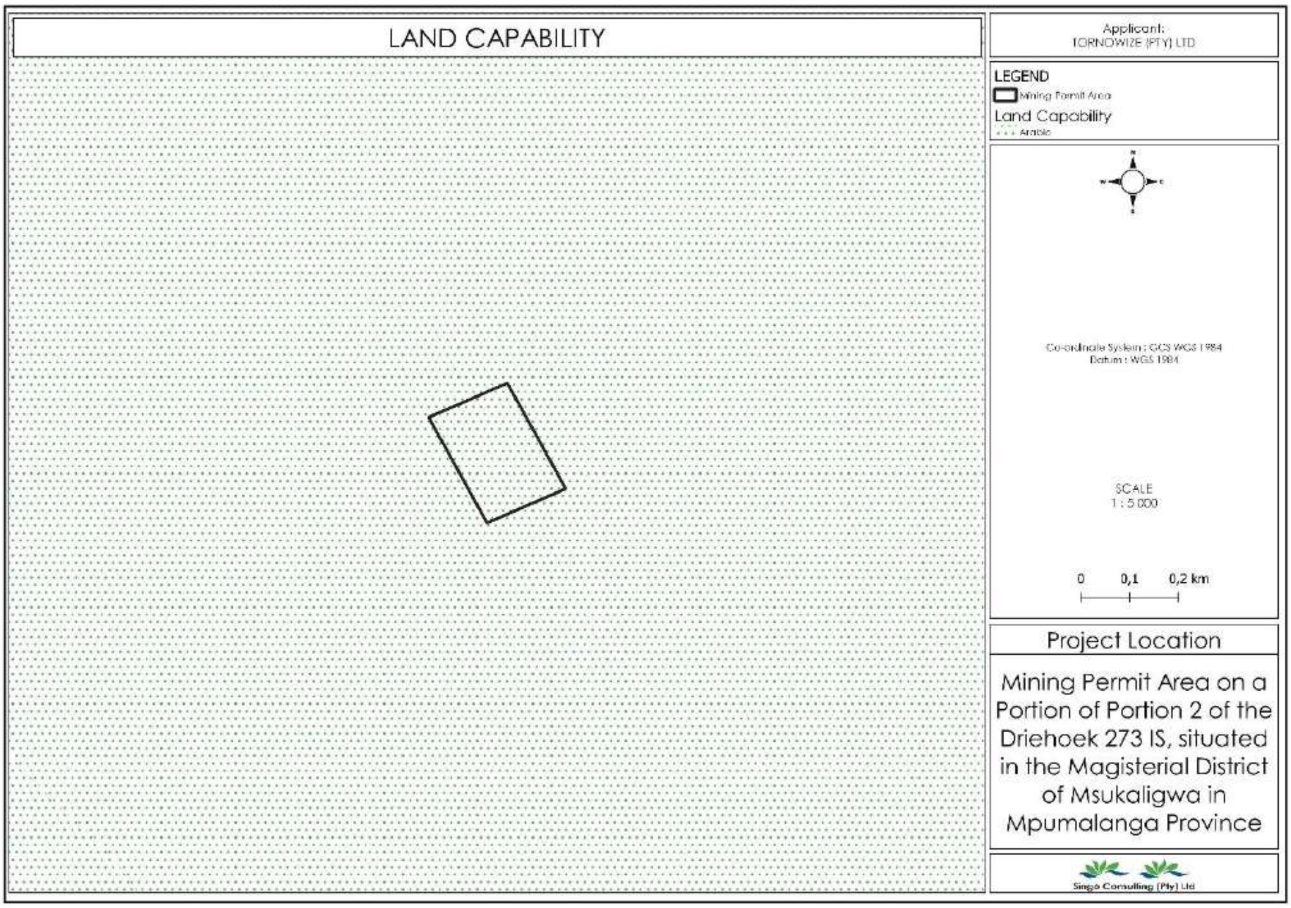


Figure 14: Land Capability map of the project area (Singo Consulting GIS Team, 2023).

8.5 Climate

Climate is the state of the atmosphere over a long period of time, such as over years, decades, centuries or greater and weather is defined as atmospheric conditions of an area over a short period of time (Naomi, 2004). Climate for the purpose of the study is chosen based on the fact that it does not change over a long period of time whereas weather conditions fluctuate more rapidly, and its data cannot be relied upon. In Ermelo, the wet season is comfortable and partly cloudy and the dry season is cool and mostly clear. Over the course of the year, the temperature typically varies from -1°C to 23°C and is rarely below -4°C or above 26°C (https://weatherspark.com/, n.d.)

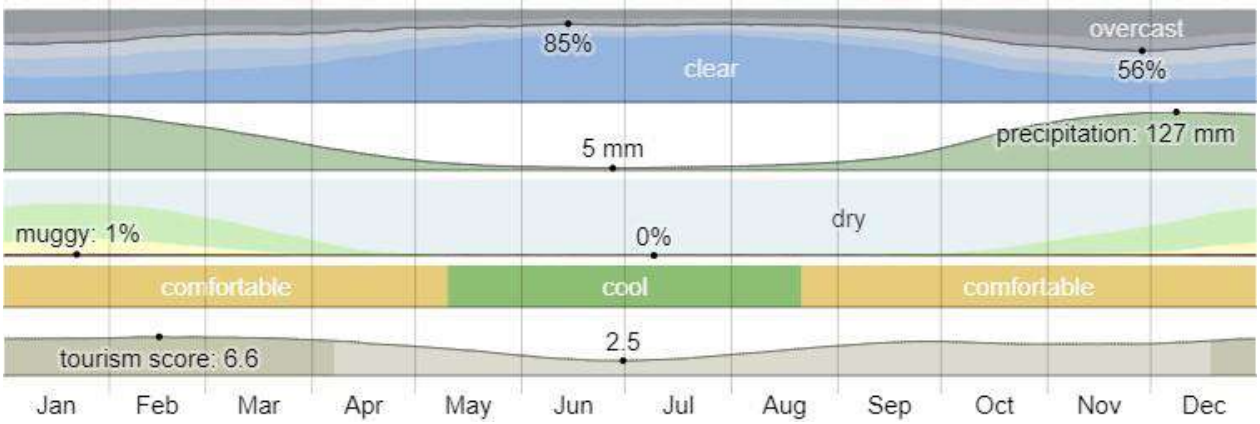


Figure 15 : Climate in Ermelo. (https://weatherspark.com/, n.d.)

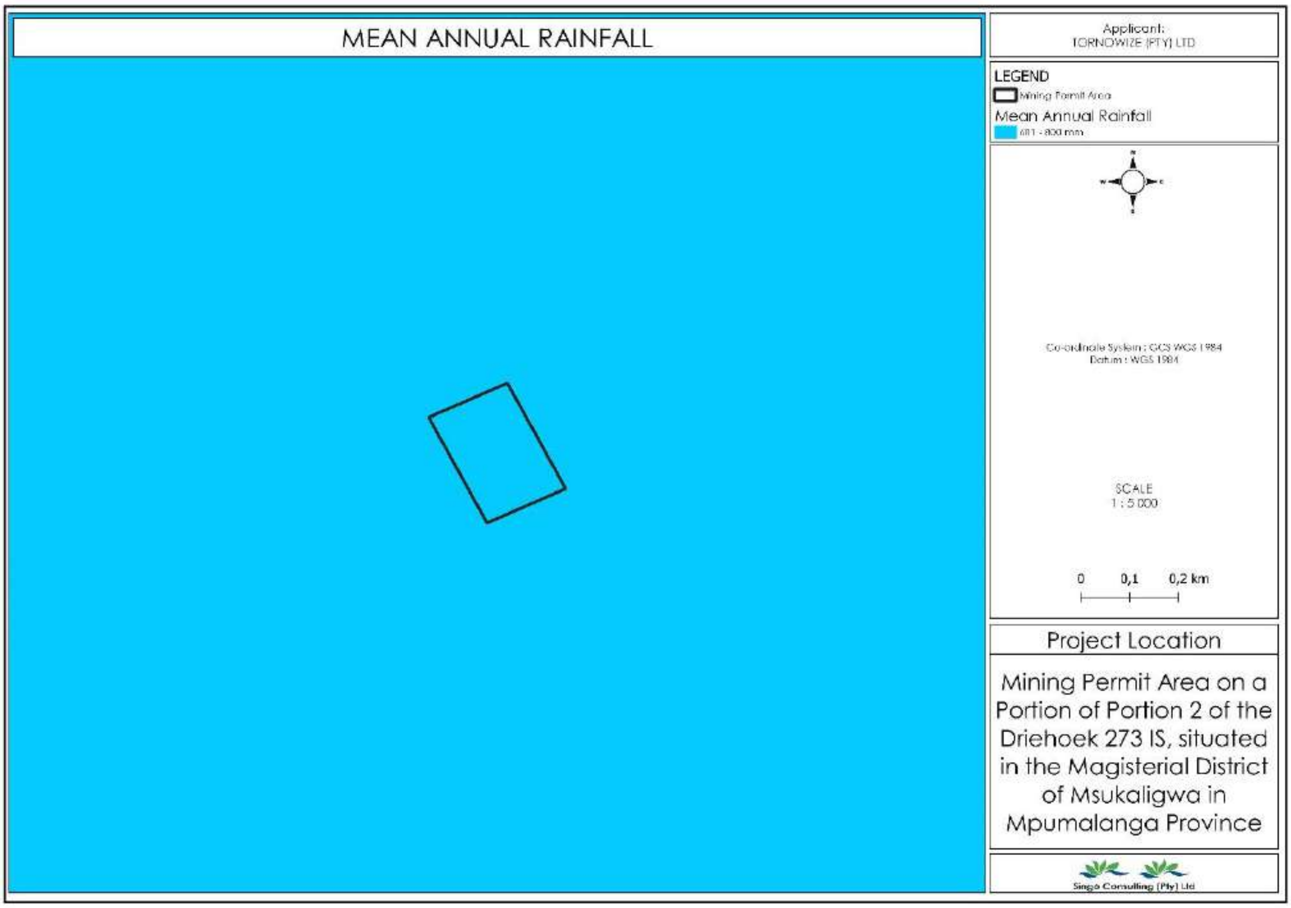


Figure 16: Mean annual Rainfall for the project area (Singo Consulting GIS Team, 2023)

8.6 Environmental Sensitivity

Table 8 summarises the environmental sensitivities identified for the proposed project. These sensitivities are indicative only and must be verified on-site by a suitably qualified person before the specialist assessments identified can be confirmed.

According to the site visit conducted on the 26th of July 2023, the area of interest does not have any sensitive features except for water bodies that are located 100m away from the proposed project area. The area was for agriculture and there were cattle grazing next to the project area.

Table 7: Proposed mining permit area environmental sensitivity.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

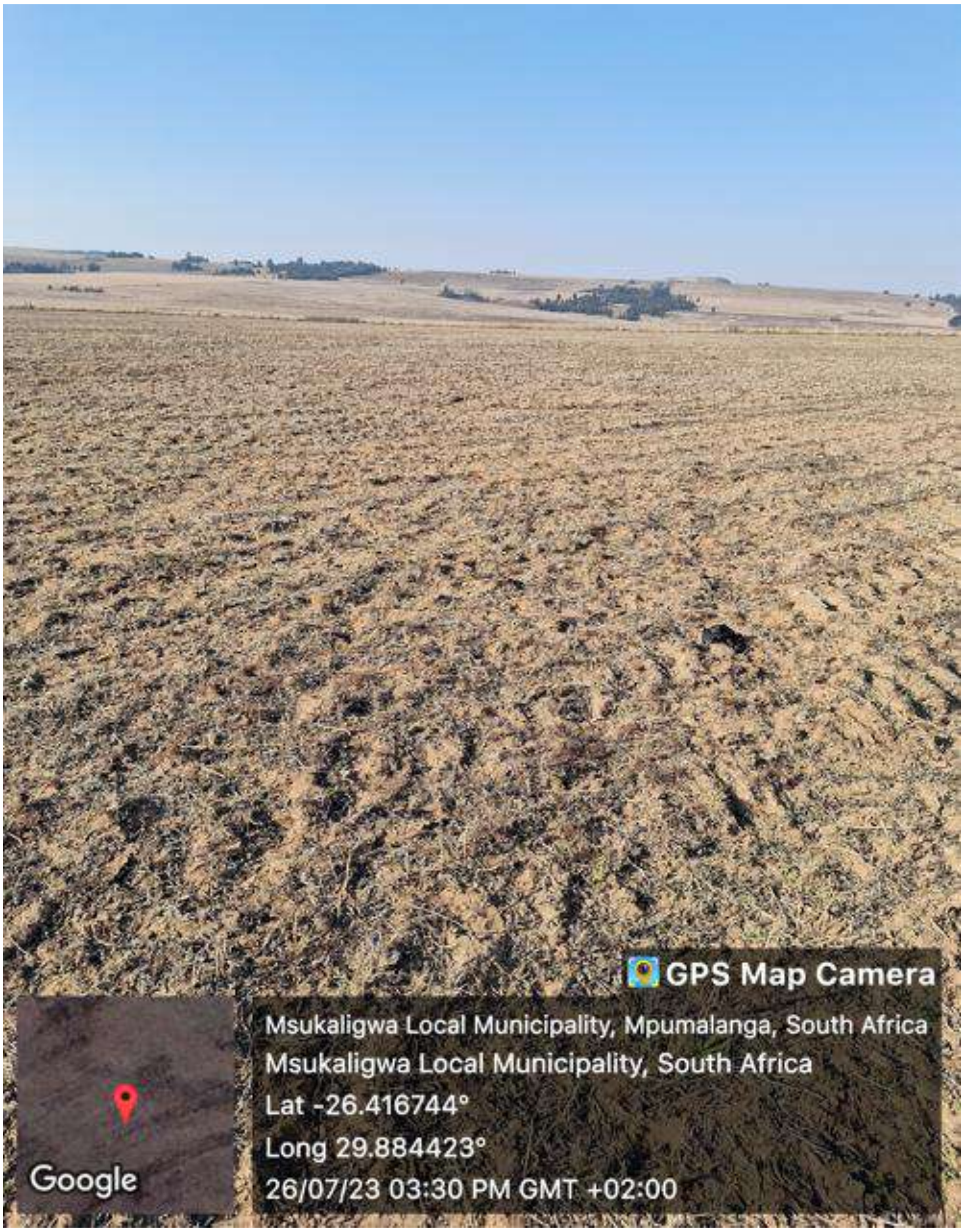


Figure 17: Proposed project area.

8.7 Surface and Ground water

Hydrology study was undertaken by a specialist at Singo consulting as attached on Appendix. South Africa's water resources are divided into quaternary catchments, which are the country's primary water management units (DWAF 2011). In a hierarchical classification system, a quaternary catchment is a fourth order catchment below the primary catchments. The primary drainages are further classified as Water Management Areas (WMA) and Catchment Management Agencies (CMA) (CMA). In accordance with Section 5 subsection 5(1) of the National Water Act, 1998, the Department of Water and Sanitation (DWS) has established nine WMAs and nine CMAs as outlined in the National Water Resource Strategy 2 (2013). (Act No. 36 of 1998). The purpose of establishing these WMAs and CMAs is to improve water governance in various regions of the country, ensuring a fair and equal distribution of the Nation's water resources while ensuring resource quality is maintained.

The proposed prospecting area falls within the Vaal Water Management Area (WMA) as shown on Figure 18 below, within quaternary catchments of C11F. The WRC 2012 study, presents hydrological parameters for each quaternary catchment including area, mean annual precipitation (MAP) and mean annual runoff (MAR), see table 2 for reference.

Table 8: WRC of 2012, Water management area, MAP and QC

Water management	Quaternary catchment	Catchment Area (km^2)	MAP (mm)	MAR (mm)	Evaporation Zone
Vaal	C11F	929.1	704.7	60.5	2D

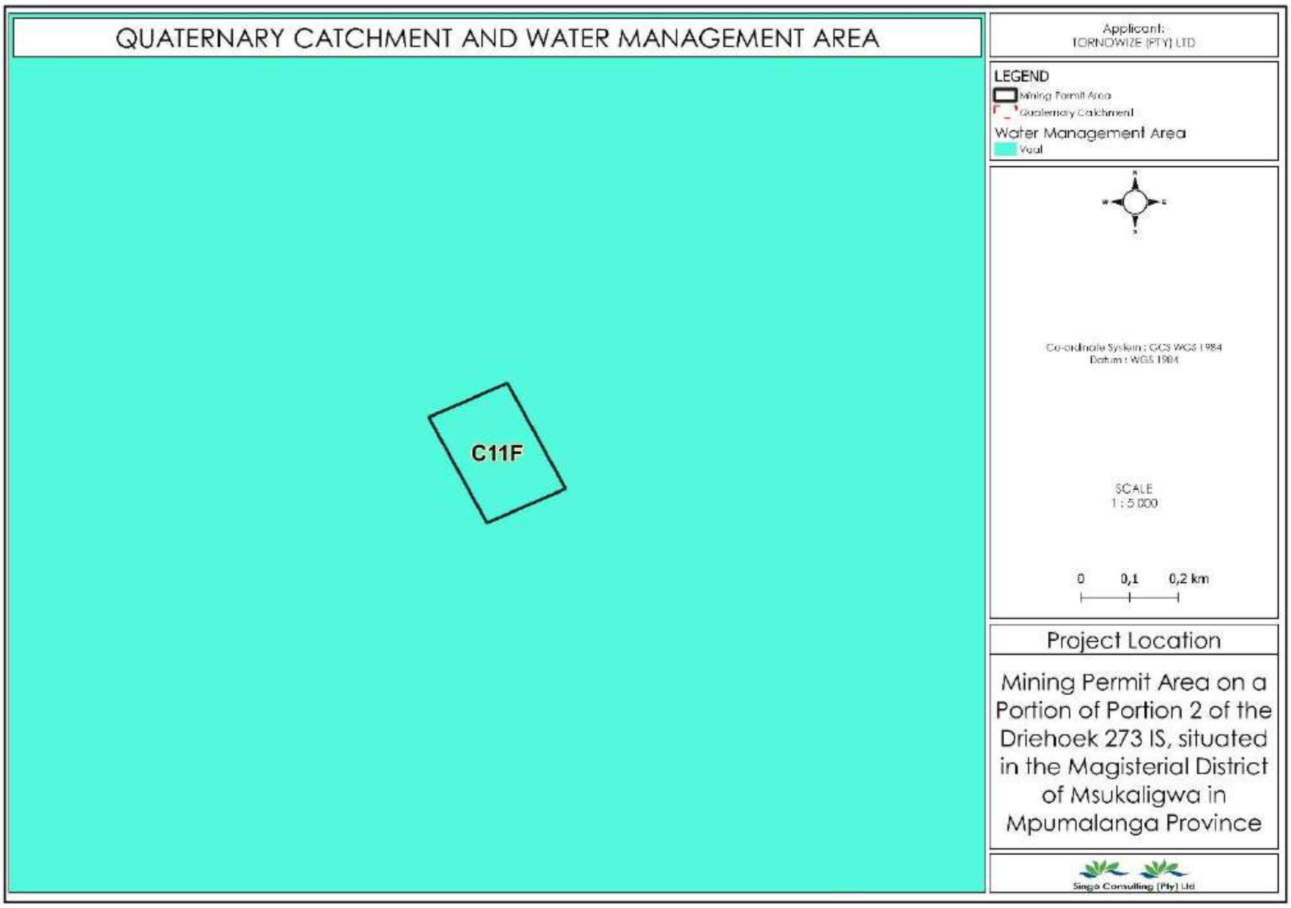


Figure 18: Quaternary Catchment and Water Management Areas (Singo Consulting GIS Team, 2023)

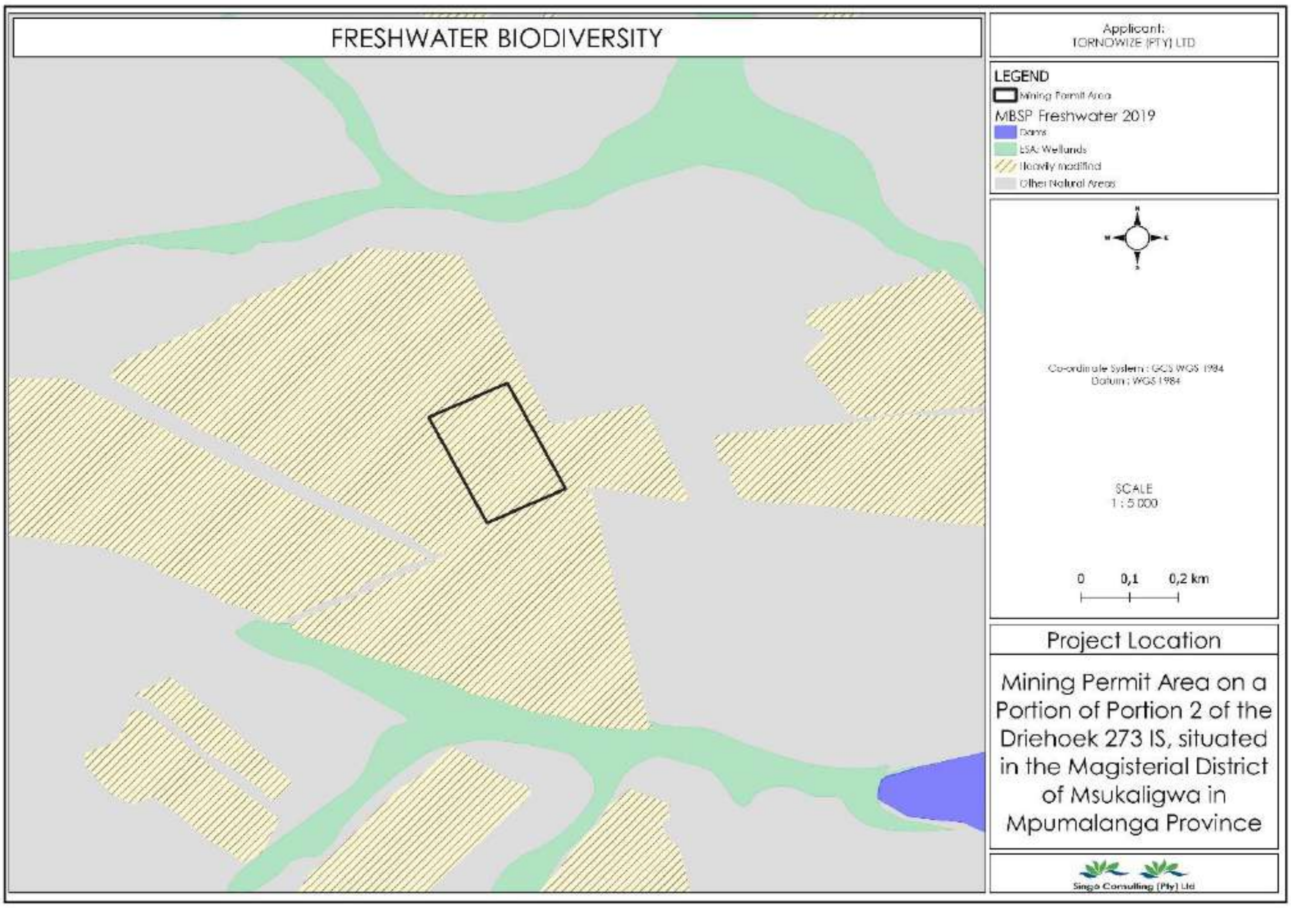


Figure 19: Freshwater Biodiversity Map (Singo Consulting GIS Team, 2023)

Topology

The topology of the area is illustrated below by Figure 20. A Topographic map is a map which indicates, to scale, the natural features of the Earth's surface, as well as human features, with features at the correct relationship to each other (Oxford Dictionary; 2020). The topography map other than showing landform features, rivers, and associated water resources, it also shows the height above sea level with the use of contour lines. Contour lines are an Imaginary line on the ground surface joining the points of equal elevation. In this environmental project, topography is used to determine how surface water flows during rainy seasons or how it would flow during the existence of the project. The topography also influences groundwater vulnerability, as topography also influences run-off and infiltration rate by means of residence time.

The slope of the study area is gentle, this is seen by the contours being widely spread, the study area lies between 1715 and 1730 mamsl. It can be concluded that in the area water flow is likely to be slow, this will increase the residence time of the water and or contaminants in the area, this gives the management time to deal or manage the contaminants in the area, but it poses a risk of groundwater contamination since it will encourage infiltration and increase the likelihood of groundwater vulnerability. This knowledge helps the site development team to be able to know how to manage water in the area, since the measures to manage water on a gentle and steep slope are different.

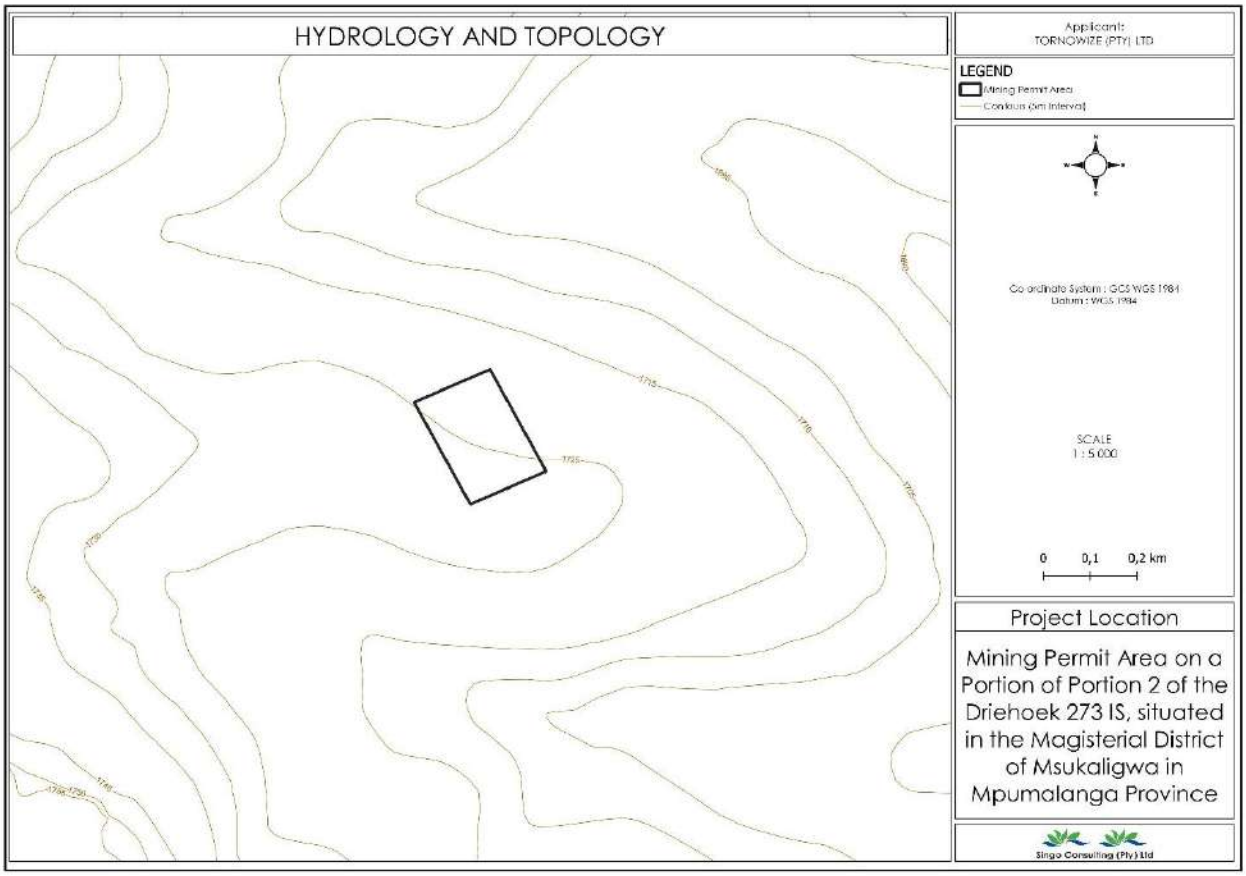


Figure 20: Hydrology & topology map of the proposed project area (Singo Consulting GIS Team, 2023)

Drainage

The hydrology surrounding the proposed area is of vital importance. In this context hydrology is all the surface waters appearing within and nearby the proposed project area, where a potential to be impacted upon by the project existence. The hydrology map as seen on Figure 21, illustrates that the following water bodies exists nearby the project area:

- Channeled Valley Bottom wetlands: Channelled valley bottom wetlands are linear fluvial, net depositional valley bottom surfaces which have a straight channel with flow on a permanent, seasonal, or ephemeral/episodic basis (Rountree, Todd, Kleynhans, et al, 2007: iv). A channelled valley bottom wetland was identified, the wetland is shown in the north-eastern direction of the study area covering the perennial river at an elevation of 1690 and 1695 mamsl.
- Non-perennial: non-Perennial rivers are rivers that flow seasonally, such as summer. The rivers flow from an area of higher elevation to an area of lower elevation. Non-perennial streams were identified at the north and southern parts of the project area, these non-perennial rivers are associated with valleys and they are found in all directions of the perennial river. They act as tributaries of the perennial river.

➢ **Perennial:** perennial rivers are rivers that flow all year round. The perennial river flowing from the northern direction towards the southern direction at an elevation of 1690 and 1695 mamsl, this perennial river connects with the non-perennial river which is flowing from the eastern direction towards southeastern direction.

➢ **Dam:** At the southern direction of the study area the is a dam. It is identified at an approximate elevation of 1600 mamsl.

➢ **Seep:** The seep wetlands are shown by red dotes within the hydrology map and are seen around the non-perennial rivers around the project area.

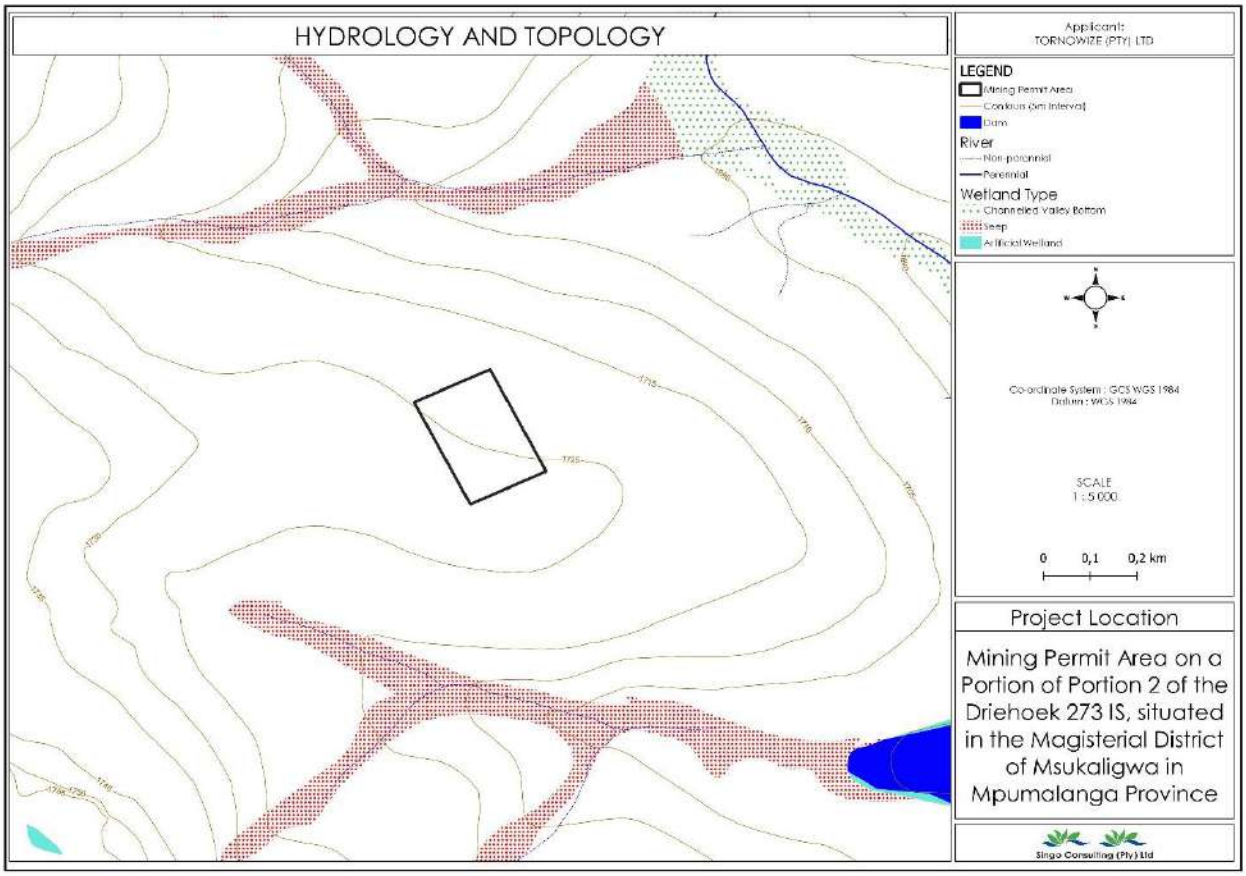


Figure 21: Drainage map of the study area. (Singo Consulting, 2023)

8.8 Flora

The vegetation of the proposed project area is dominated by Moist Clay/Moist Cool Highveld Grassland (see Figure 22). According to Mucina and Rutherford, 2006, the proposed area is located in the Moist Cool Highveld Grassland. This vegetation is distributed in Mpumalanga and Gauteng on plains between Belfast (in the east) and the eastern side of Johannesburg (in the west) and extends to Bethal and Ermelo) and Springs.

The climatic conditions of the vegetation unit are strongly seasonal summer rainfall, with very dry winters. The MAP (650-900 mm, averaging 726 mm) is relatively uniform across most of the unit, but increases significantly in the extreme south-east. The coefficient of variation in MAP is 25% across most of the unit but drops to 21% in the east and south-east. Frost occurs about thirteen to forty-two days, but longer at higher elevations. This vegetation type is listed as Endangered with approximately 0.9 % conservation target conserved in nature reserves. About 60 % of this vegetation unit is remaining, whilst transformation has reached approximately 40 %.

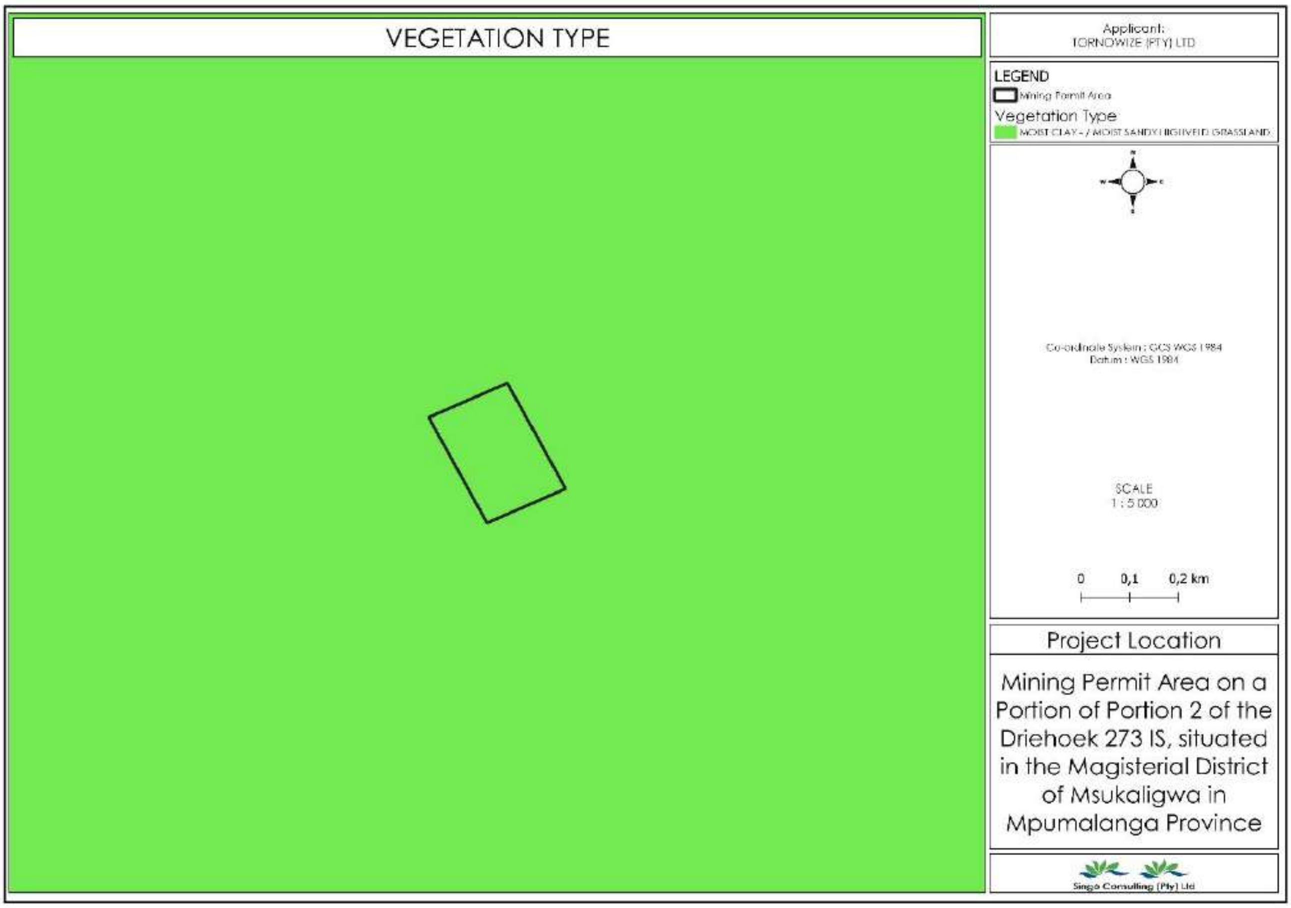


Figure 22: Vegetation type map of the proposed project area (Singo Consulting GIS Team, 2023)

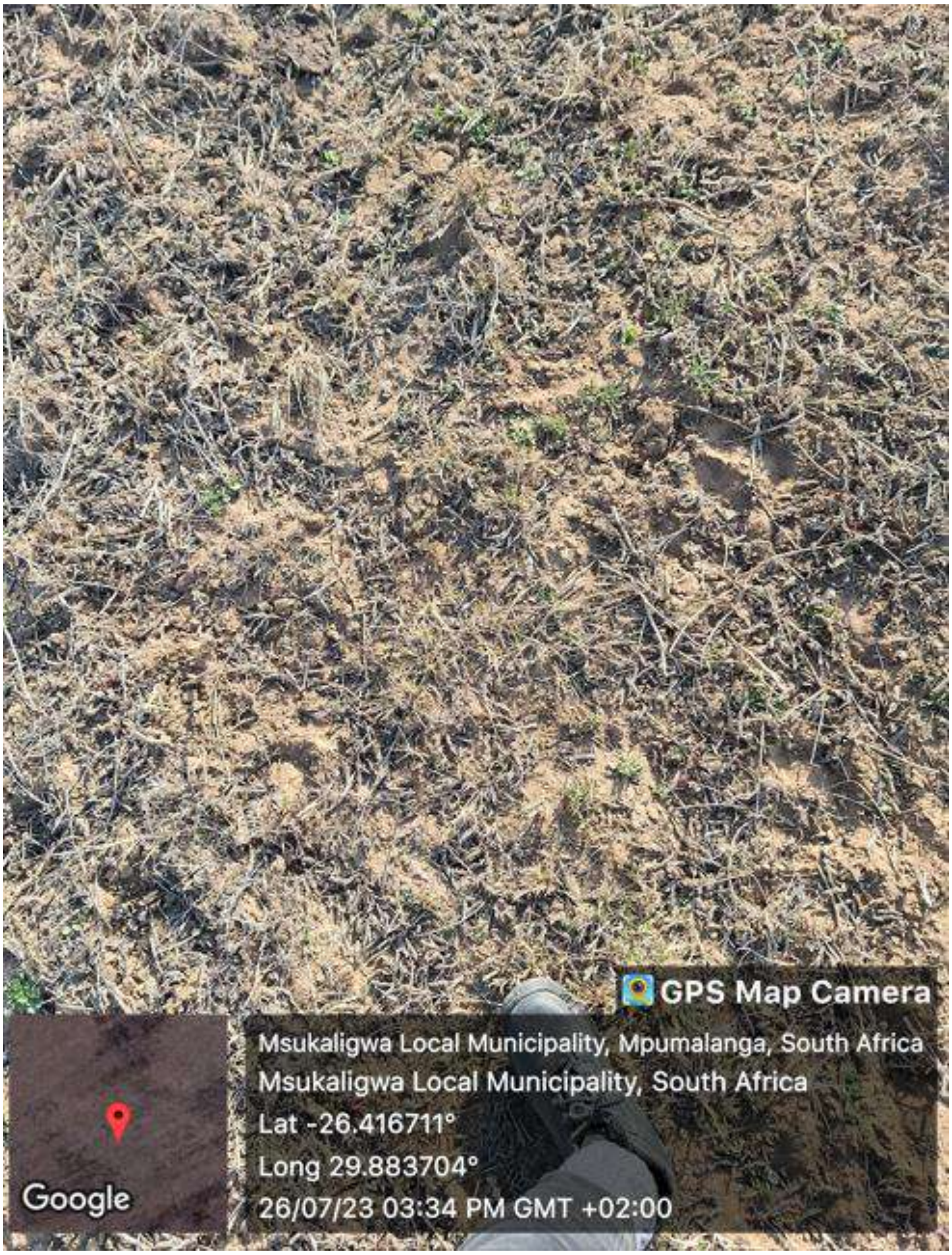
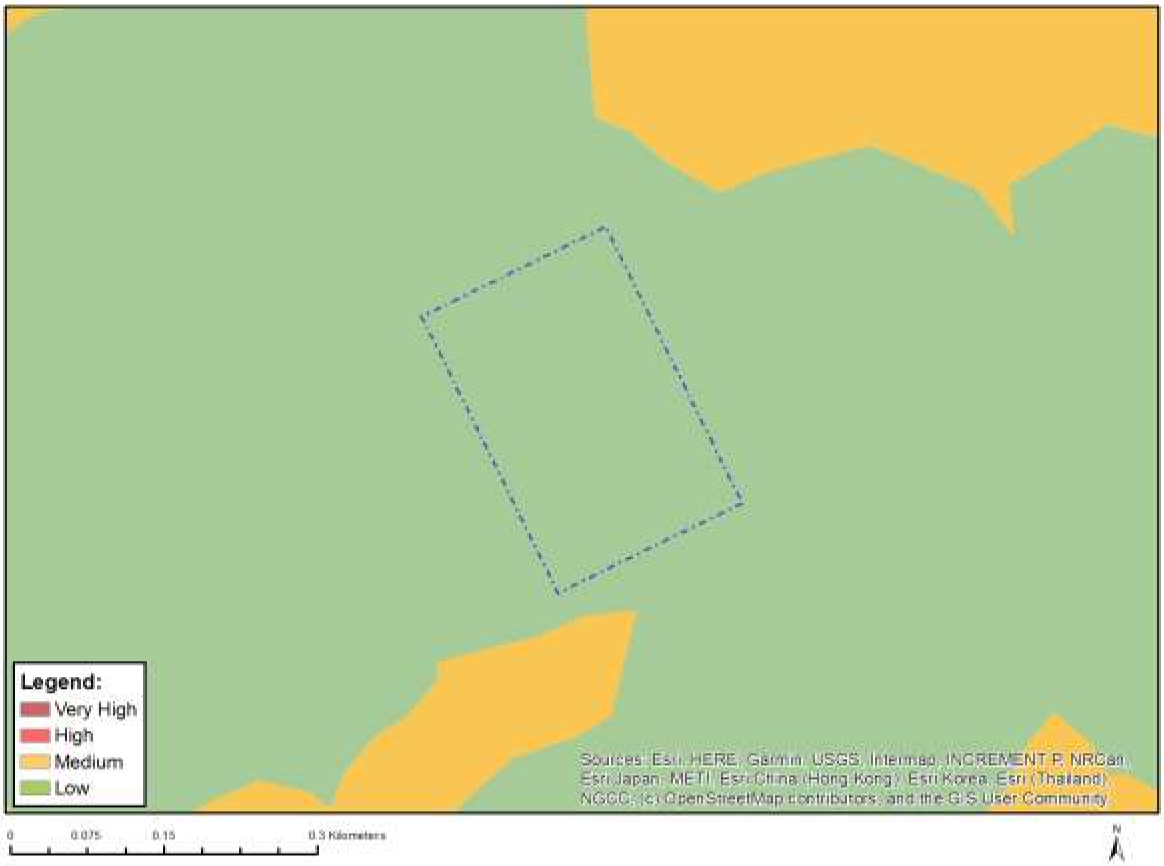


Figure 23: Vegetation observed on site.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

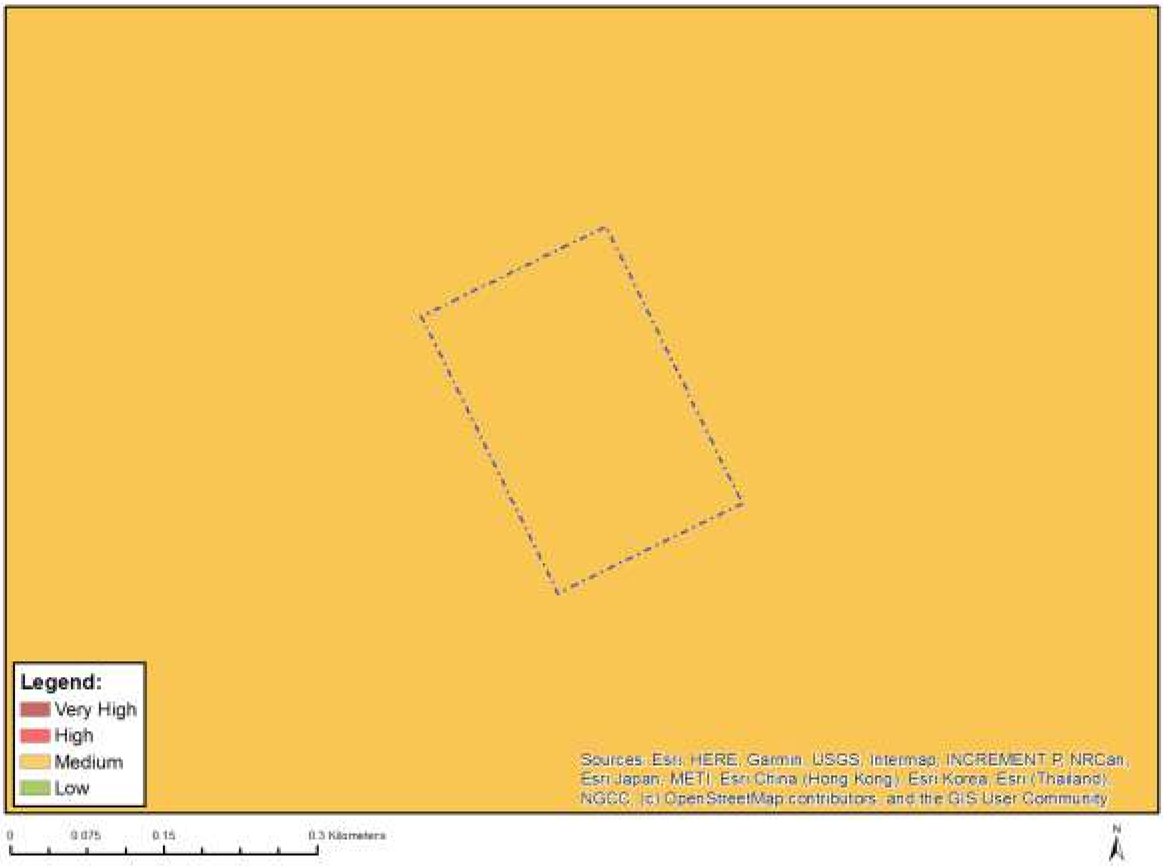
Sensitivity	Feature(s)
Low	Low Sensitivity

Figure 24: Map of relative plant species theme sensitivity (source, screening report)

8.8.1 Mammals

During the desktop study, no red data mammal species were found on the proposed site. The screening report shows that the proposed project area is of medium sensitivity. During site assessment cows and Donkeys were observed on site.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Ourebia ourebi ourebi

Figure 25: Map of relative animal species theme sensitivity (source, screening report)

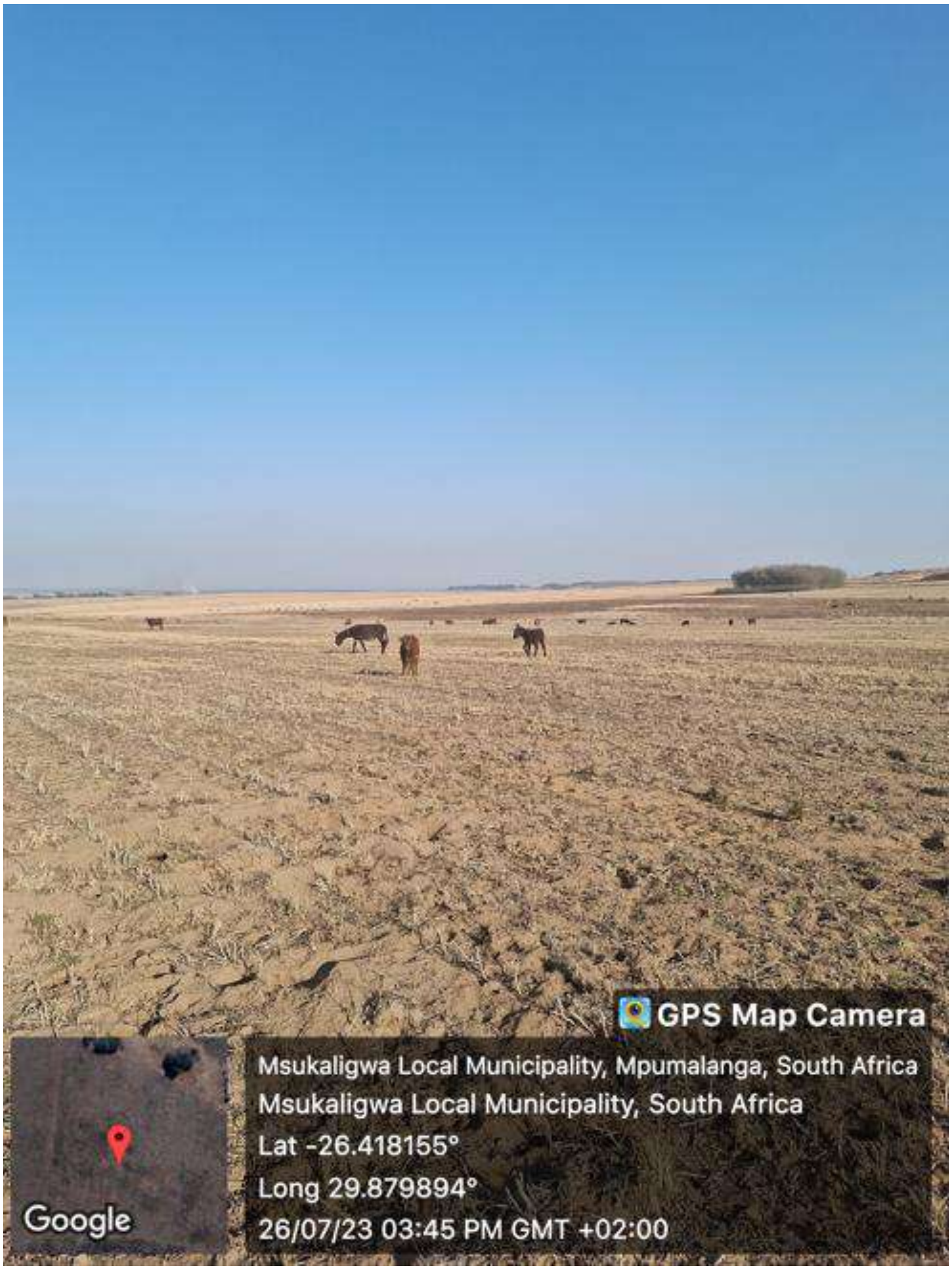


Figure 26: Fauna observed during site visit.

8.8.2 Birds

Birds are considered good ecological indicators, since their presence or absence indicate whether the ecosystem is functioning properly or not. During ground truthing, no medium sensitivity or vulnerable bird species observed onsite. Bird communities and ecological condition are linked to land cover, as the types of bird species in the area change when land cover changes. Habitat-specific species are sensitive to environmental change, with habitat destruction being the leading cause of species decline worldwide. It is widely accepted that vegetation structure, rather than the actual plant species, influences bird species distribution and abundance (Harrison et al., 1997).

8.8.3 Herpetofauna

During ground truthing, no reptile or amphibian species observed onsite. This is likely due to the inherently secretive nature of reptile species, and seasonality.

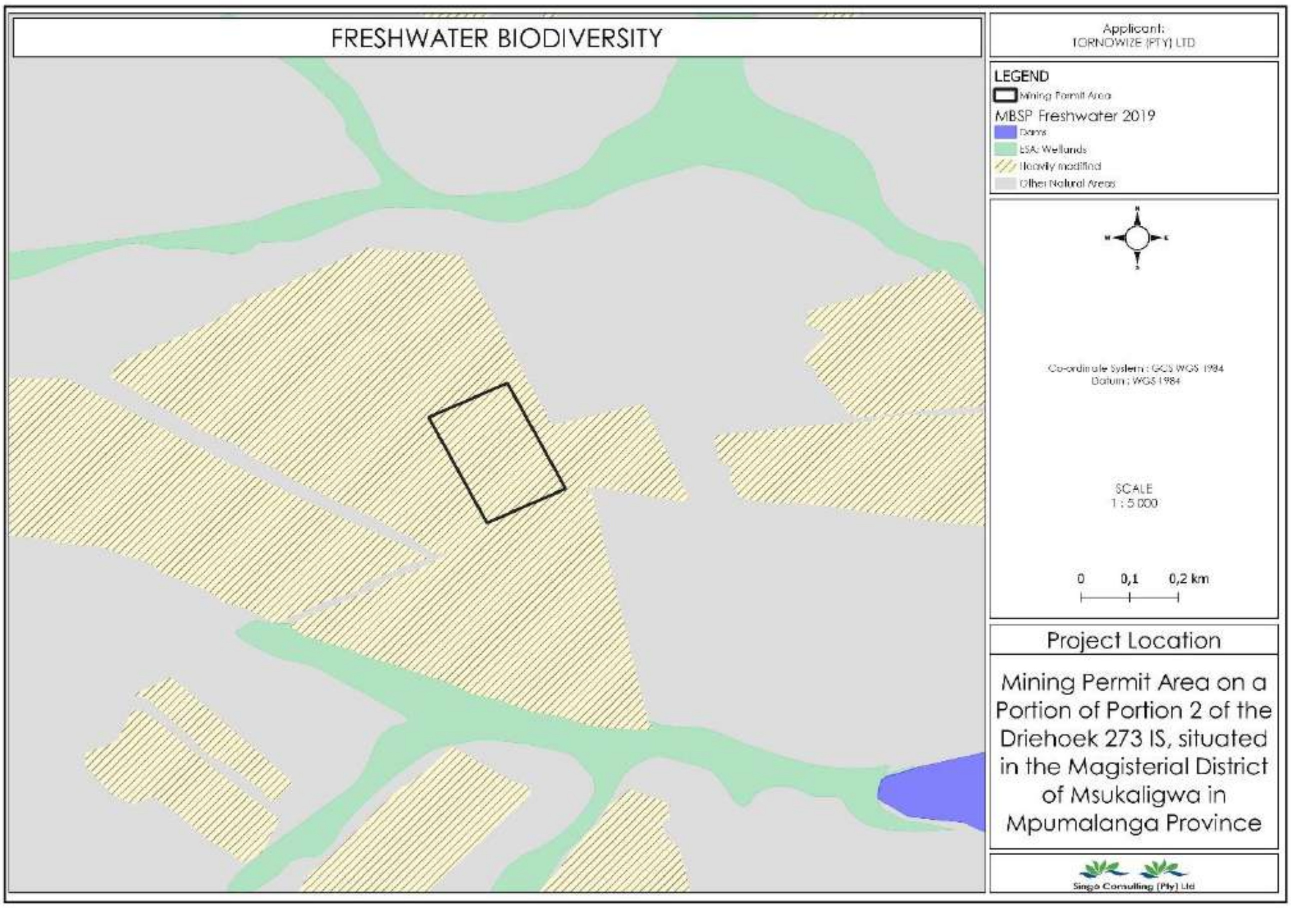
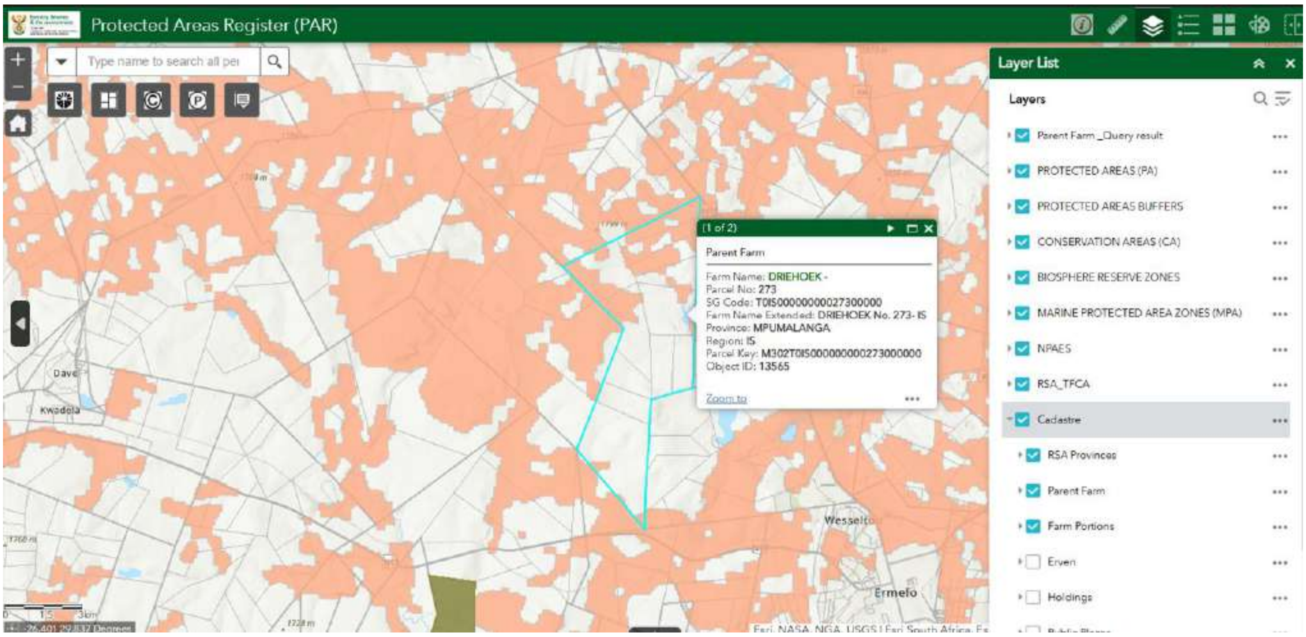


Figure 27: Biodiversity Freshwater map (Singo Consulting GIS Team, 2023)



8.8.4 Grassland habitat

During desktop study, MBSP terrestrial CBA map of 2019 and terrestrial biodiversity map depict that the area of the proposed site is heavily modified, (see Figure 25 and 26). During ground truthing, it was confirmed that the area of the proposed site falls on heavily modified.

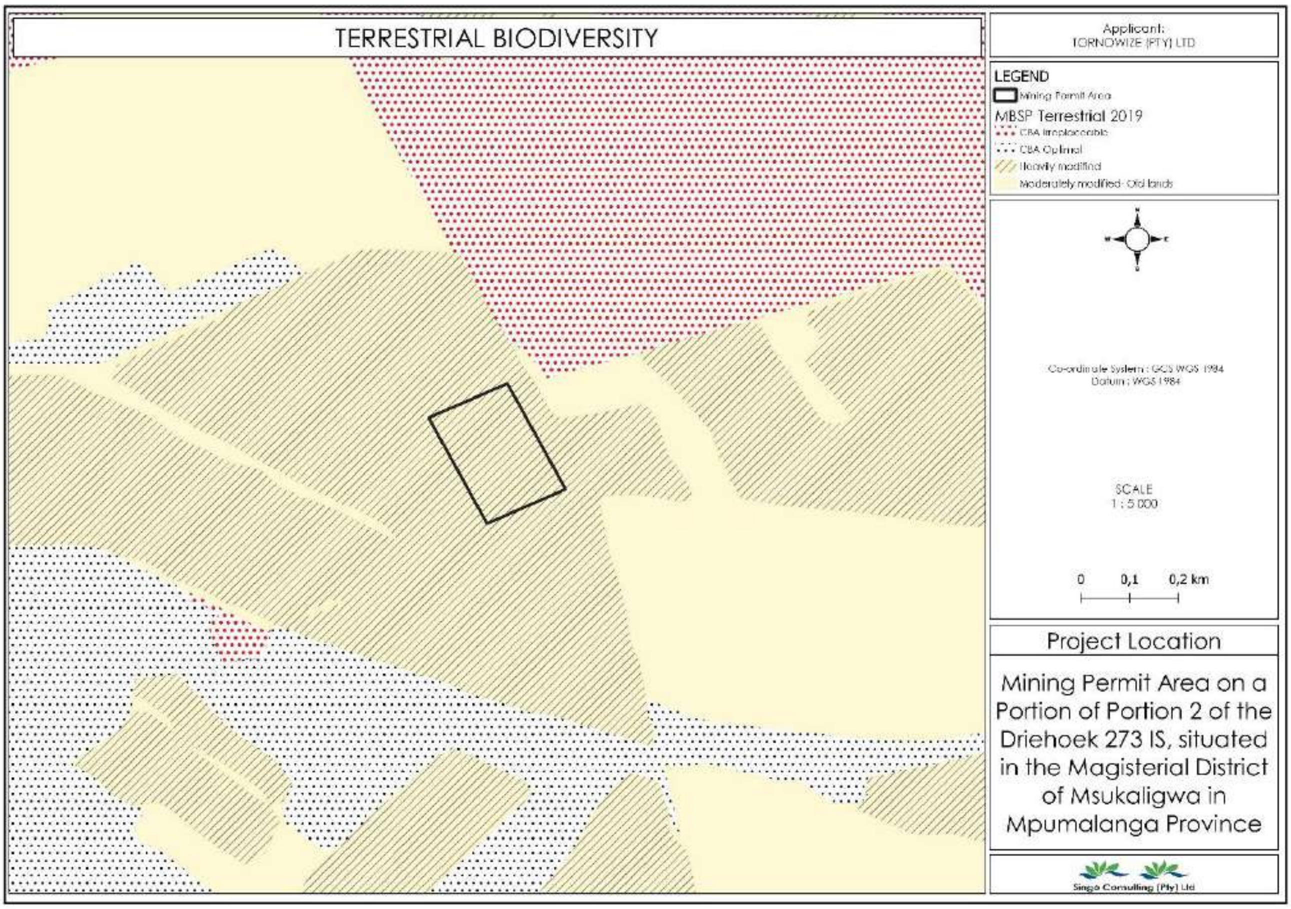


Figure 28: Terrestrial biodiversity map (Singo Consulting GIS Team, 2023)

The regulations in terms of Chapter 5 of the NEMA requires a description of the potential impacts the proposed development will have on the environment. The following tables present details of the potential impacts of the proposed project activities, as well as the proposed mitigation measures.

Table 9: Loss of vegetation and natural habitat during mining

Impact phase	Mining phase				
Possible impact	Loss of vegetation and natural habitat				
Type of impact	Direct and indirect impact				
Rating criteria	Extent	Duration	Magnitude	Probability	Significance
Calculation	3	5	8	4	High (61-90)

Can the impact be reversed	No
Will impact cause irreplaceable loss of resources	Yes
Can impact be avoided, managed, or mitigated	Yes

Impact mitigation measures

- Limit vegetation clearing to what is necessary for mining activities.
- Carry out a pre-vegetation clearing walk to identify SCC which might be present onsite.
- Prioritise development in low sensitive/already disturbed areas.
- Offer environmental awareness and training before mining commences.
- Implement a biodiversity action plan prior to mining and ensure adherence thereto.
- Fence-off mining site to demark working extent and prevent mining impacts on biodiversity.
- Minimise areas affected during mining and establish buffer zones.
- Use available farm roads to avoid unnecessary disturbance of natural and indigenous vegetation.
- Supervise (to be done by an ecologist) the rescue operation to ensure its success.
- Disturbed areas must be rehabilitated with indigenous plants as soon as mining concludes.

Table 10: Introduction of alien invasive species during rehabilitation.

Impact phase	Rehabilitation phase after mining activities				
Possible impact	Introduction of alien invasive species				
Type of impact	Direct and indirect impact				
Rating criteria	**Extent**	**Duration**	**Magnitude**	**Probability**	**Significance**
Calculation	2	5	8	4	Medium (30-60)
Can the impact be reversed					No
Will impact cause irreplaceable loss of resources					Yes
Can impact be avoided, managed, or mitigated					Yes

Impact mitigation measures

- Establish buffer zones and implement strict measures to prevent mining in these zones. Do not clear vegetation in buffer zones.
- The best mitigation measure for alien and invasive species is early detection and eradication of these species using a monitoring programme.
- An alien invasive management programme should be developed and implemented to control alien invasive species.
- Disturbed area should be rehabilitated with indigenous plant species to avoid colonisation of the area by invasive species.

Table 11: Impacts of mining on birds and its associated roosting site.

Impact phase	Mining phase				
Possible impact	The fragmentation, clearing, and alteration of natural habitat have a huge impact on birds breeding and roosting sites.				
Type of impact	Direct Impact				
Rating criteria	**Extent**	**Duration**	**Magnitude**	**Probability**	**Significance**
Calculation	3	5	8	4	High (61-90)
Can the impact be reversed					No
Will impact cause irreplaceable loss of resources					Yes
Can impact be avoided, managed, or mitigated					Yes
Impact mitigation measures • Ensure that there is no-alteration of vegetation patches that will provide space for breeding and roosting site for birds. • Ensure that there is no disturbance to bird species, nests, breeding sites if identified and create artificial site for birds. • Prohibit activities like trapping, hunting, and killing of birds onsite during mining. • ECO to conduct regular site inspections and remove any snares erected onsite. • A conservation-orientated plan should be developed personally for contractors so that there will be a penalty clause for non-compliance.					

Table 12: Loss of mammals due to mining.

Impact phase	Mining phase				
Possible impact	Loss of mammals due to habitat fragmentation and degradation				
Type of impact	Direct Impact				
Rating criteria	**Extent**	**Duration**	**Magnitude**	**Probability**	**Significance**
Calculation	3	5	8	4	High (61-90)
Can the impact be reversed					No
Will impact cause irreplaceable loss of resources					Yes
Can impact be avoided, managed, or mitigated					Yes
Impact mitigation measures • Pre-mining walk to be carried out onsite to ensure the absence of mammal habitats. • Hunting weapons are prohibited onsite. • Dogs are prohibited on the worksite as they are threats to wild animals.					

- A low-speed limit should be enforced onsite to reduce animal-vehicle collisions
- No animals should be intentionally killed/poached if identified, and hunting is not permitted on site.
- Relocate any threatened mammal species identified before commencement of mining.
- Offer environmental induction for all employees to raise awareness on the value of wild animals (if identified) and the importance of their conservation.
- ECO to conduct regular site inspections and remove any traps erected onsite.
- Contractual fines to be imposed and contract employees to be immediately dismissed if found attempting to snare or otherwise harm faunal species identified.
- Ensure that sensitive mammal habitats like drainage lines and wetlands area avoided.

Table 13: Impacts of the mining on sensitive areas

Impact phase	Mining phase				
Possible impact	Destruction of streams and wetlands and its associated vegetation				
Type of impact	Direct Impact				
Rating criteria	**Extent**	**Duration**	**Magnitude**	**Probability**	**Significance**
Calculation	3	5	8	5	High (61-90)
Can the impact be reversed					No
Will impact cause irreplaceable loss of resources					Yes
Can impact be avoided, managed, or mitigated					Yes

Impact mitigation measures

- No disturbance in drainage lines, rivers, and wetlands, including mining across wetlands and rivers, fill dumping, road construction, and all forms of temporary disturbance.
- Storm water and erosion control measures to be implemented and monitored as per EMPr to prevent siltation or erosion of sensitive environment identified onsite.
- Do not lower the original stream bed/profile of the wetland, as this may result in scouring in an upstream direction and further alteration of bed conditions.
- Prioritise development in low sensitive/already disturbed areas.
- Immediately and appropriately clean any accidental chemical, fuel, and oil spill from machines.
- Store all materials appropriately to prevent contamination of sensitive sites.

8.8.5 Results of the Archaeological/Heritage Assessment Study

The main cause of impacts to archaeological sites is direct, physical disturbance of the archaeological remains themselves and their contexts. It is important to note that the heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose buried archaeological sites and artefacts, the artefacts are relatively meaningless once removed from their original position.

The severe impacts are likely to occur during clearance at the proposed mining development site; indirect impacts may occur during movement of mining and construction vehicles and machinery. The excavation for foundations and fence line posts will result in the relocation or destruction of all existing surface heritage material. Similarly, the clearing of access roads will impact material that lies buried below the surface. Since heritage sites, including archaeological sites, are non-renewable, it is important that they are identified, and their significance assessed prior to any mining activities at the site. It is important to note, that due to the localised nature of archaeological resources, that individual archaeological sites could be missed during the survey, although the probability of this is very low within the proposed mine site.

Further, archaeological sites and unmarked graves may be buried beneath the surface and may only be exposed during mining, construction of site offices, clearance of the site and actual mining. The purpose of the AIA is to assess the sensitivity of the area in terms of archaeology and to avoid or reduce the potential impacts of the proposed development by means of mitigation measures (see appended Chance Find Procedure). The study concludes that the impacts will be negligible since the site did not yield any confirmable archaeological remains. The following section presents results of the archaeological and heritage survey conducted within the proposed development project site.

Table 14: Summary of findings

Heritage resource	Status/Findings
Buildings, structures, places and equipment of cultural significance	None occur on the site
Areas to which oral traditions are attached or which are associated with intangible heritage	None exists on the study area
Historical settlements and townscapes	None exist within the study site
Landscapes and natural features of cultural significance	None
Graves and burial grounds	None
Movable objects	None

Overall comment	During site visit no Graves/burial were observed

8.8.6 Archaeological Sites

The site visit did not record any confirmable archaeological remains on the mining permit application site. The surface of the proposed permit area was covered by the grass and farming. The chances of recovering significant archaeological materials were seriously compromised and limited due to agriculture activities and other destructive land use activities. Based on the field study results and field observations, it is the considered opinion of the author that the receiving environment for the proposed mining development site is low to yield previously unidentified archaeological sites during subsurface excavations and mining.

8.8.7 Buildings and Structures older than 60 years

In terms of built environment, there are no buildings at the site. Therefore, in terms of Section 34 of the NHRA, the mining permit application may be approved without any further investigation and mitigation.

8.8.8 Burial grounds and graves

Human remains and burials are commonly found close to archaeological sites; they may be found in abandoned and neglected burial sites or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked on the surface. Archaeological and historical burials are usually identified when they are exposed through erosion, mining and earth moving activities for infrastructure developments such as powerlines and roads. In some instances, packed stones or stones may indicate the presence of informal pre-colonial burials. The site visit on the farm confirmed that there are no graves in the permit area further investigation through sahra to see if there is any graves in the project area.

8.9 Access Road

The national roads are relatively far from the project area. The project area is easily accessible via the N11 road. The unnamed road connecting from the N11 to the project area is in reasonable condition. There is no further support from the unnamed road, and to get immediate access to the project site, an access road will have to be constructed to the project area.

Figure 29: Gravel Road to the Project Area (Photograph by SC, 2023)

8.10 Description of current land uses

The current land uses within 3 km:

- Cultivated Land.
- Grasses
- Cattle grazing

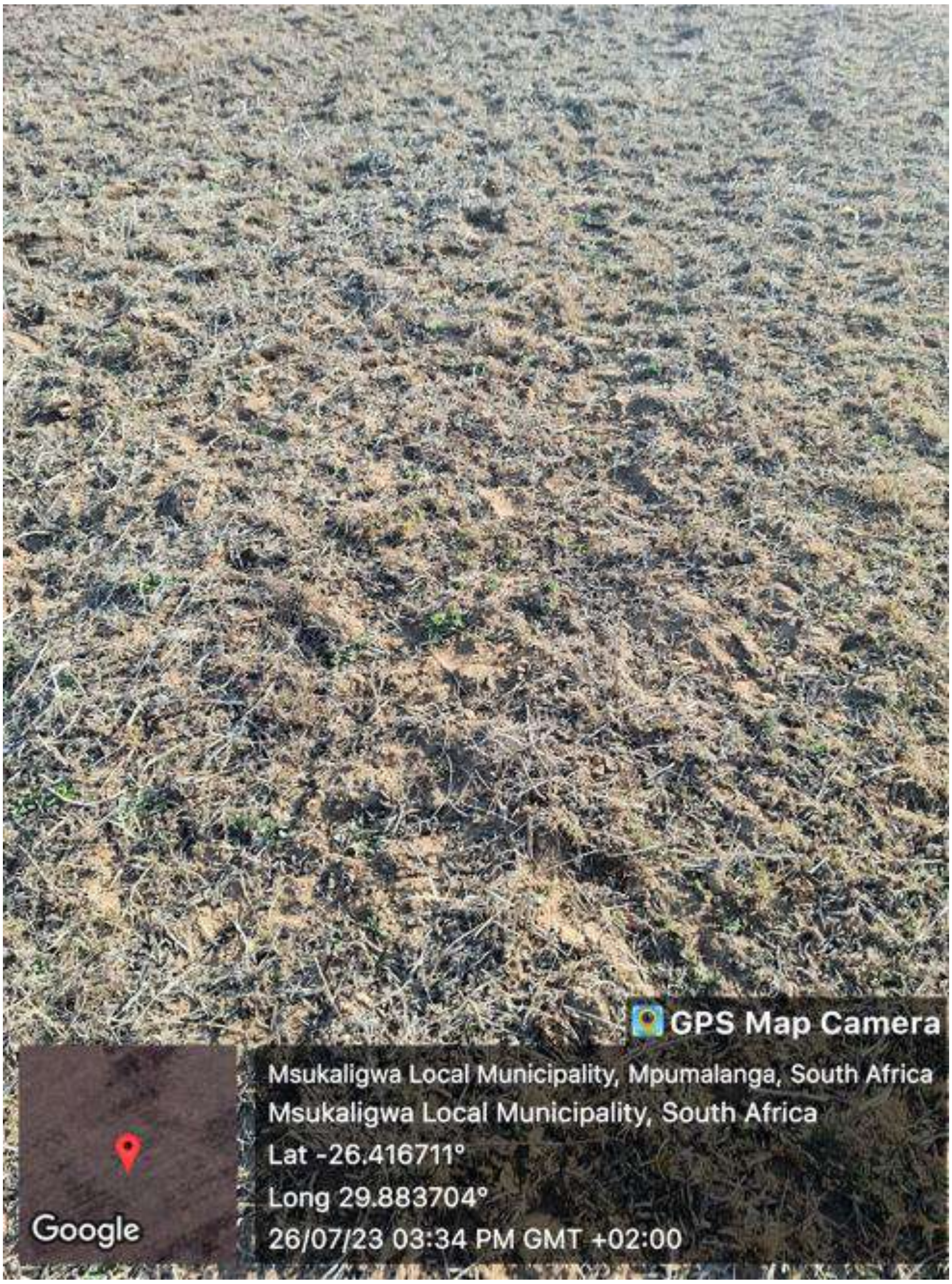


Figure 30: Overview of the Project area (Site Visit, 2023)

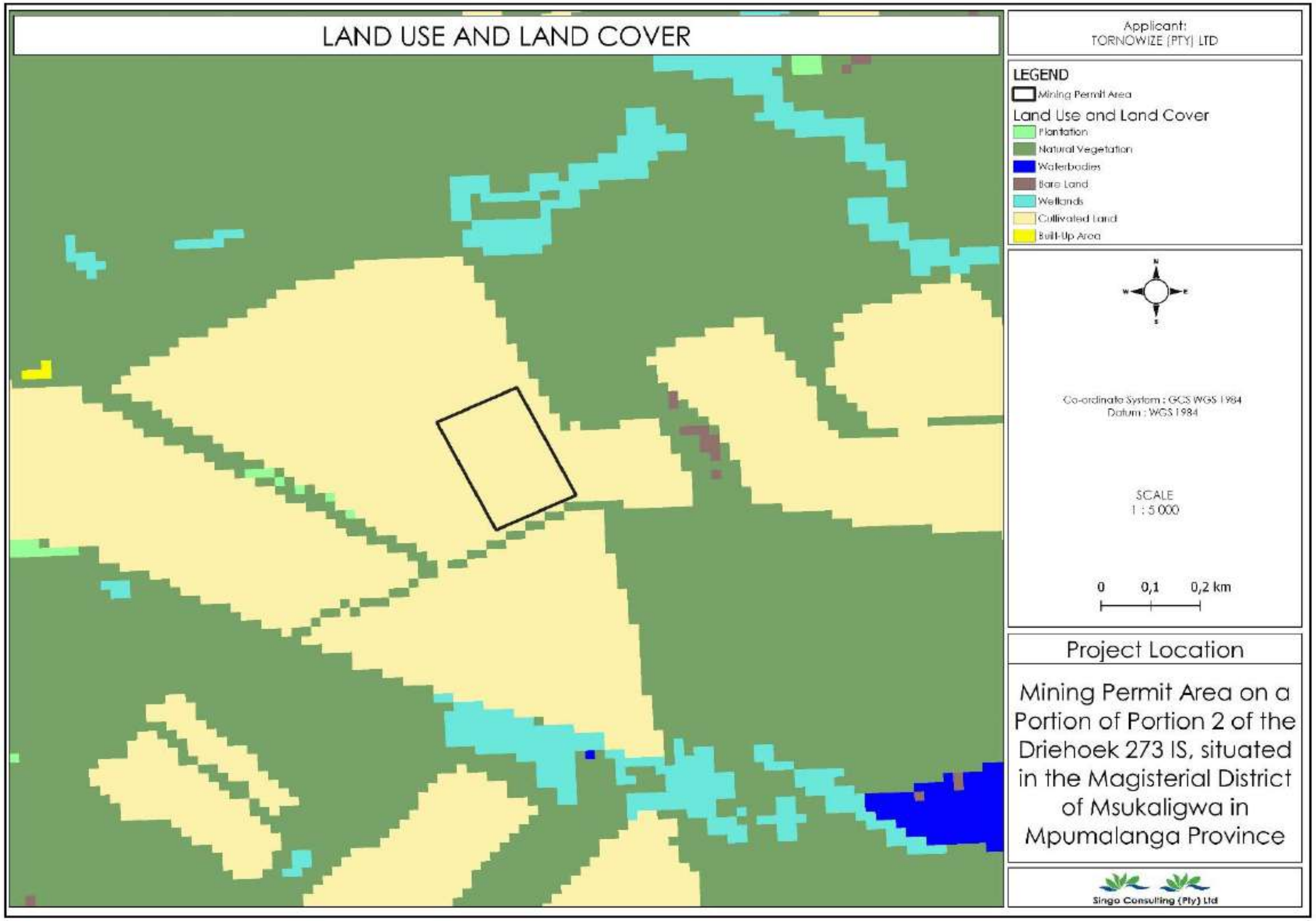


Figure 31: Land use map (Singo Consulting GIS Team, 2023)

9 IMPACTS AND RISKS IDENTIFIED

Impacts and risks were identified based on the proposed mining activities to take place on-site. Table *15* lists the potential impacts related to each of the significant activities related to the small-scale mining operation.

Table 15: List of potential impacts per activity.

Aspect	Main Activity/Action/Process	Impact
Social	Site establishment	Safety and security risks to landowners and lawful occupiers
Social	Site establishment	Interference with existing land uses
Social	Site establishment	Sense of place
Social	Site establishment	Safety and security risks to landowners and lawful occupiers
Social	Site establishment	Interference with existing land uses
Social	Site establishment	Sense of place
Social	General mine management	Crime and violence
Social	General mine management	Influx of migrant workers
Social	General mine management	Sense of place
Social	General mine management	Social vices
Socio-economic	Opencast mining	Coal supply
Socio-economic	Opencast mining	Economic growth
Socio-economic	Opencast mining	Education, skills development and training

Aspect	Main Activity/Action/Process	Impact
Socio-economic	Opencast mining	Employment opportunity
Health and safety	Maintenance and operation of site infrastructure and facilities	Fire and explosion hazard
Health and safety	Opencast mining	Fly rock
Health and safety	Opencast mining	Health impacts
Land capability	Maintenance and operation of site	Loss of soil fertility, soil resource and its utilisation potential
Land use	Opencast mining	Damage/Disruption of services (such as water and power supply, etc.)
Land use	Opencast mining	Interference with existing land uses
Soil	Opencast mining	Soil compaction
Soil	Opencast mining	Soil pollution/contamination
Soil	Opencast mining	Erosion and sedimentation
Topography and landform	Opencast mining	Alteration of topography
Topography and landform	Opencast mining	Altered drainage patterns
Transportation, infrastructure and traffic	Opencast mining	Soil surface subsidence
Transportation, infrastructure and traffic	Opencast mining	Damage to infrastructure
Transportation, infrastructure and traffic	Opencast mining	Increased traffic

Aspect	Main Activity/Action/Process	Impact
Visual	Opencast mining	Visual impact of mine infrastructure, stockpiles and dust
Air quality	Opencast mining	Fugitive emissions (dust)
Blasting and vibration	Opencast mining	Air blast
Blasting and vibration	Opencast mining	Ground vibration and human perception
Blasting and vibration	Opencast mining	Impact on infrastructure
Blasting and vibration	Opencast mining	Noxious fumes
Noise	Opencast mining	Disturbing and/or nuisance noise
Fauna and flora	Opencast mining	Direct and indirect mortality of flora and fauna
Fauna and flora	Opencast mining	Habitat fragmentation and blockage of seasonal and dispersal movements
Fauna and flora	Opencast mining	Introduction/invasion by alien (non-native) species
Surface water	Opencast mining	Pollution of surface water resources/decreased water quality
Surface water	Opencast mining	Decrease in surface water availability
Ground water	Opencast mining	Pollution of groundwater
Heritage	Opencast mining	Discovery and preservation of fossils
Heritage	Opencast mining	Destruction/damage of palaeontological resources
Heritage	Opencast mining	Destruction/damage of heritage resources
Geology	Opencast mining	Impact on geology

Aspect	Main Activity/Action/Process	Impact
Environmental pollution	Opencast mining	General environmental pollution
Environmental pollution	Opencast mining	Hydrocarbon spills/contamination
Environmental pollution	Opencast mining	Sewage spills/contamination

Each of the identified risks and impacts for these phases was assessed utilising the assessment methodology described in Section 10.1. The assessment criteria include the nature, extent, duration, magnitude/intensity, reversibility, probability, public response, cumulative impact and irreplaceable loss of resources. The full scoring of each impact is provided and a summary of the impacts and their significance before and after mitigation is provided in Section 32.

In order to calculate the significance of an impact, probability, duration, extent and magnitude will be used. The pre- and post- mitigation scores will provide an indication of the extent to which an impact can be mitigated.

9.1 The Impact Assessment Methodology

The subsections below present the approach to assessing the identified potential environmental impact with the aim of determining the relevant environmental significance.

9.1.1 Method of Assessing Impacts

The impact assessment methodology is guided by the requirements of the NEMA 2014 EIA Regulations (as amended). The broad approach to the significance rating methodology is to determine the Environmental Risk (ER) by considering the Consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the Probability/likelihood (P) of the impact occurring. This determines the Environmental Risk. In addition, other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources are used to determine a Prioritisation Factor (PF) which is applied to the ER to determine the overall Significance (S).

9.1.2 Determination of Environmental Risk

The significance (S) of an impact is determined by applying a Prioritisation Factor (PF) to the Environmental Risk (ER).

The Environmental Risk 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:

C = <u>(E+D+M+R) x N</u> 4

Each individual aspect in the determination of the Consequence is represented by a rating scale as defined in **Error! Reference source not found.**.

Table 16: Criteria for determination of 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. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),
	4	Regional (i.e. extends between 5 and 50 km from the site
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years)
	3	Medium term (6-15 years)
	4	Long term (the impact will cease after the operational life span of the project),
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).
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)
	3	Moderate (where the affected environment is altered but natural, cultural and

		social functions and processes continue albeit in a modified way)
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease) or
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease)
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 prohibitively high time and cost

Aspect	**Definition**
	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 *17*.

Table 17: Probability scoring.

		Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions;<25%),
		Low probability (there is a possibility that the impact will occur; >25% and <50%),
		Medium probability (the impact may occur; >50% and <75%),
		High probability (it is most likely that the impact will occur- > 75% probability), or
		Definite (the impact will occur),

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

$$ER = C \times P$$

Table 18: Determination of Environmental Risk.

Consequence						
	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
	Probability					

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in **Table *19***.

Table 19: Significance classes.

Environmental Risk Score	
Value	Description
< 10	Low (i.e. where this impact is unlikely to be a significant environmental risk),
≥ 10; < 20	Medium (i.e. where the impact could have a significant environmental risk),
≥ 20	High (i.e. where the impact will have a significant environmental risk).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre- mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/ mitigated.

9.1.3 Impact Prioritisation

In accordance with the requirements of Appendix 3(1)(j) of the NEMA 2014 EIA Regulations (as amended) (GNR 326 of 2017), and further to the assessment criteria presented in the Section above, it is necessary to assess each potentially significant impact in terms of cumulative impacts and the degree to which the impact may cause irreplaceable loss of resources.

In addition, it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision-making process.

In an effort to ensure that these factors are considered, an impact Prioritisation Factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/ significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/ mitigation impacts are implemented **Table *20***.

Table 20: Criteria for the determination of prioritisation.

Public response (PR)	Low (1)	Issue not raised in public response.
	Medium (2)	Issue has received a meaningful and justifiable public response.
	High (3)	Issue has received an intense meaningful and justifiable public response.
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 criterion. The impact priority is therefore determined as follows:

Priority = PR + CI + LR

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 Table *21*.

Table 21: Determination of prioritization factor.

Priority	Ranking	Prioritization Factor
3	Low	1
4	Medium	1.17
5	Medium	1.33
6	Medium	1.5
7	Medium	1.67
8	Medium	1.83
9	High	2

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance (Table *22*).

Table 22: Environmental significance rating.

Environmental Significance Rating	
Value	Description
< -10	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ -10 < -20	Medium negative (i.e. where the impact could influence the decision to develop in the area).
≥ -20	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
0	No impact
< 10	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ 10 < 20	Medium positive (i.e. where the impact could influence the decision to develop in the area).
≥ 20	High positive (i.e. where the impact must have an influence on the decision process to develop in the area)

9.2 Assessment and Evaluation of Potential Project Impacts and Mitigation Measures

The following potential impacts were identified during the Basic Assessment. Mitigation measures have also been provided for each environmental aspect assessed.The draft BAR+EMPR will be made available to I&APs for review and comment and their comments and concerns will be addressed in this final report that is submitted to the DMRE for decision-making. The results of the public consultation will be utilised to update the impact scores upon completion of the public review period. Furthermore, it is noted that the results of the public consultation will be utilised to update the proposed potential mitigation measures.

9.2.1 Topography and Landform

Topography refers to the surface shape and features of an area. Opencast operations will remove surface material to access and mine an orebody and this can alter the natural topography of the site. Resultant changes to the topography can in turn impact on groundwater, surface water drainage, visual character and the safety of both people and animals if not properly mitigated. If mining extraction techniques are not carried out correctly, lack of support from underlying layers could cause the surface soil profile to vertically subside to a greater or lesser degree. This could result in limitations to the viability of potential post mining land uses.

Impacts on the topography and landform within the application area are expected to occur as follows:

- Alteration of topography.
- Altered drainage patterns.
- Soil surface subsidence.

9.2.1.1 Significance of Impacts

The above impacts on topography and landform will be negative but site specific. With mitigation, the impact can be controlled but not prevented and will remain low to moderate in significance.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Alteration of topography	-15,00	-13,75	-13,75
Altered drainage patterns	-11,00	-5,00	-5,00
Soil surface subsidence	-10,00	-4,00	-4,67

The following mitigation types are associated with potential impacts on topography and landform:

- Control through site planning and design.
- Control through proper soil management procedures.
- Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities).

9.2.2 Impact on Geology

Geology refers to the underlying mineral structure of an area. Alterations to the natural geology could have impacts on other aspects such as groundwater and topography. Mining operations will remove the entire ore body layer which will alter the geology of the site. Resultant changes to the geology can in turn impact on groundwater, soil forms, and paleontological resources. Mining will have a permanent impact on the geology of the application area.

9.2.2.1 Significance of Impact

The impact on the local geology is permanent as an entire orebody and stratigraphic unit will be removed during the mining operations. There are no mitigation measures to reduce the impact on geology as the removal of a geological unit is the goal of the activity. The impact will remain high.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Impact on Geology	-14,00	-18,75	-25,00

The following mitigation types are associated with potential impacts on the geology:

- Control through site planning and design.
- Control through proper soil management procedures.
- Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities).

9.2.3 Impacts on Soil.

Mining operations have the potential to damage soil resources through physical loss of soil and/or the contamination of soils, thereby impacting on the soils ability to sustain natural vegetation and altering land capability. Due to the increased activity of trucks and heavy machinery the possibility of soil contamination by leaking oils and fuels is increased. The contamination of soils may contribute to the contamination of surface and groundwater resources. Increased soil erosion can be caused by a loss in vegetative cover resulting in increased water runoff. This is especially likely to occur on sloping terrain. Impacts on soil structure can result in changes to soil drainage, increasing runoff and erosion, and may also result in further potential knock on effects impacting on surface and underground water resources. Loss of the topsoil resource reduces chances of successful rehabilitation and restoration.

Impacts on soil resources are expected to occur as follows:

- Erosion and sedimentation.
- Soil compaction.
- Soil pollution/contamination.

9.2.3.1 Significance of Impacts

The above impacts on soil resources will be negative but site specific. With mitigation, the impact can be controlled but not prevented and will remain low to moderate in significance.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Erosion and sedimentation	-11,00	-5,50	-7,33
Soil compaction	-11,00	-7,50	-10,00
Soil pollution/contamination	-11,00	-5,50	-7,33

The following mitigation types have been associated with potential impacts on soil:

- Avoid and control through preventative measures (soil placement, storm water infrastructure, erosion control structures).
- Avoid through implementation of EMPR mitigation measures
- Remedy through application of treatment measures (e.g. ripping).
- Avoid through preventative measures (e.g. bunding, spill kits).
- Remedy through clean-up and waste disposal.
- Modify through soil treatment if required.

9.2.4 Impacts on Land Capability

Land capability is closely linked to the soil. Mining operations have the potential to significantly transform the land capability, often irreparably. The types of impacts related to land capability involve post mining compaction, loss of fertility, impeded soil drainage and insufficient depth of the replaced soil. In many cases, mining may result in the land capability class changing from arable to grazing post closure. The loss of potentially productive agricultural land, along with a reduction in land capability may occur as a result of site sterilisation due to mining activities. Some impacts such as acidification and loss of original soil depth and volume can be permanent and will reduce the capability post closure.

Impacts on land capability are expected to occur as follows:

- Loss of soil fertility (denitrification, loss of soil nutrient store and organic carbon stores) and loss of land capability.
- Loss of soil resource and its utilisation potential.

- The land will be transformed to arable land after a successful rehabilitation.

9.2.4.1 Significance of Impacts

The above impacts on land capability will be negative but site specific. They are long term impacts and are expected to last for the duration of the life of the mine and in some cases the disturbance will be permanent. With mitigation, the impact can be controlled but not prevented and some impacts will be permanent.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	-12,00	-11,00	-12,83
Loss of soil resource and its utilisation potential	-12,00	-11,00	-12,83

The following mitigation types are associated with potential impacts on land capability:

- Avoid through preventative measures (e.g. limit area of disturbance).
- Remedy through soil remediation if required (e.g. fertilizer and organic matter applications)

9.2.5 Impacts on Land Use

The predominant land use in the surrounding area is grassland. Mining activities have the potential to affect land uses within the application area and in the surrounding areas. This can be caused by physical transformation of land through direct or indirect impacts. Impacts may be related to factors such as loss of soil, loss of biodiversity, pollution of water, dewatering, air pollution, noise pollution, and damage/destruction from blasting. The nature of opencast mining is such that it is unlikely that mining and other land uses can coexist. This means that any area utilised for opencast mining will be unavailable for other land uses.

Impacts on land use are expected to occur as follows:

- Damage/Disruption of services (such as water and power supply, etc.).
- Interference with existing land uses.

9.2.5.1 Significance of Impacts

The above impacts on land use will be negative but site specific. With mitigation, the impact can be controlled but not prevented and will remain low in significance.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Damage/Disruption of services (such as water and power supply, etc.)	-9,00	-5,00	-5,00
Interference with existing land uses.	-9,75	-7,50	-8,75

The following mitigation types have been associated with potential impacts on land use:

- Avoid through implementation of EMPR mitigation measures (e.g. service detection and communication with landowners).
- Remedy through repair or reinstatement of services if required.

9.2.6 Impacts on Fauna and Flora

The mining activities and the establishment of the supporting infrastructure have the potential to result in loss of vegetation, habitat disruption, loss of ecosystem functionality, habitat transformation, spread of alien invasive species, a reduction in overall biodiversity, increased hunting of animals, the introduction of new species to the site and disruption of migration routes.

Mining and associated activities may result in the removal and destruction of primary vegetation communities. These communities may be in threat categories according to NEMBA or important according to the Mpumalanga C-Plan.

Disturbances to the site may result in an increase of invasive species on site and on downstream and adjacent properties. Increased erosion may alter the drivers that affect wetland vegetation. Several pollutants associated with mining activities including oil, concrete and dust have the potential to inhibit plant growth and germination and could potentially result in plant mortality. Mining alters the movement of water through the landscape, potentially affecting the hydrological flow regime which is the main driver of natural vegetation.

Threatened animal species are affected primarily by the overall loss of habitat, as direct mining impacts on individuals can often be avoided due to movement of individuals from the area of disturbance. Direct impacts during mining activities are unlikely to have an impact on individual animals of concern, as most are highly mobile and will move out of the area. During operation, birds could potentially suffer mortality due to collisions with vertical infrastructure, especially infrastructure with low visibility, such as powerlines.

Impacts on fauna and flora are expected to occur as follows:

- Direct and indirect mortality of flora and fauna.
- Habitat fragmentation and blockage of seasonal and dispersal movements.
- Introduction/invasion by alien (non-native) species.

9.2.6.1 Significance of Impacts

The above impacts fauna and flora will be negative for the duration of the Mining Permit period. With mitigation, the impact can be controlled but not prevented and will remain low to moderate in significance.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Direct and indirect mortality of flora and fauna	-12,00	-7,50	-8,75
Habitat fragmentation and blockage of seasonal and dispersal movements	-10,00	-6,00	-6,00
Introduction/invasion by alien (non-native) species	-6,75	-3,50	-4,08

The following mitigation types are associated with potential impacts fauna and flora:

- Control through implementation of EMPR mitigation measures (e.g. limit area of disturbance, maintaining corridors and alien vegetation management plan).
- Avoid/stop through relocation of threatened or protected species.

9.2.7 Impacts on Surface Water Resources

Mining activities have the potential to alter surface water features through actual mining methods employed as well as the placement of infrastructure. Hydrocarbon spills from diesel machinery also pose threats to local water resources. Surface infrastructure can result in the diversion of surface runoff to storm water dams resulting in a decrease in the quantity of water entering local resources. Should surface water become contaminated it could have impacts on downstream users, resulting in affected livelihoods and supply problems.

Impacts on surface water are expected to occur as follows:

- Pollution of surface water resources/decreased water quality.
- Decrease in surface water availability.

9.2.7.1 Significance of Impacts

The above impacts on surface water will be negative and are expected to last for the duration of the Mining Permit period. With mitigation, the impact can be controlled but not prevented.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Pollution of surface water resources/decreased water quality	-8,25	-4,50	-5,25
Decrease in surface water quantity/availability	-5,50	-4,50	-5,25

The following mitigation types are associated with potential impacts on surface water resources:

- Avoid through implementation of preventative measures (e.g. bunding, hazardous materials management, pollution prevention measures and storm water management).
- Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimisation of water usage and recycling).

9.2.8 Pollution of Groundwater

Mining activities have the potential to impact on groundwater resources through potential pollution and/or contamination as a result of activities such as the actual mining method employed and resultant geological exposure of oxidising materials, seepage, spillages and both mineralised and non-mineralised waste streams.

9.2.8.1 Significance of Impact

The above impacts on groundwater will be negative and are expected to last for the duration of the Mining Permit period. Mitigation is possible and effective if implemented correctly.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Pollution of groundwater	-13,00	-6,00	-7,00

The following mitigation types have been associated with potential impacts on groundwater:

- Avoid and control through implementation of preventative measures (e.g. mine design and progressive rehabilitation).
- Avoid and control through implementation of preventative measures (e.g. bunding, hazardous materials management, Pollution prevention measures).

9.2.9 Impacts of Environmental Pollution

Environmental pollution refers to any contamination of the environment resulting from mining activities. The types of impacts related to environmental pollution include hydrocarbon spills, sewage spills, and decant from underground workings. Environmental pollution can affect surface water, groundwater, wetlands, soil resources, and air quality. Poorly designed wash bays, accidental spillages, related water facilities on site, hydrocarbon spills from heavy machinery and vehicles onsite, the removal or capping of waste products from the site, the intentional washing and rinsing of equipment, storage and use of hydrocarbons and other hazardous materials including cement, and improper waste handling, storage and disposal can all be sources of environmental pollution.

Impacts of environmental pollution are expected to occur as follows:

- General environmental pollution.
- Hydrocarbon spills/contamination.
- Sewage spills/contamination.

9.2.9.1 Significance of Impact

The above impacts of environmental pollution will be negative and are expected to last for the duration of the Mining Permit period. Mitigation is possible and effective in most cases.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
General environmental pollution	-13,00	-6,00	-7,00

Hydrocarbon spills/contamination	-10,50	-4,00	-4,67
Sewage spills/contamination	-9,00	-4,50	-5,25

The following mitigation types have been associated with potential impacts on environmental pollution:

- Avoid through implementation of suitable progressive rehabilitation and soil management.
- Control/remedy through interception of decant and treatment of polluted water where required.
- Avoid and control through implementation of EMPR mitigation measures (e.g. spill prevention, hydrocarbon storage).
- Avoid through preventative measures (e.g. bunding, spill kits).
- Remedy through clean-up and waste disposal.
- Modify through soil treatment if required.
- Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management).

9.2.10 Impacts on Heritage Resources

No heritage were encountered during site visit if any encountered during construction a specialist must be appointed and the contractors must be informed about the potential impacts that the proposed mining development may have on heritage resources (if any) located in the study area. In addition, the document aims to inform the Mpumalanga Province Heritage Resource Agency (MPHRA) and the South African Heritage Resource Agency (SAHRA) Burial Ground and Graves Unit about the presence, absence and significance of heritage resources that may be located within the proposed mining permit application site.

9.2.10.1 Significance of Impact

If the provided mitigation measures are implemented any disturbance to heritage features can be minimised. Any destruction of heritage features is considered permanent. If the provided mitigation measures are implemented any disturbance to heritage features can be minimised.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Discovery and	-10,00	-3,50	-4,67

preservation of fossils.			
Destruction/damage of palaeontological resources	-11,00	-3,50	-4,67
Destruction/damage of heritage resources	-7,50	-3,00	-4,00

The following mitigation types have been associated with potential impacts on heritage resources:

- It is advised that the SAHRA/ MPHRA is alerted when work on site begins.
- Strict and clear reporting procedures for chance findings must be followed by and its contractors throughout the mining phase.
- Although the burial site was recorded outside the mining permit application site, it is the responsibility of the applicant to protect the graves during the operational phase of the mine.
- The proposed mining development must provide at least 100m buffer zone from the recorded burial site.
- The burial site must be mapped and clearly marked to avoid any accidental damage to the graves.

9.2.11 Social Impacts

It is important to understand the difference between a social change process and a social impact. Social change processes are set in motion by project activities or policies. Social change processes can be measured objectively, independent of the local context. Examples of a social change process are increase in the population, relocation or presence of temporary workers. Under certain circumstances these processes may result in social impacts, but if managed properly these changes may not create impacts. Whether impacts are caused will depend on the characteristics and history of the host community, and the extent of mitigation measures that are put in place (Vanclay, 2003).

A social impact is something that is experienced or felt by humans. It can be positive or negative. Social impacts can be experienced in a physical or perceptual sense. Social impacts can be either objective or subjective. Objective social impacts can be quantified and verified by independent observers in the local context, such as changes in employment patterns, in standard of living or in health and safety. Subjective social impacts occur "in the heads" or emotions of people, such as negative public attitudes, psychological stress or reduced quality of life. It is very likely that a number of social changes processes will be set in motion by the project. Whether these processes result in social impacts will depend on the successful implementation of the suggested mitigation measures.

Impacts on the social environment are expected to occur as follows:

- Crime and violence.
- Influx of migrant workers.
- Loss of sense of place.
- Social vices.

9.2.11.1 Significance of Impacts

Social impacts will be negative and site specific. Social impacts will remain for the duration of the Mining Permit period and have an overall to moderate significance. With mitigation, the impacts can be controlled but not prevented.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Crime and violence	-12,00	-5,00	-5,00
Influx of migrant workers	-13,00	-12,00	-12,00
Loss of sense of place	-9,00	-5,25	-5,25
Social vices	-9,00	-8,25	-8,25

The following mitigation types have been associated with potential social impacts:

- Avoidance and control through preventative measures (e.g. site security, code of conduct).
- Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct).

9.2.12 Socio-Economic Impacts

The study of economic development, which is generally broad in its scope, refers to the standard of living of citizens; most often measured by GDP per capita, literacy rate, and life expectancy. Economic development incorporates many elements of pure macro-economics, such as price stability, high employment, and sustainable growth. However, this is underpinned by the study of infrastructure and social development programmes, such as education, housing, and road networks. Mine operations have the potential to positively or negatively influence/affect the economic environment of the area. Mines contribute directly towards employment, procurement, skills development and taxes on a local, regional and national scale. In addition, mines indirectly contribute to economic growth in the local and regional economies because the increase in the number of income earning people has a multiplying effect on the trade of other goods and services in other sectors.

However, the introduction of a mine into an area can have undesirable implications in the surrounding environment. This is because changes occur not only to the pre-existing land uses but also to the existing associated social structures and general way of life. The closure phase of the mine can have highly negative impacts because the surrounding environment loses the economic support that it receives during the operation of the mine. To ensure the economic safety of the communities which are affected by the mining operations, mitigation measures post closure of the mine will need to consider the economic environment of the communities and address these impacts effectively.

Impacts on the socio-economic environment are expected to occur as follows:

- Coal supply for metallurgical companies.
- Economic growth.
- Education, skills development and training.
- Employment opportunities.

9.2.12.1 Significance of Impacts

The socio-economic impact will be positive in nature and of short-term duration over the region. Considering the levels of unemployment in the area, the significance is moderate. The impact is definite but will only be temporary as employment positions will be lost once the mining activities cease. Implementation of mitigation measures will help maximise the positive impact of the mining operation.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Coal supply for metallurgical companies	13,00	18,75	21,88
Economic growth	6,00	12,00	14,00
Education, skills development and training	5,50	8,25	9,63
Employment opportunities	9,00	12,00	14,00

The following mitigation types are associated with potential socio-economic impacts:

- Maximise through optimisation of economic growth opportunities.

- Maximise employment opportunities, skills development and training.
- Minimise impacts of job loss through compensation, skills development and livelihood restoration.
- Avoid through implementation of preventative measures (e.g. consultation and communication).
- Maximise security of Coal supply through sound and responsible mine management.

9.2.13 Impacts on Health and Safety

It is important to recognise that mining activities, equipment, and infrastructure can increase community exposure to risks and impacts. The mining activities can result in a possible increase in crime due to increased number of strangers in the community. Hazardous structures and excavations may pose a threat to community safety if not correctly located, properly designed and correctly managed. By way of example, excavations may pose a risk to animals and people if not properly managed to prevent unauthorised access. The use of hazardous materials on the mine may result in a community health and safety risk if these materials are not stored, handled and disposed of in an appropriate manner. For example, the storage and use of explosives may represent a safety risk if appropriate controls and procedures are not followed.

Fly rock in particular may pose a risk to people, animals and infrastructure within close proximity to the mine. The use of public roads for hauling Coal will result in increased safety risks for members of the community and public utilising these roads. Mining activities have the potential to increase the risk of accidental fires. Impacts on ecosystem services can impact on communities, particularly where these communities rely on these ecosystem services (e.g. water from watercourses) for their livelihoods. The contamination or degradation of natural resources, such as adverse impacts on the quality, quantity, and availability of freshwater, may result in health- related risks and impacts. Land use changes may result in the loss of natural buffer areas such as wetlands, and impacts to natural vegetation areas that mitigate the effects of natural hazards such as flooding, landslides, and fire, may result in increased vulnerability and community safety-related risks and impacts. An influx of people to the mining area seeking employment may the increase the risk for community exposure to waterborne, water based, water-related, and vector borne and communicable diseases.

Impacts on health and safety are expected to occur as follows:

- Fire and explosion hazard.
- Fly rock
- Health impacts.

9.2.13.1 Significance of Impacts

The socio-economic impact will be positive in nature and of short-term duration over the region. Considering the levels of unemployment in the area, the significance is moderate. The impact is definite but will only be temporary as employment positions will be lost once the mining activities cease. With mitigation, the impact can be controlled but not prevented.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Fire and explosion hazard	-7,50	-4,50	-5,25
Fly rock	-7,50	-4,50	-5,25
Health impacts	-12,50	-6,00	-7,00

The following mitigation types are associated with potential impacts on health and safety:

- Avoidance and control through preventative measures (e.g. HIV/AIDS awareness).
- Remedy through application of mitigation measures in EMPR.
- Avoid and control through implementation of preventative measures (e.g. fire breaks, blasting procedures, hazardous substances management).
- Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures).

9.2.14 Impacts on Transportation, Infrastructure and Traffic

In terms of potential impacts, the mine will result in increased use of the local road network which may result in the deterioration of road surfacing, damage to bridges and culverts in the area, and safety risks to surrounding communities. This will be predominantly due to the increase in transport of heavy machinery, and vehicles carrying Coal and labour for mining activities. Increased traffic may have repercussions on safety for other road users, predominantly by increasing the potential for road accidents in nearby communities.

Impacts on transportation, infrastructure, and traffic are expected to occur as follows:

- Damage to road infrastructure.
- Increased traffic.

9.2.14.1 Significance of Impacts

The impacts on transportation, infrastructure, and traffic will be negative. With mitigation, the impact can be controlled but not prevented and will remain low to moderate in significance.

Impact	Pre-Mitigation Score	Post-Mitigation	Final Significance Score

		Score	
Damage to road infrastructure	-11,00	-4,00	-4,67
Increased traffic	-12,00	-10,00	-10,00

The following mitigation types have been associated with potential impacts on transportation, infrastructure and traffic:

- Avoid and control through implementation of EMPR mitigation measures (e.g. speed limit enforcement and vehicle maintenance).

9.2.15 Visual Impact

Considering the rural setting of the application area and the mountain backdrop, it is anticipated that the introduction of mining structures and related activities would create strong contrast with the existing landscape characteristics. During mining, it is expected that there will be haul trucks and other mine vehicles on the roads. This, along with the removal of vegetation, dust generation and preparation of opencast mining areas will result in a negative impact on the visual aspect. Operational areas may require lighting at night for safety reasons.

The visual impact is expected to occur as follows:

- Visual impact of mine infrastructure, stockpiles and dust.

9.2.15.1 Significance of Impact

The impact on transportation, infrastructure, and traffic will be negative. Mitigation is possible and effective if implemented correctly.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Visual impact of mine infrastructure, stockpiles and dust	-9,00	-5,25	-5,25

The following mitigation types have been associated with the potential visual impact:

- Avoid and control through implementation of EMPR mitigation measures (e.g. directional down lighting, dust suppression, mine planning and progressive rehabilitation).

9.2.16 Impacts on Air Quality

Existing sources of emissions in the region and the characterization of existing ambient pollution concentrations is fundamental to the assessment of cumulative air impacts. A change in the ambient air quality can result in a variety of impacts which in turn may cause a disturbance to and/or health impacts on nearby receptors. Sensitive receptor sites include residential areas, communities, and natural environments. Mining activities have the potential to result in increased levels of atmospheric dust, increased concentrations of PM10 (Particulate Matter with an aerodynamic diameter of less than 10µm) and increased concentrations of PM2.5 (Particulate Matter with an aerodynamic diameter of less than 2.5µm). Historical evidence indicates that the pollutant of concern associated with open-cast mining operations is particulate matter creating a dust source and resulting in human health concerns and nuisance.

Impact on air quality is expected to occur as follows:

- Fugitive emissions (Dust).

9.2.16.1 Significance of Impact

The impact on air quality will be negative. With mitigation, the impact can be controlled but not prevented and will remain low in significance.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Fugitive emissions (Dust)	-13,00	-7,50	-8,75

The following mitigation types have been associated with potential impacts on air quality:

- Avoid and control through implementation of EMPR mitigation measures (e.g., vehicle maintenance and progressive rehabilitation).
- Avoid through preventative measures (e.g., speed limit enforcement).
- Control through implementation of EMPR mitigation measures (e.g., dust suppression).

9.2.17 Noise Impact

Certain noise generating activities associated with mining operations can cause an increase in ambient noise levels in and around the site. Significant noise is associated with opencast and plant (including workshops) activities. A source of noise during the operational phase will be traffic to and from the site, traffic around the facility, RoM and product transport and activities associated with waste management. In some cases, mining and related activities may result in an increase in noise levels above the allowable thresholds. Whilst studies show that the response differs greatly between species, noise typically disturbs animals and results in them moving away from the source of noise or becoming adapted to the noise. Some of the typical effects that disturbing noise may have on sensitive receptors include interference with daily activities (work, leisure and sleeping), hindered speech communication, impeded thinking process and interference with concentration. Mine workers in very close proximity to noisy activities would be at risk to hearing damage if the proper precautions (e.g. use of personal protective equipment) are not taken.

The impact of noise is expected to occur as follows:

- Disturbing and/or nuisance noise

9.2.17.1 Significance of Impact

The impact of noise will be negative and will remain for the duration of the Mining Permit period. With mitigation, the impact can be controlled but not prevented and will remain low in significance.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Disturbing and/or nuisance noise	-9,00	-5,50	-6,42

The following mitigation types have been associated with the potential noise impact:

- Avoid through preventative measures (e.g. communication with landowners and timing of activities).
- Control through implementation of EMPR mitigation measures (e.g. noise abatement measures).

9.2.18 Blasting and Vibration

The application of explosives for breaking rock will always have an effect on the surrounding environment. These effects can manifest in the form of ground vibration, air blast, fumes, fly rock and noxious fumes. These short duration events may be noticeable by communities and individuals living in the immediate environment. These events tend to cause nuisance and elicit an emotive response because of resonance because they are easily recognised as being related to blasting.

Impacts of blasting and vibration are expected to occur as follows:

- Ground vibration and human perception.
- Impacts on infrastructure (roads, communications infrastructure, services, houses, boreholes).
- Noxious fumes.

9.2.18.1 Significance of Impacts

The impacts of blasting and vibration will be negative and will remain for the duration of the Mining Permit period. Mitigation is possible and is effective in most cases.

Impact	Pre-Mitigation Score	Post-Mitigation Score	Final Significance Score
Air blast	-12,00	-6,00	-7,00
Ground vibration and human perception	-12,00	-8,25	-9,63
Impacts on infrastructure (roads, communications infrastructure, services, houses, boreholes	-12,00	-8,25	-9,63
Noxious fumes	-12,00	-8,25	-9,63

The following mitigation types are associated with potential blasting and vibration impacts:

- Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures).

10 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

No alternatives have been investigated as the activity or project is solely dependent on the underlying geology, prospecting results and historical mining operations on the property, as well as surrounding areas which indicate that economically viable mineral resources occur within the application area.

11 STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE

No alternative development location within the overall site was selected as no alternatives were considered.

12 FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) THROUGH THE LIFE OF THE ACTIVITY

The impact assessment process may be summarised as follows:

- Identification of proposed mining activities including their nature and duration.
- Screening of activities likely to result in impacts or risks.
- Utilisation of the above-mentioned methodology to assess and score preliminary impacts and risks identified.
- Inclusion of I&AP comments regarding impact identification and assessment.
- Finalisation of impact identification and scoring.

The impact significance rating methodology is guided by the requirements of the NEMA 2014 EIA Regulations (as amended). Please refer to Section 10.1 for a full description of the impact assessment methodology. Please refer to **Error! Reference source not found.** for a description of the activities and a ssociated impacts.

13 IMPACT ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

Table 23: Impact significance table.

IMPACT DESCRIPTION						
Aspect	Main Activity/Action/Process	Impact	Phase	Pre-Mitigation	Post-Mitigation	Final Score
Social	Site establishment	Safety and security risks to landowners and lawful occupiers	Planning		-8,00	-9,33
		Interferenc				

Social	Site establishment	e with existing land uses	Planning		-5,25	-5,25
Social	Site establishment	Sense of place	Planning		-5,25	-5,25
Social	Site establishment	Safety and security risks to landowners and lawful occupiers	Construction		-8,00	-9,33
Social	Site establishment	Interference with existing land uses	Construction		-5,25	-5,25
Social	Site establishment	Sense of place	Construction		-5,25	-5,25
Social	General mine manage	Crime and	Operation		-5,00	-5,00

	ment	violence				
Social	General mine manage ment	Influx of migrant workers	Operation		-12,00	- 12,00
Social	General mine manage ment	Sense of place	Operation		-5,25	-5,25
Social	General mine manage ment	Social vices	Operation		-8,25	-8,25
Socio-economic	Mining	Coal supply	Operation		18,75	21,88
Socio-economic	Mining	Economic growth	Operation		12,00	14,00

Socio-economic	Mining	Education, skills development and training	Operation		8,25	9,63
Socio-economic	Mining	Employment opportunity	Operation		12,00	14,00
Health and safety	Maintenance and operation of site infrastructure and facilities	Fire and explosion hazard	Operation		-4,50	-5,25
Health and safety	Opencast mining	Fly rock	Operation		-4,50	-5,25

IMPACT DESCRIPTION						
Aspect	Main Activity/Action/Process	Impact	Phase	Pre-Mitigation	Post-Mitigation	Final Score
Health and	Opencast	Health impacts	Operation	-12,50	-6,00	-7,00

safety	mining					
Land capability	Maintenance and operation of site	Loss of soil fertility, soil resource and its utilisation potential	Operation	-12,00	-11,00	-12,83
Land use	Opencast mining	Impacts on services	Operation	-9,00	-5,00	-5,00
Land use	Opencast mining	Interference with existing land uses	Operation	-9,75	-7,50	-8,75
Soil	Opencast mining	Soil compaction	Operation	-11,00	-7,50	-10,00
Soil	Opencast mining	Soil pollution/contaminati on	Operation	-11,00	-5,50	-7,33
Soil	Opencast mining	Erosion and sedimentation	Operation	-11,00	-5,50	-7,33
Topography and landform	Opencast mining	Alteration of topography	Operation	-15,00	-13,75	-13,75
Topography and landform	Opencast mining	Altered drainage patterns	Operation	-11,00	-5,00	-5,00
Transportati						

on, infrastructure and traffic	Opencast mining	Soil surface subsidence	Operation	-10,00	-4,00	-4,67
Transportation, infrastructure and traffic	Opencast mining	Damage to infrastructure	Operation	-11,00	-4,00	-4,67
Transportation, infrastructure and traffic	Opencast mining	Increased traffic	Operation	-12,00	-10,00	-10,00
Visual	Opencast mining	Visual impact of mine infrastructure, stockpiles and dust	Operation	-9,00	-5,25	-5,25
Air quality	Opencast mining	Fugitive emissions (dust)	Operation	-13,00	-7,50	-8,75
Blasting and vibration	Opencast mining	Ground vibration and human perception	Operation	-12,00	-8,25	-9,63
Blasting and vibration	Opencast mining	Impact on infrastructure	Operation	-12,00	-8,25	-9,63
Blasting and vibration	Opencast mining	Noxious fumes	Operation	-12,00	-8,25	-9,63

Noise	Opencast mining	Noise generation	Operation	-9,00	-5,50	-6,42
Fauna and flora	Opencast mining	Direct and indirect mortality of flora and fauna	Operation	-12,00	-7,50	-8,75
Fauna and flora	Opencast mining	Habitat fragmentation and blockage of seasonal and dispersal movements	Operation	-10,00	-6,00	-6,00
Fauna and flora	Opencast mining	Introduction/invasion by alien (non-native) species	Operation	-6,75	-3,50	-4,08

IMPACT DESCRIPTION						
Aspect	Main Activity/Action/Process	Impact	Phase	Pre-Mitigation	Post-Mitigation	Final Score
Surface water	Opencast mining	Pollution of surface water resources/decreased water quality	Operation	-8,25	-4,50	-5,25
Surface water	Opencast mining	Decrease in surface water	Operation	-5,50	-4,50	-5,25

		availability				
Ground water	Opencast mining	Pollution of groundwater	Operation	-13,00	-6,00	-7,00
Heritage	Opencast mining	Discovery and preservation of fossils	Operation	-10,00	-3,50	-4,67
Heritage	Opencast mining	Destruction/ damage of palaeontological resources	Operation	-11,00	-3,50	-4,67
Heritage	Opencast mining	Destruction/damage of heritage resources	Operation	-7,50	-3,00	-4,00
Geology	Opencast mining	Impacts on geology	Operation	-14,00	-18,75	-25,00
Environmental Pollution	Opencast mining	General environmental pollution	Operation	-13,00	-6,00	-7,00
Environmental Pollution	Opencast mining	Hydrocarbon spills/contamination	Operation	-10,50	-4,00	-4,67
Environmental Pollution	Opencast mining	Sewage spills/contamination	Operation	-9,00	-4,50	-5,25
	Decommission					

Soil	ing of surface infrastructure	Soil compaction	Decommissioning	-11,00	-7,50	-10,00
Visual	Decommissioning of surface infrastructure	Visual impact of mine infrastructure, stockpiles and dust	Decommissioning	-9,00	-5,25	-5,25
Noise	Decommissioning of surface infrastructure	Noise generation	Decommissioning	-9,00	-5,50	-6,42
Surface water	Decommissioning of surface infrastructure	Pollution of surface water resources/decreased water quality	Decommissioning	-8,25	-4,50	-5,25
Ground water	Decommissioning of surface infrastructure	Pollution of groundwater	Decommissioning	-13,00	-6,00	-7,00
Environmental Pollution	Decommissioning of surface infrastructure	General environmental pollution	Decommissioning	-13,00	-6,00	-7,00
Soil	Surface rehabilitation	Erosion and sedimentation	Rehab and closure	-11,00	-5,50	-7,33
Topography and landform	Surface rehabilitation	Altered drainage patterns	Rehab and closure	-11,00	-5,00	-5,00
Environmental Pollution	Surface	General environmental pollution	Rehab and	-13,00	-6,00	-7,00

	rehabilitation		closure			

Summary of specialist reports

This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form.

List of studies undertaken	**Recommendations of specialist reports**	**Specialist recommendations included in the BASIC ASSESSMENT report** Mark with an X where applicable	**Reference to applicable report section** Where specialist recommendations have been included
Soil Study	• The proposed mining land should be returned to its origin as before mining activities and the rehabilitation performance assessment in the proposed land must be done progressively (annually) during the operational phase by a soil specialist. • Final surface rehabilitation of all disturbed areas during mining activities. Rehabilitation of unnecessary water management facilities once appropriate to do so. • Specialists should be used to evaluate the erosion and other possible impacts during the entire mining process. • Limit impacts to the footprints to keep physical impacts as small as possible. Areas for road, site lay-out should be minimized, dust generation. • Ensure all stockpiles (especially topsoil) are clearly and permanently demarcated and located in defined no-go areas. • Stockpile height should be restricted, A maximum height of 2-3 m is therefore	**X**	Appendix 8

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations included in the BASIC ASSESSMENT report Mark with an X where applicable	Reference to applicable report section Where specialist recommendations have been included
	proposed. • Stockpiles should also be always kept free of alien vegetation to prevent loss of soil quality. • The recovered soil should be re-used to rehabilitate the mine footprint following mine closure.		
Hydrogeological Study	• In the northeast direction, there are water bodies, the construction should take into consideration of surface drainage systems to ensure surface water is not polluted. • The study area falls on a fractured aquifer system, the mine planning should take into consideration the fracture zones in the Vryheid formation, drilling activities should not contact the fractures as that is where most groundwater in the area is found and to prevent possible groundwater pollution from residual explosive material used. • The numerical model should be recalibrated as soon as more hydrogeological data such as monitoring holes are made available. This would enhance model predictions and certainty. • It is recommended that there should be regular testing or monitoring of surrounding soil, water resources to detect any change in chemistry so that	**X**	Appendix 8

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations included in the BASIC ASSESSMENT report Mark with an X where applicable	Reference to applicable report section Where specialist recommendations have been included
	remedial measures are implemented in time. • There should be soil, water resources and land pollution mitigation measures on site. • Wastewater source should be identified, and mitigation measures put in place to prevent groundwater contamination. • The stockpile, there should be regular monitoring of any heavy metal which could be exposed, could result in leaching during rainfall. • Proper and competent structure of the tailings dam should be built, to contain liquid, or solid waste and to prevent such waste from entering the outside environment. • According to section 21(S21) of the National Water Act 36 of 1998, if a proposed project triggers any of the listed S21 activities, a water use license must be applied for. For this project, there will be activities which includes abstraction of water from groundwater, mining activities within 100 m from the water courses dust suppression, dewatering and ROM stockpiles. It is therefore recommended that a water use license be applied for. • Should the perennial river in the north direction of the mining permit be diverted for path of any development, it should be directed in a way that it is		

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations included in the BASIC ASSESSMENT report Mark with an X where applicable	Reference to applicable report section Where specialist recommendations have been included
	still sustainable as that river will be used for monitoring purposes. • It is recommended that throughout the mining project, compliance of NEMA Act 107 of 1998, NWA Act 36 of 1998, NEM: Waste Management Act 58 of 1998.		
Hydrological Study	• Proper stormwater management is recommended to prevent the risk of water resources contamination. • The study area falls on a fractured aquifer system, the mine planning should take into consideration the fracture zones in the Vryheid formation, drilling activities should not contact the fractures as that is where most groundwater in the area is found and to prevent possible groundwater pollution from residual explosive material used. • The numerical model should be recalibrated as soon as more hydrogeological data such as monitoring holes are made available. This would enhance model predictions and certainty. • It is recommended that there should be regular testing or monitoring of surrounding soil, water resources to detect any change in chemistry so that remedial measures are implemented in time. • The monitoring process throughout the existence of the project, the chemical	**X**	Appendix 8

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations included in the BASIC ASSESSMENT report Mark with an X where applicable	Reference to applicable report section Where specialist recommendations have been included
	and physical parameters of the water samples should be tested and compared with the SANS241: 2015. • There should be soil, water resources and land pollution mitigation measures on site. • Wastewater source should be identified, and mitigation measures put in place to prevent groundwater contamination. • The stockpile, there should be regular monitoring of any heavy metal which could be exposed, as such could result in leaching during rainfall. • Proper and competent structure of the tailings dam should be built, to contain liquid, or solid waste and to prevent such waste from entering the outside environment. • According to section 21(S21) of the National Water Act 36 of 1998, if a proposed project triggers any of the listed S21 activities, a water use license must be applied for. For this project, there will be activities which include abstraction of water from groundwater, mining activities within 100 m from the water courses dust suppression, dewatering, and ROM stockpiles. It is therefore recommended that a water use license be applied for.		
Rehab Study	• It is recommended that the financial provision for closure and rehabilitation	**X**	Appendix 8

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations included in the BASIC ASSESSMENT report Mark with an X where applicable	Reference to applicable report section Where specialist recommendations have been included
	be annually updated as per the requirements of the MPRDA. • Surface water monitoring of the pans and associated wetlands surrounding the project area is to be undertaken to determine the impacts associated with operations of the mine. • Regular audits should be undertaken by a soil scientist during the soil stripping process. This will guarantee that soil is stripped and stockpiled correctly. • Regular audits should be undertaken to monitor the progress of areas that have been rehabilitated. • Long term management of the rehabilitated areas will be required via contractual agreements with landowners in the area and rehabilitation should also be undertaken to best practice. • An independent Environmental Assessment Practitioner shall be appointed to ensure compliance with requirements of the Final Rehabilitation, decommissioning and Closure Plan.		

14 ENVIRONMENTAL IMPACT STATEMENT

Based on the impact assessment conducted by the EAP, the environmental impacts associated with the mining activities are expected to be localised and of low to medium significance, with one impact (impact on geology) remaining permanently high even if mitigation measures are implemented. Mitigation measures have been recommended by the EAP and specialists in order to eliminate and/or reduce environmental impacts. These mitigation measures and monitoring programmes have been included as commitment in the Environmental Management Programme. The Environmental Management Programme aims to present management measures that will eliminate, offset or reduce adverse environmental impacts, as well as to provide the framework for environmental monitoring. The primary purpose of the Environmental Management.

Programme is to ensure that negative environmental impacts of the proposed project are effectively managed within acceptable limits and that the positive impacts are enhanced.

In terms of site sensitivities, the most sensitive features which will require protection on site may be summarised as follows:

- Critical Biodiversity Areas
- Watercourses and wetlands.
- Heritage sites (cemeteries).

In terms of positive impacts, the following key benefits have been identified:

- Coal supply for the market.
- Economic growth.
- Employment opportunities.

15 COMBINED SENSITIVITY

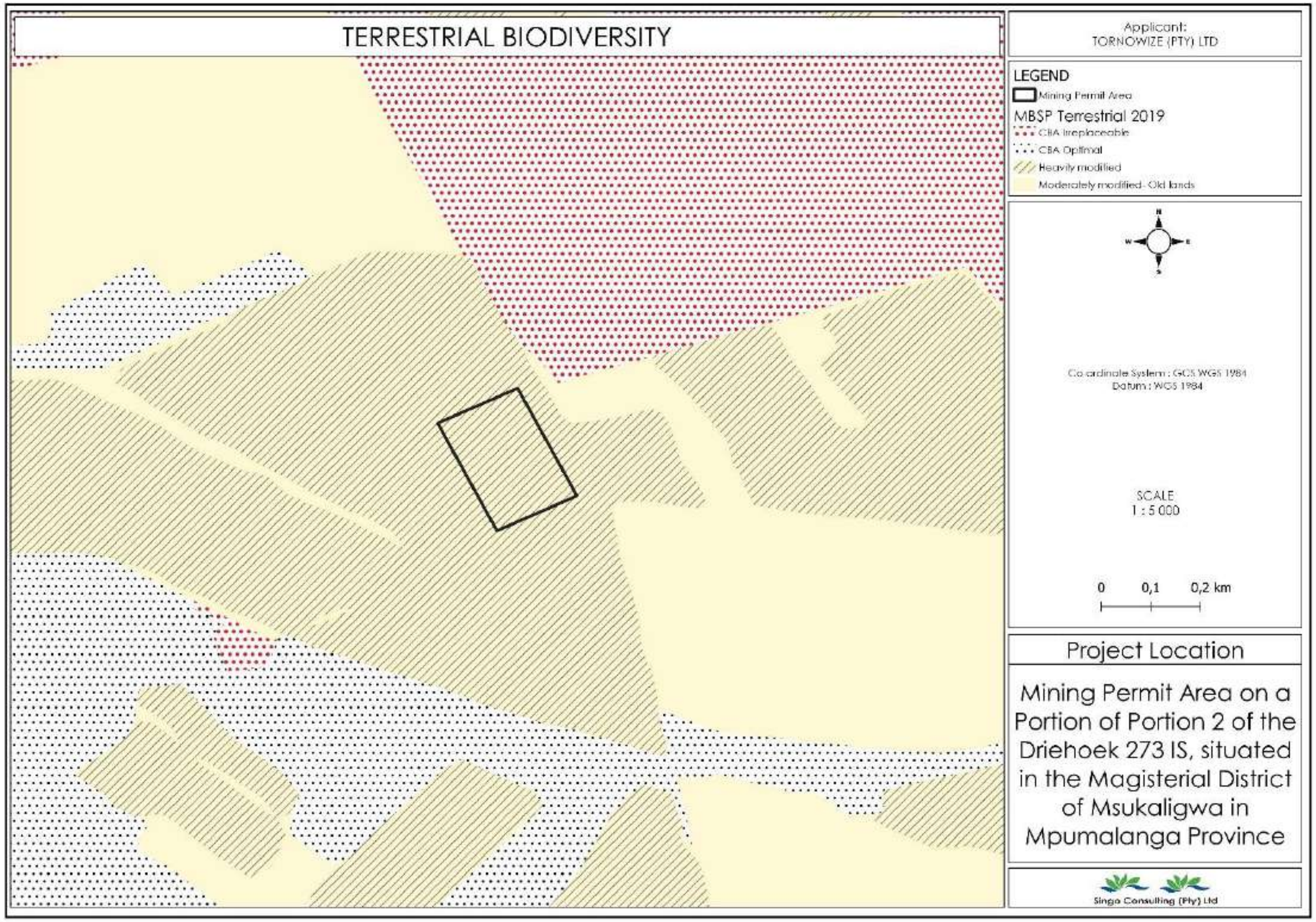


Figure 32: MBSP Terrestrial Map (Singo Consulting GIS Team, 2023)

16 SUMMARY OF POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS

The positive implications of the proposed project include (i) economic growth, (ii) employment, (iii) Coal supply, (iv) education, (v) skills development and (vi) training. In terms of risks and negative implications, the mine will have an adverse effect on the environment. These include impacts to the geophysical, hydrological, biological, and social aspects of the local environment. The most severe risks relate to the potential for water pollution and the destruction of heritage resources. These potential impacts also have legal implications and risks should they not be minimised through the application of mitigation measures.

This Basic Assessment Report and the associated EMPR has identified appropriate mechanisms for avoidance and mitigation of negative impacts. It is anticipated that the implementation of the measures stipulated in this report will result in effective mitigation of the negative impacts. Conversely, the implementation of the mitigation measures is designed to maximise the positive aspects of the project and it will result in a significant positive influence as a result of the small-scale mine's operation. There is a notable risk that may results in relation to influx of employee which may give rise to theft on surrounding farms.

17 PROPOSED IMPACT MANAGEMENT OBJECTIVES AND OUTCOMES

The following potential mitigation measures and residual risks have been provided for each environmental aspect assessed. It is noted that the draft BAR and EMPR report was made available to I&APs for review and comment, and their comments and concerns were addressed in this final report that is submitted to the DMRE for adjudication. Furthermore, it is noted that the results of the public consultation were utilised to update the proposed potential mitigation measures prior to the submission of this finalised BAR and EMPR to the DMRE for decision-making.

As a result of the impact assessment and the specialist studies undertaken, the following principles and objectives have been identified for the management of the proposed Project:

- Socio-Economic

The following socio-economic objectives should be attained during the planning, construction, operation, and decommissioning phases of the mining operations:

- Always adhere to an open and transparent communication procedure with stakeholders.
- Ensure that accurate and regular information is communicated to I&APs.
- Ensure that information is communicated in a manner which is understandable and accessible to

I&APs.

- Enhance project benefits and minimise negative impacts through intensive consultation with stakeholders.
- Assemble adequate, accurate, appropriate, and relevant socio-economic information relating to the context of the operation.
- Ensure that recruitment strategies for the mine prioritizes the sourcing of local labour and share in gender equality.
- Ensure an atmosphere of equality and non-discrimination among the workforce.
- Contribute to the development of functional literacy and numeracy among employees.
- Empower the workforce to develop skills that will equip them to obtain employment in other sectors of the economy.
- Historical and Cultural Aspects

The following objectives should be attained during the planning, construction, operation, and decommissioning phases of the mining operations:

- All heritage sites must be demarcated as No-Go Zones to prevent accidental damage by mining activities.
- A Cultural Heritage Management Plan must be established.
- Topography

The following objectives should be attained during the planning, construction, operation, and decommissioning phases of the mining operations:

- Maintain the integrity of the landscape as far as possible by reinstating the topography to match the surroundings.
- Reinstate vegetation cover to match the surroundings.
- Monitor the reinstated areas to ensure that erosion does not occur.
- Ensure drainage lines are not disturbed as far as possible.
- Create pollution control structures to ensure pollution on site is minimised.
- Geology

The following objectives should be attained during the planning, construction, operation, and decommissioning phases of the mining operations:

- Stockpile slopes should be kept as flat as possible.
- Areas of high danger should be checked regularly for potential subsidence.

- Soil

The following objectives should be attained during the planning, construction, operation, and decommissioning phases of the mining operations:

- Only clear areas needed and keep footprints as small as possible.
- Vegetate topsoil stockpiles as soon as possible. Implement storm water management infrastructures.
- Keep active pit area as small as possible and implement continual rehabilitation.
- Conduct waste classification of overburden material. Backfill opencast as soon as possible to reduce volume of overburden stored on site.
- Land Use

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Preserve soil so that land capability class can be re-established post mining (as far as this is possible).

- Surface Water

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Ensure minimal impact to the surface water resources.
- Ensure that the construction activities are carried out so as to aid rehabilitation during decommissioning.
- Groundwater

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Prevent construction material becoming a source for pollution to the local aquifers.
- Ensure effective management of any accidental spills.
- Flora

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Ensure awareness amongst all staff, contractors and visitors to site to not needlessly damage flora.
- A management plan for the control of invasive alien species needs to be implemented. Specialist advice should be used in this regard. This plan should include pre-treatment, initial treatment

and follow-up treatment and should be planned and budgeted for in advance. The cleared areas after removal should be re-vegetated with indigenous naturally occurring species to decrease large patches of bare soil. The best mitigation measure in this regard is avoiding invasive and/or exotic species from being established. It is vital that the control of alien invasive species is ongoing.

- No foraging, food and wood collecting within the veld should be allowed.
- Eliminate alien invasive and exotic plants.
- Minimise and limit the destruction or disturbance of vegetation of the proposed mining areas and mine infrastructure. The vegetation removal should be controlled and should be very specific.
- Prevent the destruction of natural and/or pasture vegetation of the surrounding areas that will not be mined.
- Prevent heavy machinery and light vehicles driving through natural vegetation that will not be disturbed by the proposed activities.
- Prevent the destruction of vegetation in areas prone to soil erosion.
- Remove and relocate any rare and endangered species within the areas where the natural vegetation will be destroyed.
- Prevent any pollution of natural vegetation, wetlands and red data species.
- Fauna

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Fauna (domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.
- Activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act 71 of 1962). Workers should also be advised on the penalties associated with the needless destruction of wildlife, as set out in this act.
- Appoint an ECO to oversee the activities and ensure that ecological aspects are kept in mind.
- Priority species, specifically nests if encountered, should be identified first and a management plan should be established for each of the priority species.
- Continuous rehabilitation and clean-up of the area should be implemented during the operational phase.
- Limit activities (transport etc.) to the smallest area possible. This is to prevent fragmentation that may have irreversible changes to faunal communities. It also increases the invasion of

alien/foreign species.

- A management plan for the control of invasive and exotic plant species needs to be implemented (if required).
- No camping activities or other contractor camps should be allowed on Project and this practice will be a good investment in preventing more impacts, noise and waste or possibly the spread of fires.
- Air Quality

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Implement dust suppression in and around site as needed.
- Vehicles must be regularly serviced.
- By minimising the removal of vegetation and topsoil in affected area, this will minimise the potential for dusty conditions.
- Vehicles utilising public gravel roads must adhere to the speed limits.

- Noise

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- All vehicles and machinery must be maintained in good working order.
- When working or traveling past noise sensitive receptors, no unnecessary hooting or noise should occur.
- Visual

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To limit the visual impact of mining and related infrastructure as far as possible during mining.
- To enhance the visual aspect and maintain the aesthetics of the region post mining.

- Transportation, Infrastructure and Traffic

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Ensure trucks and vehicles remain on roads and areas designated as a construction site to limit disturbance to areas unaffected by construction.
- Ensure drivers are informed that off-road travelling is prohibited except where otherwise not

practically feasible.

- Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits.
- Drip trays must be placed under vehicles.
- Any spills or leaks must immediately be cleaned up and the contaminated soil suitably disposed of.
- During refuelling of vehicles or equipment, drip trays must be utilised to prevent spills or leaks.
- Spill clean-up equipment must be available on site at all times.
- In the event of large spills, this must be reported to the authorities and a specialist spill contractor immediately sought to assist with the clean-up
- Create safe entry roads into the construction and mining areas.
- Repair damage to road infrastructure.
- Maintain safety to pedestrians and motorists.

Health and Safety

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Undertake mining and ancillary activities in safe and responsible manner to protect the safety of people and the environment.
- Manage hazardous materials and explosives in a safe and responsible manner to protect the safety of people and the environment.

Environmental Pollution

The following objective should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Any excess or waste material or chemicals must be removed from the site and must preferably be recycled (e.g. oil and other hydrocarbon waste products).
- Any waste materials or chemicals that cannot be recycled must be disposed of at a suitably licensed waste facility.
- All permanent facilities must be removed from site upon closure. This will include the associated equipment, material and waste on site.
- Under no circumstances is any form of waste to be disposed of on site.

18 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

- The approval of the project is for opencast mining of a 5 ha area only.
- A 100 m buffer zone around watercourses must be regarded as a No-Go area for mining activities.
- A 100 m buffer zone around existing structures (such as dwellings, pipelines, Eskom underground and overhead powerlines, cemeteries, any fences, etc.) must be regarded as No-Go areas for mining activities unless permission is granted by landowners and/or relevant authorities.
- The Mining Permit holder must appoint a suitably qualified Environmental Control Officer (ECO) who must oversee the mining activities and monitor compliance with the EMPR and relevant legislation.
- The EMPR must be made binding on all contractors, sub-contractors or agents operating on behalf of the Mining Permit Holder.
- Stakeholder engagement will continue throughout the mining activities to ensure the community and landowners are kept informed and allowed to raise issues. These issues will then be addressed through a grievance mechanism.
- No animal burrows found on site should be destroyed, and no wild animals found during the operations should be killed.
- Any pit left open temporarily (not backfilled during the operations) should be fenced off to prevent humans and animals from falling into the pits.
- All topsoil stockpiles must be removed and the soil be reused as topsoil again on the denuded areas.
- All denuded backfill and the surfaces revegetated upon completion of operations.
- The Mining Permit holder should adhere to the conditions of the EA, EMPR and the specialist reports for this project.
- Arrangements for Financial Provision for the decommissioning, closure and rehabilitation must be made prior to the commencement of the mining activities.

19 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

Certain assumptions, limitations, and uncertainties are associated with the BAR and EMPR. These are detailed for each aspect below:

19.1 Heritage

Due to the underground nature of these resources, even while every attempt was made to find, identify, and record all potential cultural heritage sites and features (including archaeological remains), it is always possible that some may have been missed (including low stone-packed or unmarked graves). If any previously hidden or unknown places, features, or materials are discovered during any development activities, a specialist should be consulted to conduct an investigation and offer suggestions for the future. The development can therefore proceed while taking into account the suggestions and consultations with the impacted from the perspective of cultural heritage.

19.2 Surface Water

The Surface Water specialist report is a desktop assessment and the assessment is thus based on available information. It is not expected that the proposed opencast activities will have a significant impact on the water resource mostly due to the fact that the activities are located more than 100 m from the nearest water resource.

19.3 Flora

The desktop flora study was conducted with up-to-date resources and the site visit was conducted as thoroughly as possible. However, it might be possible that additional information becomes available in time, as environmental impact assessments deal with dynamic natural ecosystems. It is therefore important that the specialist report be viewed and acted upon with these limitations in mind. In order to obtain a comprehensive understanding of the dynamics of the vegetation of the study area, surveys should ideally have been replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible and this vegetation survey was conducted in one season.

Species flowering only during specific times of the year could be confused with a very similar species of the same genus and some plant species that emerge and bloom during another time of the year or under very specific circumstances may have been missed entirely. No scientific data was collected or analysed for the calculation of ecological veld condition. Any comments or observations made in this regard are based on observations, the expert knowledge and relevant professional experience of the specialist investigator. The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

19.4 Fauna

In terms of the baseline investigation conducted. No amphibians or reptiles with red listed status were recorded for the quarter degree square and suitable habitat for these species is associated closer to the nature reserve and not the footprint. No red listed butterflies were recorded for the specific quarter degree square. There are several sensitive birds recorded in the baseline study that enjoys conservation status.

20 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

This BAR and EMPR has assessed the potential impacts associated with the proposed mining activities and mitigation measures have been developed to address the impacts identified. Furthermore, this BAR and EMPR has been compiled in accordance with the most recent guidelines and legislation. The draft BAR and EMPR was also be made available to I&APs review and comments, and appropriate changes have been made to this final BAR and EMPR as a result of the I&APs consultation process. Furthermore, appropriate measures are included in the BAR and EMPR wherever possible, to ensure I&APs concerns are addressed. As such, the EAP is of the opinion that the activity should be authorised.

21 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The Environmental Authorisation is required for 2 years and may be renewed for three periods of which may not exceed one year.

22 UNDERTAKING

It is confirmed that the undertaking required to meet the requirements of this section is provided at the end of the EMPR and is applicable to both the BAR and the EMPR.

23 FINANCIAL PROVISION

The Regulations pertaining to the Financial Provision for Mining and Production Operations promulgated under Section 44(A) (e), (f), (g), (h) read with sections 24(5)(b)(ix), 24(5)(d), 24N, 24P and 24R of the National Environmental Management Act, 1998 (Act 107 of 1998) (20 November 2015) have been considered and this is anticipated to result in an increase in the rehabilitation costs estimated using the above-mentioned quantum. The amount that is required to both manage and rehabilitate the environment in respect of rehabilitation is reflected in the quantum of financial provision in Section 32 (Part B) of the report. **An amount of R 1 191 074 will be required for rehabilitation of a 5 ha**.

24 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

As part of the consultation process, the Competent Authority requires proof of consultation of the community concerned that is supported by a resolution taken in a meeting attended. This report has the required information.

25 COMPLIANCE WITH THE PROVISIONS OF SECTIONS 24(4)(A) AND (B) READ WITH SECTION 24(3)(A) AND (7) OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998) THE BAR REPORT MUST INCLUDE THE:

25.1 Impact on the Socio-Economic Conditions of any Directly Affected Person

The potential impacts on the socio-economic conditions have the potential to include:

- Education, skills development and training
- The implementation of skills development and training programmes will have a direct positive effect on a number of individuals.
- Employment opportunities
- The operation of the mine will result in both direct and indirect employment opportunities.
- Influx of migrant workers
- The mining operations can result in the influx of migrant workers seeking jobs and thereby reducing the number of jobs available to local labour. This is addressed through the recruitment procedure which focuses on employment of local labour.
- Upon closure and downscaling of mining operations, there will be a loss of jobs and income for a large number of individuals. Training and skills development aim to equip to employees with portable skills, thereby opening up other employment opportunities post mining.
- Perceptions and expectations
- When a new mine operation commences in an area there is often false perceptions and expectations, particularly surrounding potential employment. There are inevitably more people seeking jobs than the number of jobs available at the mine, especially for unskilled labour. The manner in which false perceptions and expectations is addressed is through extensive consultation and communication to ensure people are fully aware of the potential employment opportunities and recruitment process.

The consultation process allows directly affected parties to raise their concerns. It is noted that I&APs, including directly affected parties such as landowners, were given the opportunity to review and comment on the draft BAR and EMPR. The results of the public consultation are included in this final report that is submitted to the Department for adjudication.

25.2 Impact on any National Estate Referred to in Section 3(2) of the National Heritage Resources Act

Integrated Specialist Services (Pty) Ltd conducted the Phase 1 Archaeological and Heritage Impact Assessment. The literature review and field research confirmed that the project area is situated within a contemporary cultural landscape dotted with settlements with long local history. No mining activity should take place within 100m from the site. In terms of the archaeology and heritage in respect of the proposed mining development site, there are no obvious 'Fatal Flaws' or 'No-Go' areas on the site however the burial site must be treated as a No-Go area. The potential for chance finds is rated low, however, the applicant and contractors are advised to be diligent during clearance and mining, should mining activities commence on the site. This report concludes that the mining permit application may be approved by SAHRA/MPHRA to proceed as planned subject to recommendations herein made and heritage monitoring and management plan being incorporated into the EMPr. The mitigation measures are informed by the results of the AIA/HIA study and principles of heritage management enshrined in the NHRA.

26 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

There are no other matters required in terms of Section 24(4)(A) and (B) of the Act.

PART B:

ENVIRONMENTAL MANAGEMENT PROGRAMME

27 INTRODUCTION

27.1 Details of the EAP

The details and expertise of the EAP are detailed in Sections 2 above as required.

27.2 Description of the Aspects of the Activity

A description of the aspects of the activity covered by the EMPR below is included in Section 2 above.

28 ENVIRONMENTAL MANAGEMENT PRINCIPLES

It is extremely important for effective environmental management that the Applicant be aware of the general principles upon which sound environmental management is based and that these principles are considered in all aspects of the mining operation. NEMA has established a general framework for environmental law, in part by prescribing national environmental management principles that must be applied when making decisions that may have a significant impact on the environment. These principles are briefly summarized in the sections that follow.

28.1 Holistic Principle

The Holistic principle, as defined by NEMA (Section 2(4)(b) requires that environmental management must be integrated, acknowledging that all elements of the environment are linked and inter-related and it must take into account the effect of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option (defined below). Holistic evaluation does not mean that a project must be looked at as a whole. It rather means that it must be accepted that there is a whole into which a project introduced. If the indications are that the project could have major adverse effects, the project must be reconsidered and where appropriate re-planned or relocated to avoid an adverse impact or to ensure a beneficial impact.

28.2 Best Practicable Environmental Option

When it is necessary to undertake any action with environmental impacts, the different options that could be considered for the purpose must be identified and defined. The Best Practicable Environmental

Option (BPEO) is defined in NEMA as "the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term." Other guidelines typically used for environmental management in terms of other legislation include: BPM which is the Best Practicable Means and BAT which is the Best Available Technology.

28.3 Sustainable Development

The concept of sustainable development was introduced in the 1980's with the aim to ensure that the use of natural resources is such that our present needs are provided without compromising the ability of future generations to meet their own needs. The constitution of South Africa is built around the fact that everyone has the right to have the environment protected through reasonable legislative and other measures that secure ecologically sustainable development. The National Environmental Principles included in the NEMA require development to be socially, environmentally and economically sustainable.

28.4 Preventative Principles

The preventative principle is fundamental to sustainable development and requires that the disturbance to ecosystems and the pollution, degradation of the environment and negative impacts on the environment be avoided, or, where they cannot be altogether avoided, are minimised and remedied.

28.5 The Precautionary Principles

The precautionary principle requires that where there is uncertainty, based on available information, that an impact will be harmful to the environment, it is assumed, as a matter of precaution, that said impact will be harmful to the environment until such time that it can be proven otherwise. The precautionary principle requires that decisions by the private sector, governments, institutions and individuals need to allow for and recognize conditions of uncertainty, particularly with respect to the possible environmental consequences of those decisions. In South Africa, the DWA (then DWAF, now DWS) adopted a BPEO guideline in 1991 for water quality management and in 1994 in the Minimum Requirements document for waste management.

In terms of DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, the precautionary principle is defined as, "Where a risk is unknown; the assumption of the worst-case situation and the making of provision for such a situation." Here the precautionary principle assumes that a waste or an identified contaminant of a waste is "both highly hazardous and toxic until proven otherwise."

In the context of the EIA process in South Africa, the precautionary principle also translates to a requirement to provide sound, scientifically based, information that is sufficient to provide the decision-making authority with reasonable grounds to understand the potential impacts on the environment, the extent thereof and how impacts could be mitigated. If such information is not adequate for this purpose, the relevant authority cannot be satisfied as is required and then the authority should require that further information be collected and provided.

28.6 Duty of Care and Cradle to Grave Principle

In terms of the NEMA Section 28, “Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.”

By way of example, the principle of “duty of care” in terms of waste management emphasizes the responsibility to make sure that waste is correctly stored and correctly transported, as it passes through the chain of custody to final point of disposal. This means that waste must always be stored safely and securely. The company removing and disposing of waste also holds the responsibility to hold the relevant licenses, and that waste is transported alongside the necessary paperwork.

“Cradle to Grave” refers to the responsibility a company takes for the entire life cycle of a product, service or program, from design to disposal or termination. In terms of the DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, “any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorized transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generated or handled.” This places responsibility for a waste on the Generator and is supported by the "Cradle to Grave" principle, according to which a "manifest" accompanies each load of Hazardous Waste until it is responsibly and legally disposed. This manifest is transferred from one transporter to the next along with the load, should more than one transporter be involved. Once the waste is properly disposed of at a suitable, permitted facility, a copy of the manifest must be returned to the point of origin.” Duty of Care offers one strategy to implement sustainable development.

28.7 Polluter Pays Principle

The "polluter pays principle" entails that the person or organization causing pollution is liable for any costs involved in cleaning it up or rehabilitating its effects. It is noted that the polluter will not always necessarily be the generator, as it is possible for responsibility for the safe handling, treatment or disposal of waste to pass from one competent contracting party to another. The polluter may therefore not be the generator but could be a disposal site operator or a transporter. Through the 'duty of care' principle, however, the generator will always be one of the parties held accountable for the pollution caused by the waste. Accordingly, the generator must be able to prove that the transferal of management of the waste was a responsible action. The polluter pays principle acceding to NEMA dictates that "the cost of remedying pollution, environmental degradation and consequent adverse effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment."

28.8 Duty of Care Responsibilities

The principle of duty of care is especially important to understand when it comes to pollution that arises as a result of mining. Notwithstanding any licenses or permits that may exist, the mine still has a responsibility to take suitable measures should pollution arise as a result of the mining activities.

Training and awareness should be fostered in all staff working to ensure that they can perform their duties. Failure to comply with the provisions in the EMPR and NEMA would be a contravention of the Act. The relevant sections of NEMA are provided below, to outline the duty of care and responsibility that the applicant and all employees have towards the environment. The National Environmental Management Act (Act 107 of 1998) (NEMA) Section 28 makes provision for Duty of care and remediation of environmental damage. The binding principals are described below:

- Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.
- Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which-
- any activity or process is or was performed or undertaken or
    - any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.
- The measures required in terms of subsection (1) may include measures to-
    - investigate, assess and evaluate the impact on the environment.
    - inform and educate employees about the environmental risks of their work and the manner in

which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment.

- cease, modify or control any act, activity or process causing the pollution or degradation.ontain or prevent the movement of pollutants or the cause of degradation.
- eliminate any source of the pollution or degradation or
- remedy the effects of the pollution or degradation.

- No person may-

- unlawfully and intentionally or negligently commit any act or omission which causes significant or is likely to cause significant pollution or degradation of the environment.
- unlawfully and intentionally or negligently commit any act or omission which detrimentally affects or is likely to affect the environment in such manner or
- refuse to comply with a directive issued under this section.

Any person who contravenes or fails to comply with subsection (14) is guilty of an offence and liable on conviction to a fine not exceeding R1million or to imprisonment for a period not exceeding 1 year or to both such a fine and such imprisonment.

28.9 Failure to Comply with Environmental Considerations

Within the provisions of the relevant environmental legislation, there are a number of penalties for non-compliance or offences. Below a few extracts are presented for information purposes, however these must not be read in isolation and the reader is reminded that there are other acts that may be applicable to the relevant project:

- NEMA Section 24F(2): It is an offence for any person to fail to comply with or to contravene the conditions applicable to any environmental authorization granted for that listed activity. 24F(4) A person convicted for an offence under subsection 2 is liable to a fine not exceeding 5 million rand or to imprisonment not exceeding 10 years or to both such a fine and imprisonment
- NEMA Section 34(6): Whenever any manager, agent or employee does or omits to do an act which it had been his or her task to do, or to refrain from doing on behalf of the employer and which would be an offence under any provision listed in Schedule 3 (relates to all environmental related acts) for the employer to do or omit to do, he or she shall be liable to be convicted and sentenced in respect thereof as if he or she were the employer
- NWA Section 151 (1): "No person may fail to comply with any condition attached to a permitted water use (Water Use License)"
- NWA Section 151 (2): "Any person who contravenes any provision of subsection 1 is guilty of an

offence and liable, on the first conviction, to a fine or imprisonment for a period not exceeding 5 years or to both a fine and such imprisonment (10 years for second conviction)"

- In addition, if anyone is convicted of an offence under the act which has resulted in harm, loss or damage to any other person, the court may award damages to be paid by the accused or convicted
- NWA Section 154: Makes provision that it's not only the applicant that may be liable but also an employee or agent acting on their behalf
- In terms of the MPRDA, Section 98, any person is guilty of an offence if he or she fails to comply with the requirements of the issued mining permit
- MPRDA Section 99 (1a): any person convicted of an offence in terms of the MPRDA is liable to a fine not exceeding R100, 000 or to imprisonment to a period not exceeding 2 years or to both such fine and imprisonment.

It is recommended that a procedure for non-compliances (i.e. incentives or disincentives for conformance and non-conformance with the EMPR requirements) must be employed to ensure that the EMPR is adequately implemented. The system to be used must be determined before mining commences, included in the tender documents and contracts, and made clear to all project workers. The system may include that the independent ECO can be authorised to impose spot fines on the Contractor and/or his subcontractors for any of the transgressions detailed below:

- Littering on site
- Lighting of illegal fires on site
- Persistent or un-repaired oil leaks
- Any persons, vehicles or equipment related to the Contractor's operations found within the designated "No - Go" areas
- Any vehicles being driven in excess of designated speed limits
- Removal and/or damage to fauna, flora or heritage objects on site
- Legal contraventions

Such fines should be issued in addition to any remedial costs incurred as a result of non-compliance with the Environmental Specifications and or legal obligations.

29 DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

29.1 Determination of Closure Objectives

The vision, and consequent objective and targets for rehabilitation, decommissioning and closure, aim to reflect the local environmental and socio-economic context of the project, and to represent both the corporate requirements and the stakeholder expectations.

The receiving environment within which the mining activities will be undertaken includes the following key land uses:

- Agriculture.
- Grassland.

Concerns raised by the stakeholders consulted during the public participation process for the basic assessment have been taken into consideration and will be included in the final BAR and EMPR which will be submitted to the DMRE.

In practice the post closure land-use will depend on the pre-mining land use of the study area. Considering that the exact location of the planned mining have been identified and assessed, it can be said that the closure plan will sufficiently address the objectives for the site. This EMPR does, however, aim to address the key closure objectives which are likely to remain consistent for the majority of the mining activities.

The EMPR includes a monitoring and a rehabilitation plan. The plan shall outline the closure objectives which are aimed at reinstating the landform, land use and vegetation units to the same as before mining operations take place unless a specific, reasonable alternative land use is requested by the landowner. As such, the intended end use for the disturbed mining area and the closure objectives will be defined in consultation with the relevant landowner. Proof of such consultation will be submitted together with the Application for Closure Certificate. The overall aim of the rehabilitation plan is to rehabilitate the environment to a condition as close as possible to that which existed prior to mining.

This shall be achieved with a number of specific objectives.

- Making the area safe. i.e. decommission mining activities so as to ensure that the environment is safe for people and animals. This entails refilling excavations, etc.
- Recreating a free draining landform. This entails earthworks infilling, reshaping, levelling, etc. to recreate as close as possible the original topography and to ensure a free draining landscape.
- Re-vegetation. This involves either reseeding or allowing natural succession depending on the area, climate etc.

- Storm water management and erosion control. Management of stormwater and prevention of erosion during rehabilitation. E.g. cut off drains, berms etc. and erosion control where required.
- Verification of rehabilitation success. Entails monitoring of rehabilitation.

29.2 Volumes and Rate of Water Use Required for the Operation

Limited water will be consumed by the surface dust suppression activities (water mist added for dust suppression when required), approximately 18000 liters per day.

29.3 Has a Water Use License Been Applied For?

No mining activities will occur within identified watercourses. No water use license has been applied for as part of this this Mining Permit application. Water required for dust suppression will be trucked in.

30 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

Table 24: Impacts to be mitigated.

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Environmental Management					
General opencast management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The small-scale mine shall ensure that social and environmental human resources have the knowledge, skills, and experience necessary to perform their work with competence and efficiency.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
General opencast management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The small-scale mine shall appoint a suitably qualified and competent Environmental Control Officer (ECO) who shall preferably be independent from the Applicant and the Contractor. The ECO must preferably have a tertiary qualification in an Environmental Management or appropriate field. The ECO should have appropriate qualification and experience in the implementation of	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

			environmental management specifications. The ECO shall be tasked with auditing the mines environmental compliance on a regular basis (annually). The Applicant shall provide		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			the ECO with the necessary support to ensure that the environmental aspects relating to the development is adhered to.		
General opencast management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	All contractors and sub-contractors must have a copy of this EMPR at the point of use and should be briefed by the Pit Environmental Officer (EO) or ECO with regards to the use and implementation of the EMPR.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
General opencast management	Planning and Design Construction Operation Decommissioning Rehabilitation and	No direct physical disturbance	The EMPR must be binding for all contractors operating on behalf of the Mining Permit Holder.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

	Closure				
General opencast management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The small-scale mine shall ensure that all sub-contractors working under the main mining contractor abide by the requirements of the EMPR through the inclusion of the EMPR and applicable environmental requirements in contractual agreements for all sub- contractors.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Health and Safety					
General opencast management	Planning and Design Construction Operation Decommissioning	Health and safety risks are classified as high significance due to the value of	The small-scale mine shall ensure that reasonable measures are taken to ensure the safety of all site staff, including induction training for all	OHS MHSA	Throughout

	Rehabilitation and Closure	human life	employees and visitors.		
General opencast management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	The small-scale mine shall provide appropriate Personal Protective Equipment (PPE) to employees wherever required and in accordance with the risks associated with their activities.	OHS MHSA	Throughout
General opencast management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	The small-scale mine shall undertake safety audits to ensure compliance with the (i) Occupational Health and Safety Act (Act No. 85 of 1993) and associated regulations and (ii) Mine Health and Safety Act (Act 29 of 1996) as amended and associated regulations.	OHS MHSA	Throughout
General opencast management	Construction Operation Decommissioning Rehabilitation and	Health and safety risks are classified as high significance due to the value of	The small-scale mine shall implement a safety reporting procedure to ensure that all accidents and incidents (safety and environmental) are recorded and	OHS MHSA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Closure	human life	reported to the pit manager and EO.		
General opencast management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	Any containers in which hazardous substances (e.g. fuel, paints, solvents) are stored shall be clearly marked as to the contents therein (in accordance with OHSA regulations).	OHS MHSA	Throughout
Site Access and Security					
General opencast management	Construction Operation Decommissioning Rehabilitation and Closure	Security risks can have a highly significant impact although minimise	On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation off site, and to minimise disruption of traffic.	OHS MHSA	Throughout
General opencast management	Constructio n Operation	The creation of roads can have a significant and relatively widespread impact, especially	Any new access (if required) shall first be approved by the pit manager and ECO (method statement may be required) and should be provided with erosion and silt pollution prevention measures where required.	OHS MHSA	Throughout

		as roads create corridors			
General opencast management	Constructio n Operation Decommissioning	Security risks can have a highly significant impact	No person will be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares	OHS MHSA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure	although localised	or otherwise dangerous objects on-site, or to enter the site while under the influence of alcohol or drugs.		
Environmental Awareness					

General opencast management	Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	All employees and visitors to the site must undergo a site induction which shall include basic environmental awareness and site specific environmental requirements (e.g. site sensitivities and relevant protocols/procedures). This induction should be presented or otherwise facilitated by the Contractors EO/Pit EO wherever possible.	NEMA	Throughout
Social and Socio-Economic					
General opencast management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The small-scale mine shall develop and implement a recruitment policy that allows equal opportunity to all people (woman, disabled) and give preference to local labour from the local Municipality.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act	Throughout
General opencast management	Planning Constructio n Operation Decommissioning	No direct physical disturbance	The procurement policy for the mine should focus on utilising service providers from the local area so as to encourage the growth of businesses.	Adherence to corporate policies and compliance with legislation including Labour Act and	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure			Employment Act	
General opencast management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The small-scale mine shall attempt, where possible, to recruit local service providers and contractors to undertake construction activities.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act	Throughout
General opencast management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The small-scale mine and contractor(s) shall comply with all relevant legislation pertaining to labour recruitment and employment.	Compliance with legislation including Labour Act and Employment Act	Throughout
General opencast management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The small-scale mine shall appoint a community liaison officer that deals specifically with the surrounding communities. The mine shall communicate frequently with the affected stakeholders to ensure that they understand the processes and do not develop more unrealistic	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Appointment as early as possible and implemented throughout

			expectations.		
General opencast management	Planning Construction Operation	No direct physical disturbance	The small-scale mine shall establish a detailed grievance mechanism for communities to lodge concerns,	Shall adhere to the ESMS Framework guided by	Developed as early as possible and

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation

	Decommissioning Rehabilitation and Closure		suggestions and grievances which can be dealt with by the Project in a timely manner. The grievance mechanism shall aim to accomplish the following objectives: • Receive and register external communications from the public. • Screen and assess the issues raised and determine how to address them. • Identify roles and responsibilities relating to the reporting, recording and addressing of grievances. • Maintenance of a grievance register to record and track, and document responses and actions taken to address grievances. • Reporting of grievances to DMRE. • Adjust the management program, as appropriate.	Equator Principles, and IFC Performance Standards	implemented throughout

General opencast management	Planning Construction Operation Decommissionin g Rehabilitation and	No direct physical disturbance	A grievance register must be maintained by the mine to log grievances from landowners, communities, occupants and other Interested and Affected Parties, and	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance	Developed as early as possible and implemented throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Closure		response to such grievances. The grievance register should be provided to authorities at any point in time if so requested. The grievance register shall contain, at a minimum, the following information: • Date of the grievance being lodged. • Location relating to the grievance. • Contact details of the complainant. • Grievance description (detailed as possible). • Person receiving grievance. • Agreed corrective action. • Responsible party for corrective action. • Summary of actions taken (and date action was taken).	Standards	
General opencast management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	Employees should be sourced from the local area where possible.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General opencast management	Operation	No direct physical disturbance	The workforce should undergo up-skilling during the operation of the mine so that they may be productively absorbed into the local economy after mine closure.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	During operation
General opencast management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	Stakeholder engagement will continue throughout to ensure local communities are kept informed and allowed to raise issues. These issues will then be addressed through the grievance mechanism.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
General opencast management	Operation	No direct physical disturbance	Where retrenchments are unavoidable, they should be managed humanely according to legislative requirements.	Legislative requirements	When retrenchments are required
General opencast management	Operation	No direct physical disturbance	Upon closure, the contracting company for the mining operations should attempt to redeploy employees to its other operations.		As required when scaling down operations and prior to closure

Site Establishment					
Construction camp sewage management Dust suppression	Construction	Construction impacts are temporary in nature and have a limited	The physical footprint of any construction or site camp shall be minimised and vegetation clearance should be kept to the minimum required	Shall adhere to the ESMS Framework guided by Equator Principles and IFC Performance	Throughout constructio n

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Earthworks Fencing Fuel storage and refueling Hazardous substances management Site security Soil management Truck and heavy machinery operation		extent but may include significant impacts	area. Topsoil shall be handled in accordance with the soil management principles presented in this EMPR and the soil management guide developed for the Mine.	Standards OHSA MHSA NEMA MPRDA	
			All construction and/or site camps shall be enclosed with a fence. The mesh size should be small enough for the fence to act as a catch net for blown debris and as a demarcation of the site. The fence shall be maintained as required to ensure access control remains effective. All temporary fences erected by the contractor shall be		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Utilisation of portable toilets and generation of sewage			removed and the site restored on completion of construction, unless otherwise agreed in writing with the Applicant.		
Vegetation clearance			Site and construction camps must be kept in a clean, neat and tidy condition at all times. The contractor shall maintain good housekeeping practises and shall comply with the relevant HSE regulations in terms of materials storage. Stockpiles of construction materials may only be placed within demarcated areas within the construction camp. Laydown areas must be kept neat and tidy and free of litter or waste at all times.		

			A waste storage area must be established within the site camp/construction camp that provides for appropriate and adequate waste storage and waste separation for recycling. All waste must be adequately contained so as to prevent ground and/or water pollution. The total volume of general waste stored shall not exceed 100 m3. In the case that a storage capacity exceeding this amount is required or planned for, the necessary waste permits must be obtained in accordance with the NEMWA beforehand (GN 718).		
			The site camp/construction camp shall have adequate provision for the storage of hazardous waste (e.g. old oil filters, soil from spills etc.) and the waste shall be contained within closed containers to prevent the possibility of spillages.		
			All fuel storage areas shall be bunded.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			Fuel storage areas may not be located within 100 m of the watercourse and the total volume of fuel stored on site may not exceed 30 m3 (30 000 liters) without the necessary authorisation in terms of the NEMA. Fuel storage areas must be provided with an impervious surface with the provision to contain any potential fuel spillages during re-fueling (e.g. a bunded, sealed concrete slab which drains to a sump/oil separator). No person smoke or take part in any activity that may results in sparks in the vicinity of fuels and other flammable substances to prevent ignition.		

			All hazardous substances shall be stored within designated areas that comply with the relevant HSE standards (e.g. access control, HSE signage, fire-fighting equipment etc.) and that provide for spill prevention and containment. It is recommended that a dedicated, bunded and fenced Hazardous Storage Area is provided within the construction camp for this		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			purpose.		
			Site camps/construction camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and this equipment must be readily accessible.		
			No open fires shall be permitted within the site camp/construction camp, except where approved by the responsible safety officer and ECO and within a designated structure designed for that purpose. In such cases fire fighting equipment must be readily available in the vicinity of the fire place and an appropriate safety representative should be present at all times during burning of the fire. All fires shall be fully extinguished after use.		
Flora					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General surface rehabilitation Infrastructure removal Maintenance and operation of site	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high	The small-scale mine, in consultation with the ECO, shall develop an appropriate weed management plan, to be implemented throughout the lifespan of the project. The weed management plan shall aim to eradicate and control	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by	Development of plan as soon as possible and implementation throughout
infrastructure and facilities Mining Permit area site preparation Filling opencast voids Post closure monitoring and maintenance		significance	alien vegetation in accordance with NEMBA. Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Specialist input shall be sought in developing the plan to ensure the potential for residual or latent impacts	Equator Principles IFC Performance Standards	

Site establishment			resulting from alien vegetation removal are minimised and mitigated. The weed management plan shall include appropriate measures for removal/control of alien vegetation across the entire site. The weed management plan shall include the following measures as a minimum: • Weeds and invader plants will be controlled in the manner prescribed for that category by the Conservation of Agricultural Resources Act or in terms of Working for Water guidelines.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented. • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds (including closure and post closure monitoring). • The Plan must clearly define the areas from which alien vegetation must be removed as well as the plant, equipment, materials and methodology to be used		
	Planning and Design Construction Operation	Impacts on red data species has a very high significance	All Red Data Plants within the Mining Permit area, roads and all other infrastructure areas should be transplanted and relocated within either	NEMBA Threatened or Protected Species (TOPS) regulations	Prior to commencement of activities or disturbance

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			a nursery or any neighbouring piece of land where it can be conserved until rehabilitation can take place. These species can either be replanted during the rehabilitation process of the Opencast pit mining areas as rehabilitation of mined out areas progresses, or left in their new location if this is not to be disturbed in future.	National Forests Act DAFF permitting requirements	
	Planning and Design Construction Operation	Impacts on red data species has a very high significance	The small-scale mine shall ensure that the relevant permits are obtained to remove and relocate protected species. Plan activities carefully so that only vegetation that needs to be impacted is impacted. Incorporate herbaceous vegetation into soil stockpiles to maintain a seed bank. Limit activity to area of disturbance and revegetate impacted areas as soon as possible.	NEMBA TOPS regulations National Forests Act DAFF permitting requirements	Prior to commencement of activities or disturbance

	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	No unnecessary clearing of vegetation will take place, to enable seeds from undisturbed areas to move into disturbed area through natural processes of succession.	NEMA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	The small-scale mine shall plan activities carefully so that only vegetation that needs to be impacted is impacted. Incorporate herbaceous vegetation into soil stockpiles to maintain a seed bank. Limit activity to area of disturbance and revegetate impacted areas as soon as possible. Allow pioneer species to establish in disturbed areas. Erosion prevention measures will be implemented along infrastructure areas.	NEMA CARA	Throughout

	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	The harvesting of plants by construction and mine workers is prohibited on site. This includes the harvesting of plants for firewood, construction material, the making of crafts and medicinal purposes.	NEMA	Throughout
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Damage or harm to threatened plant species is illegal in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004). Threatened species are defined in terms of the most recent Red Data list of Southern African Plants. Employees	NEMBA TOPS regulations National Forests Act DAFF permitting requirements	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			and workers shall be educated with regards to any potential threatened species that may be encountered on site, and shall take the necessary actions to prevent of harm to any such species found on site.		
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	All alien vegetation occurring on the site must be controlled in accordance with NEMBA. The area should be assessed and the alien invasive species controlled prior to the commencement of the construction activities. The area should be monitored for the establishment and spread of alien invasive species throughout. The weed management plan and principles for weed management presented in this EMPR must be implemented throughout the lifespan of the project.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

	Construction Operation	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	All soil stockpiles shall be kept free of any weeds or alien invader plant species.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Alien species removal must take place in an appropriate manner, which includes: • Avoid disturbance to the soil. • Use an appropriate control for each species. Some species may require manual and herbicide control. • Where appropriate, use biological control. • Where herbicide control is used, ensure that the correct herbicide as registered for the species is used. • Use only herbicides that are registered for use near water close to the wetland areas. • In most cases herbicide control is only successful in the growing season. All herbicides must be applied appropriately.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high	Where large clumps of invasive trees are to be controlled, do not clear all invasive species at once, since this will lead to large areas bare of vegetation and may lead to erosion and a large sediment load in the adjacent water	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		significance	resources. Aliens must be removed gradually over a long period and the trees replaced with grassland.	IFC Performance Standards	
	Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	The small-scale mine should consider the use of excess vegetation (tree stumps etc.) to create 'safe sites' for seedling recruitment as well as animal habitats in rehabilitated areas.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	During Rehabilitation
	Rehabilitation and Closure	Impacts on flora may occur over a	Disturbed surfaces will be re-vegetated as soon as they become available, by	Adherence to Rehabilitation and	During rehabilitation

		large area (active mine areas) and has the potential to be a relatively high significance	seeding with an appropriate seed mix as per direction by a vegetation specialist.	Closure Plan	
Fauna					
General surface rehabilitation	Planning and Design Construction Operation Decommissioning	Impacts on fauna has the potential to be a relatively high significance	Visitors and workers will be informed that the killing of fauna is prohibited within the boundaries of the mining area, as well as neighbouring areas.	Induction training shall comply with ESMS Framework guided by Equator Principles, and	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Filling opencast voids Post closure monitoring and maintenance Site establishment	Rehabilitation and Closure	especially where threatened or protected species are impacted upon		IFC Performance Standards	
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	The small-scale mine shall educate and inform all workers, contractors and visitors about any rare and endangered species through an environmental awareness plan and the distribution of posters, containing pictures of any potential rare and endangered species.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	The sighting of any rare or endangered species needs to be reported to management which will keep record of all such species. Should there be a risk of an impact to such a species, the mine shall notify a specialist who shall advise on the best course of action. Should relocation or destruction of any species be required, the necessary permits shall be obtained.	NEMBA TOPS Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

	Construction Operation	Impacts on sensitive landscapes have the potential to be	The destruction of sensitive landscape features shall be avoided where possible and otherwise minimised through effective planning. In areas	In accordance with Rehabilitation and closure plan	During construction and operation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		a relatively high significance with widespread effects	where the destruction cannot be avoided, these features should be re- introduced in the post mining landscape.		
	Constructio n Operation	Impacts on sensitive landscapes have the potential to be a relatively high significance with widespread effects	Infrastructure should be designed to rather follow the edge of natural areas than crossing it. If crossing it is the only option, then the area should be transected so that one large area remains rather two equally sized areas. Infrastructure should be condensed to prevent unnecessary sprawl into sensitive areas.	In accordance with Rehabilitation and closure plan	During construction and operation

	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	No construction workers or mine employees may disturb, hunt, set traps/snares, utilise dead or alive fauna/livestock/wildlife/fish. This includes the killing of any animal caught in construction works. No construction workers or mine employees may collect or remove firewood or medicinal plants or other plants/crops/fruits from the site or areas adjacent to the site. Disciplinary action must be taken in the event that any flora or fauna is willfully disturbed or killed.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Any animals found within excavations should be carefully returned without harm to an adjacent area away from potential harm, but preferably not further than 200 m away from where it was found unless otherwise agreed to by the ECO.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	The contractor shall ensure that any snakes discovered in excavated areas, on or near the construction site are not killed or otherwise harassed. The Pit EO must be notified should a snake be found on or near the site. The Pit EO will be responsible to ensure that an appropriately skilled person is summoned to remove the snake from the site for relocation to a suitable nearby location.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout

	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species	The small-scale mine shall take the necessary measures to limit the speed of trucks and vehicles on the roads on site and enforce these speed limits.	Internal speed limits for haul roads and declared legal speed limits for public roads	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		are impacted upon			
	Planning and Design Construction Operation Decommissioning	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Any Red Data species recorded within the areas that will be cleared for the newly Opencast pit mining areas should be relocated within re- vegetated areas where a good vegetation cover has been established. The mine must ensure relevant permits are in place if any threatened or protected species are relocated.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	No person should willfully disturb the movement of any mammals, birds, amphibians, insects or reptiles on the mine site.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
Soils					

Filling opencast voids General decommissioning activities	Construction Operation Decommissioning	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can	Topsoil shall be removed from all areas where physical disturbance of the surface will occur (up to a maximum of 30 cm depth). Topsoil must be stockpiled for re-use in subsequent rehabilitation activities outside of areas	CARA NEMA GN704 In accordance with Rehabilitation and closure plan	As required

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General surface rehabilitation Infrastructure removal		in turn affect land use and land capability	prone to erosion and 1:100 year floodplain demarcation.		
Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Re-vegetation Site establishment	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability	Soils must be stripped from the area of activity. Topsoils and subsoils should be stripped separately. The stripped soils should be utilised to create a berm up-slope of the proposed development area to divert runoff water around the site. Re-vegetate any bare soil immediately. Activity should be limited to area of disturbance. Where required the compacted soils should be ripped to an adequate depth and re- vegetated with indigenous plants.	CARA NEMA In accordance with Rehabilitation and closure plan	As required

	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability	To the greatest extent possible topsoil shall only be handled twice, only-once during the initial stripping of topsoil and a second time to replace it.	CARA NEMA In accordance with Rehabilitation and closure plan	Throughout
	Construction Operation	Impacts on soils can have	It must be ensured that the topsoil is separated from the subsoil and that the	CARA NEMA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability	topsoil is stockpiled separately from the subsoil and construction materials.	In accordance with Rehabilitation and closure plan	
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability	Topsoil and sub-soil stockpiles must be located such that the potential for erosion is minimised. Areas with existing erosion and stability issues must be avoided. Topsoil stockpiles will not be placed within the 1:100 year floodline of a water course, and will not be placed within the path of a stormwater channel, and if necessary, will be provided with a silt fence around the perimeter of the foot of the stockpile. Stockpiles are to be stabilised if signs of erosion are visible. Any evidence of erosion, scouring, sedimentation, and/or undercutting	CARA NEMA GN 704 In accordance with Rehabilitation and closure plan	Throughout

			must be rectified and rehabilitated immediately.		
	Construction Operation	Impacts on soils can have	There must be no contamination of topsoil. The biological, chemical and	MPRDA CARA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning Rehabilitation and Closure	significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability	physical properties of the topsoil must not be changed by introducing detrimental foreign material, gravel, rock, rubble or mine residue to such soil (MPRDA Regulation 70(7)). This also includes littering, waste disposal, fuel or chemical contamination, plant matter dumping or other activity occurs that may introduce pollutants or foreign plant species into stockpiled soils. Material laydown areas and stockpiles of construction materials must be clearly separated from topsoil stockpiles in order to limit any contamination of the topsoil.		

	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Care must be taken to protect topsoil resources on site and thereby avoid the need to obtain additional topsoil from outside the site for rehabilitation. However, in the event that additional topsoil needs to be sourced from outside the site, this shall be done with extreme caution not to introduce any alien or invasive species to the site.	NEMBA NEMA	Throughout
	Construction Operation	Impacts on soils can have	Compacting of soil must be avoided as far as possible. The contractor should	MPRDA CARA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning Rehabilitation and Closure	significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	restrict the use of heavy machinery, particularly in areas outside of the physical mining footprint area to reduce the compaction of soils. No vehicles or machines will be allowed to drive over or be parked on the topsoil stockpiles.		

	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Stockpiles and berms should be vegetated with a suitable seed-mix.	MPRDA CARA	As required
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	A monitoring system shall be implemented which will include inspecting soil stockpiles and berms for any degradation or erosion, and ensure immediate action if these are noted.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Ongoing throughou t

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	The regular inspections shall aim to identify negative effects such as acidification and erosion of cover-soil, poor quality leachate seeping from the residue deposits and deterioration of vegetation cover. The mine shall take measures to re-vegetate any bare soil immediately.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Ongoing throughout
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability	Trucks, machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks. All leaks will be cleaned up immediately using spill kits or as per the emergency response plan. For large spills a hazardous materials specialist shall be utilised.	NEMA NWA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Ongoing throughout

	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land	Accidental hydrocarbon spillages should be reported immediately, and then the affected soil should be removed, and rehabilitated or if this is not possible, disposed of at a waste sites designated to accept such waste.	NEMWA DWAF minimum requirement for waste disposal	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		capability			
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability	Activity should be limited to area of disturbance. This can be encouraged by pegging out the area of activity. Where required the compacted soils should be disked/ripped to an adequate depth and re- vegetated with indigenous plants.	In accordance with Rehabilitation and closure plan	Throughout

	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability	All vehicles will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks. All leaks will be cleaned up immediately using spill kits or as per the emergency response plan.	NEMWA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
	Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land	The small-scale mine shall reinstate the soil over the open cast mining areas to the following standards at least 1.5 m deep, preferably the same as before construction in the correct soil profile order add mulching.	In accordance with Rehabilitation and closure plan	During rehabilitation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		use and land capability	and soil stabilisation measures ensure that the vegetation cover is as evenly spaced as possible with an initial basal cover of at least 15% with pioneer species.		
			Land use		
General surface Rehabilitation Infrastructure removal Mining Permit area site preparation Opencast mining Filling opencast voids Storm water management	Construction Operation	Impacts on alternative land uses are considered highly significant and can occur over a large area	Soil stockpiles shall be designed to have free drainage of water with minimal soil erosion potential.	MPRDA	Throughout
	Operation	Impacts on alternative land uses are considered highly significant and can occur over a large area	The ongoing rehabilitation should occur soon after the area has been mined out so that alternative land use can commence.	In accordance with Rehabilitation and closure plan	During rehabilitation

construction	Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can	Rehabilitation should follow procedures with regard to seed bed preparation and fertilising, and advice on seed mixtures to seed with.	In accordance with Rehabilitation and closure plan	During rehabilitation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		occur over a large area.			
	Operation Decommissioning Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	Rehabilitated areas should be mowed or grazed (where appropriate) as soon as they become available.	In accordance with Rehabilitation and closure plan	During rehabilitation
	Operation Decommissioning Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	Areas that have been rehabilitated and are suitable for grazing must be fenced off from the adjacent mining areas and made available to landowners.	In accordance with Rehabilitation and closure plan	During rehabilitation
	Operation Decommissioning Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	The post mining land use must be predetermined in order to ensure it is rehabilitated to suit the use of the land.	In accordance with Rehabilitation and closure plan	Established early during operations and implemented during rehabilitation
Pollution Prevention					
General	Construction	Small scale and	Vehicles/machinery will be regularly	NEMA Polluter Pays	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
decommissioning activities General surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Filling opencast voids Post closure monitoring and maintenance Re-vegetation	Operation Decommissioning Rehabilitation and Closure	localised	serviced to reduce risk of leaks. Drip trays will be placed under potential leak sites. Any leakages should be reported and treated as per the emergency response plan. For large spills a hazardous materials company (specialist spill cleanup company) will be appointed.	Principle NEMA Duty of Care NWA OHSA MHSA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	operations
	Construction Operation Decommissioning Rehabilitation and Closure		Any equipment that may leak, and does not have to be transported regularly, shall be placed on watertight drip trays to catch any potential spillages of pollutants. The drip trays shall be of a size that the equipment can be placed inside it. Daily inspections shall be carried out to ensure such spill prevention measures are in place and remain effective. Drip trays shall be cleaned regularly and shall not be allowed to overflow. All spilled hazardous substances must be collected and adequately disposed of at a suitably licensed facility.		
	Construction Operation Decommissioning		Appropriate measures must be implemented to ensure that rainwater does not run into areas containing		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			cement, oil, diesel etc. as this could result in a pollution threat. Storage areas for these substances should be placed on high-lying ground, and surrounded by erosion control measures e.g. rows of filled hessian bags, silt fences etc.		
	Construction Operation Decommissioning Rehabilitation and Closure		Servicing and maintenance of vehicles may only take place in the workshop area (subject to suitable spill prevention and containment measures). If emergency repairs are required elsewhere on site, this shall be undertaken with the necessary spill prevention measures in place.		
	Construction Operation		Cement and liquid concrete are hazardous to the natural environment on account of the very high pH of the material, and the chemicals contained therein. As a result, the contractor shall		

			ensure that: Concrete shall only be mixed on mortar boards, and not directly on the ground The visible remains of concrete, either solid, or from washings, shall be physically removed immediately and		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			disposed of as waste, (Washing of visible signs into the ground is not acceptable). All excess aggregate shall also be removed.		
	Construction Operation Decommissioning Rehabilitation and Closure	Small scale and localised	All hazardous substances (e.g. fuel, grease, oil, brake fluid, hydraulic fluid) must be handled, stored and disposed of in a safe and responsible manner so as to prevent pollution of the environment or harm to people or animals. Appropriate measures must be implemented to prevent spillage and appropriate steps must be taken to prevent pollution in the event of a spill.		
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	Hazardous substances shall be confined to specific and secured areas, and in such a way that does not pose any danger of pollution even during times of high rainfall. Hazardous storage areas shall be bunded (impermeable) with adequate containment (at least 110% the largest volume stored) for potential spills or leaks. Bunded storage areas shall be either be provided with an oil separator	NEMA Polluter Pays Principle NEMA Duty of Care NEMA NWA OHSA MHSA	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			or sump. Waste from spillages will then be removed and recycled or disposed of responsibly.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	All fuel storage areas shall be bunded to contain at least 110 % of the volume stored and will comply with the relevant environmental and safety regulations. Fuel storage areas must be provided with an impervious surface with the provision to contain any potential fuel spillages during refueling (e.g. a sealed concrete slab which drains to a sump/oil separator). The applicant and Contractor(s) must ensure that employees and labourers do not smoke or take part in any activity that may results in sparks in the vicinity of fuels and other flammable substances to		

			prevent ignition.		
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	Refueling may only take place within a dedicated area inside the mine that is subject to appropriate spill prevention and containment measures refueling and transfer of hazardous chemicals and other potentially hazardous substances must be carried out so as to		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			minimise the potential for leakage and to prevent spillage onto the soil. Drip trays should be utilised in relevant locations (inlets, outlets, points of leakage, etc.) during transfer so as to prevent such spillage or leakage. Any accidental spillages shall be contained and cleaned up promptly.		
	Construction Operation Decommissioning	High significance and potentially a moderate scale disturbance	Any excess or waste material or chemicals should be removed from the site and should preferably be recycled (e.g. oil and other hydrocarbon waste products). Any waste materials or chemicals that cannot be recycled shall be disposed of at a suitably licensed waste facility.	NEMWA DWAF minimum requirement for waste disposal	Throughou t operations
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	Hazardous waste may only be disposed of at a licensed hazardous waste disposal facility. A specialist waste contractor shall dispose of such waste and shall be required to provide waste manifests and safe disposal certificates. The 'cradle-to-grave' principle must be complied with.	NEMA Polluter Pays Principle NEMA Duty of Care NEMWA DWAF minimum requirement for waste disposal	Throughou t operations

	Construction Operation	Potential health risks are	All relevant personnel on site must be properly trained concerning the proper	MSDS specifications OHSA	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning Rehabilitation and Closure	considered high significance	use, handling and disposal of hazardous substances applicable to their line of work. If required, advice shall be obtained from the manufacturer with regard to the safe handling and storage of hazardous materials.	MHSA	
	Construction Operation Decommissioning	Small scale and localised	The contractor shall supply the Pit EO with a list of all hazardous materials that would be present on site during the construction period. The same applies to any sub-contractor that should provide the contractor with this information. The Pit EO shall develop and maintain a hazardous substance register for all hazardous materials that shall be kept on site during all phases of the project. The register shall be provided to the ECO upon request. Material Safety Data Sheets (MSDS) must be available on site at the point of use and readily accessible for all. hazardous substances stored.	OHSA MHSA	Throughou t operations
Waste Management					
Maintenance and operation of site	Construction Operation	Waste has the potential to pollute	The small-scale mine shall develop and implement a waste management plan	NEMWA NEMA Cradle to Grave	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
infrastructure and facilities Infrastructure construction General construction Mining Permit area site preparation General opencast management Opencast mining General decommissioning activities Infrastructure removal	Decommissioning Rehabilitation and Closure	the environment and can vary from localised to large scale impacts	which complies with the principles of the NEMWA and provides a mechanism for the effective management of waste throughout. This plan shall ensure the appropriate management of all solid waste, including construction debris (cement bags, wrapping material, timber, cans, wire, nails, etc.), waste and surplus food, food packaging, organic waste etc.	DWAF minimum requirement for waste disposal Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localised to large scale impacts	The waste management system shall provide for adequate waste storage (in the form of waste skips and bins with lids), waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. No waste material is to be disposed of on site. Under no circumstances may there be any burial of waste underground or on the site.	NEMWA NEMA Cradle to Grave DWAF minimum requirement for waste disposal	Throughout operations
	Construction Operation Decommissioning Rehabilitation and	Waste has the potential to pollute the environment and can vary from	Waste generated on site should be recycled as far as possible and sold/given to interested contractors. Recyclable waste should not be stored	NEMWA NEMA Cradle to Grave DWAF minimum requirement for waste	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Closure	localised to large scale impacts	on site for excessive periods to reduce risk of environmental contamination.	disposal	
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localised to large scale impacts	The small-scale mine shall implement a waste removal regime that ensures waste skips do not exceed their capacity before being removed from site for disposal.	NEMWA NEMA cradle to grave	Throughou t operations
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localised to large scale impacts	Littering shall be strictly prohibited. The site shall remain in a neat and tidy condition at all times. If required, the mine shall make use of regular litter patrols to remove litter and ensure the site remains clean, neat and tidy.	NEMWA NEMA Cradle to Grave	Throughou t operations
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localised to large scale impacts	The small-scale mine shall maintain a waste register which shall be used to track all waste removed from site. Proof of appropriate waste disposal shall be kept on file at the site for auditing purposes.	NEMA Cradle to Grave	Throughou t operations

	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localised to large scale impacts	The small-scale mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in the prescribed and correct manner.	NEMA Cradle to Grave	Throughou t operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Sewage and Sanitation					
General Construction Mining Permit area site preparation General opencast management Opencast mining Maintenance and operation of site infrastructure and facilities General decommissioning activities Infrastructure removal	Construction Operation Decommissioning Rehabilitation and Closure	Sewage has the potential to result in localised impacts of low to medium significance	There must be adequate provision for safe and effective sanitation (i.e. ablution facilities) at the mine and work sites and these shall conform to all relevant health and safety standards and codes. The Mine shall ensure compliance with the OHSA and MHSA in terms of sewage and sanitation. Under no circumstances will pit latrines, french drain systems or soak away systems be allowed.	NEMWA NWA NEMA Cradle to Grave	Throughou t operations
			Portable toilets will be managed by reputable contractors and inspected daily for any potential leaks. The Contractor (or reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. Chemical toilets shall be emptied/serviced frequently to avoid offensive odours (at least weekly). Toilets must be kept in a clean, neat and hygienic condition. Chemical toilets shall be cleaned and emptied before the contractor’s long weekends or		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			public holidays. Toilets must be easily accessible. Toilets shall be placed outside areas susceptible to potential flooding and shall not be placed within 100 m of any wetland or watercourse. Ablution facilities shall be located a sufficient distance from any offices or eating areas to prevent nuisance from offensive odours. Disposal of sewage from chemical toilets shall be in a safe and responsible manner and at an approved facility specifically for that purpose. Proof of sewage removal and disposal shall be kept on file for auditing purposes.		
Noise					
General decommissioning activities General surface rehabilitation	Construction Operation Decommissioning Rehabilitation and Closure	Noise has the potential to result in significant impacts to sensitive receptors at a small to medium scale	The small-scale mine shall take reasonable measures to limit exceedingly noisy activities. Where noise is generated which may impact on sensitive receptors, the mine shall apply measures to control the noise cannot be avoided, mitigation measures	SANS10103 ECA Noise Regulations World Bank EHS Guidelines OHSA MHSA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Mineral Processing Opencast mining Filling opencast voids Re-vegetation Site establishment – contractors camp			to be applied shall include but is not limited to: • Using the smallest/quietest equipment for the particular purpose. • Ensuring that equipment is well- maintained and fitted with the correct and appropriate noise abatement measures. • Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation can reduce noise by up to 20 dBA. All construction vehicles and equipment are to be kept in good repair. • Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum. • The contractor must attempt to restrict noisy activities as far as is possible to times and locations		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			whereby the potential for noise nuisance is reduced. • When working near (within 800 meters) to a potential sensitive receptor(s), the Contractor shall limit the number of simultaneous activities to the minimum. • All machines should be equipped with appropriate noise reduction equipment. • All machines should be roadworthy (including meeting maximum noise specifications). • The vehicles exhaust and baffle systems must be maintained regularly to ensure that the noise from these vehicles is within the required noise specification. • All plant and equipment must be operated in accordance with the specifications provided by the manufacturer. • Safety measures that generate noise, including reverse gear alarms, should be adjusted to		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			minimise noise where possible.		
			A maintenance programme will be investigated for the ventilation machinery and shall be implemented should feasible options exist.		
			Community involvement needs to continue throughout the project. Good public relations are essential. At all stages surrounding receptors should be educated with respect to the potential increase of noise from the mine. The information presented to stakeholders should be factual and should not set unrealistic expectations.		
			Trucks, machinery and equipment will be regularly serviced to ensure acceptable noise levels are not exceeded. Quieter equipment will be sought where possible when purchasing new equipment. Silencers will be utilised where possible. Point sources will be enclosed where possible. Acoustic screens will be considered if I&AP complaints are received.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			Local residents should be notified of any potentially noisy activities or work and these activities should be undertaken at reasonable times of the day. These works should not take place at night or on weekends.	SANS10103 ECA Noise Regulations World Bank EHS Guidelines	Throughout
			A channel of communication should be established and promoted between the mine and surrounding stakeholders. All noise complaints must be recorded and investigated. If required, the complaints should be investigated by an acoustical consultant.	OHSA MHSA	
			As a general rule, construction operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993). The Applicant and Contractor(s) shall obtain a copy of the relevant noise regulations and take all reasonable measures to abide by these regulations. Sound pressure levels should not exceed the specified threshold level for the relevant area in accordance with SANS10103, as experienced by the nearest noise		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			sensitive receivers (i.e. local residents). In the event that noise levels exceed the specified thresholds in terms of the noise regulations, the Applicant shall appoint a suitably qualified acoustic engineer to identify sources of the elevated noise levels and to suggest suitable and reasonable mitigation measures.		
Air Quality					
General decommissioning activities General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area	Construction Operation Decommissioning Rehabilitation and Closure	Localised and low significance	Areas of high risk for spontaneous combustion will be inspected regularly for signs of possible combustion. An emergency procedure will be set up in the case of spontaneous combustion.	NEMAQA Dust Regulations	Throughout
	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localised high significant impacts	It is important to note that dust could be a major disturbance, especially during the dry winter periods to people residing around the site. All reasonable measures must be utilised to minimise the generation of dust as a result of activities on site. Such measures shall include, but shall not be limited to: • Traffic control measures aimed at reducing the entrainment of	NEMAQA Dust Regulations	Throughout

site preparation					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast mining Post closure monitoring and maintenance Re-vegetation			material by restricting traffic volumes and reducing vehicle speeds. • Regular and effective measures aimed at binding the surface material or enhancing moisture retention, such as wet suppression and chemical stabilization. • Application of chemical dust palliatives and the optimal selection of wearing course materials (where possible environmentally friendly products should be utilised). • Appropriate scheduling of dust-generating activities (e.g. the clearing of parking areas should be postponed until the construction programme requires the clearing of that specific area). • Avoid excavation and stockpiling activities during periods of strong winds. • Increase dust suppression efforts during conditions conducive to excessive dust creation (e.g. dry and windy conditions).		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Limit the height of soil stockpiles where possible, and wetting down of soil stockpiles when excessive dust is generated from these stockpiles. • Areas where excessive or difficult to manage fallout dust and erosion occur remain may be treated with chemical dust suppressant or paved as opposed to using water.		
	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localised high significant impacts	The small-scale mine shall comply with the National Dust Control Regulations, Promulgated under the National Environmental Management: Air Quality Act (Act 39 of 2008). In the event that dust levels exceed the specified thresholds in terms of the dust control regulations, the Mining Permit holder shall appoint a suitably qualified specialist to identify sources of the excessive dust levels and to suggest suitable and reasonable mitigation measures.	NEMAQA Dust Regulations	Throughout
	Construction Operation	Localised and low significance	The small-scale mine must ensure that no transported materials escape from	NEMAQA Dust Regulations	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning		the construction and mine vehicles (no spillage on roads or dust clouds). If necessary, the load bin of the vehicle shall be covered with a tarpaulin to prevent dust.		
	Construction Operation Decommissioning Rehabilitation and Closure	No direct Impacts	The small-scale mine shall maintain open and transparent communication with the community and surrounding landowners regarding air quality and shall supply monitoring records to the public upon request.	NEMAQA Dust Regulations	Throughout
	Constructio n Operation	Localised and low significance	A skirt (dust barrier) shall be placed around the base of dry drills to minimise the generation of airborne dust.	NEMAQA Dust Regulations	Throughout
	Construction Operation Decommissioning Rehabilitation and Closure	Health impacts have a localised but high significance	Employees will receive training on the use of personal dust respirators, whenever high dust levels are experienced.	NEMAQA Dust Regulations	Throughout

	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localised high significant impacts	Speed limits will be established and enforced on the mine to minimise dust generation.	NEMAQA Dust Regulations	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation Decommissioning Rehabilitation and Closure	Localised and low significance	Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.	NEMAQA Dust Regulations	Throughout
Heritage					
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law	Should artefacts or archaeological items be observed, then all activity should cease immediately, the area marked off and a specialists consulted prior to any further activity.	NHRA	Throughout
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law	Should graves be observed on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialist will need to be consulted and responsible action considered, whether grave relocation or ceasing activity completely within the area and a 100 m buffer zone.	NHRA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation	Impacts on heritage affect a	The small-scale mine must develop a heritage management plan. This should	NHRA	As soon as possible and
	Decommissioning Rehabilitation and Closure	limit extent but have a very high significance due to the value of heritage resources which are protected by law	include the relevant measures to protect and monitor all known heritage resources on site. Furthermore, the plan should include a chance finds procedure.		implemented throughout
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	All identified gravesites will be fenced off, or relocated. Access to gravesites will be arranged for family members/friends of the deceased if requested. Grave sites that remain in- situ shall be inspected on a regular basis as per the heritage management plan to ensure no damage has occurred.	NHRA	As soon as possible and implemented throughout

	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	In the event that graves or cemeteries must be relocated, a full grave relocation process must be undertaken that includes comprehensive social consultation. The grave relocation process must include: • A detailed social consultation process, that will trace the next-of- kin and obtain their consent for the	NHRA Human Tissue Act	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			relocation of the graves, which will be at least 60 days in length. • Site notices indicating the intent of the relocation. • Newspaper notice indicating the intent of the relocation. • A permit from the local authority. • A permit from the Provincial Department of Health. • A permit from the South African Heritage Resources Agency, if the graves are older than 60 years, or unidentified and thus presumed older than 60 years. • An exhumation process that keeps the dignity of the remains and family intact. The whole process must be done by a reputable company that is well versed in relocations. • The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the development company.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Land Capability					
General surface rehabilitation Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Filling opencast voids	Construction Operation Decommissioning	Impacts on land capability have long term effects and can be of a high significance	The small-scale mine will ensure that overburden stockpiles are located in accordance with the rehabilitation plan to allow for minimal handling when returning soils during rehabilitation.	In accordance with Rehabilitation and Closure Plan	Throughout
	Construction Operation Decommissioning Rehabilitation and Closure		The small-scale mine shall preserve soil potential as far as possible, thus conserving land capability.	In accordance with Rehabilitation and Closure Plan	Throughout
	Construction Operation Decommissioning Rehabilitation		Soil stockpiles should be vegetated with prescribed seed mixtures to prevent soil erosion.	In accordance with Rehabilitation and Closure Plan	Throughout
	Rehabilitation		During rehabilitation care must be taken to return the correct soil types and depths to specific sections of rehabilitated land to ensure land capability potential is restored to that area.	In accordance with Rehabilitation and Closure Plan	During Rehabilitatio n

	Construction Operation Decommissioning Rehabilitation and Closure		Re-vegetate rehabilitated areas as soon as possible to prevent soil erosion.	In accordance with Rehabilitation and Closure Plan	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Surface Water					
Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Re-vegetation Site establishment	Construction Operation Decommissioning	Impacts on surface water can have a high significance and extent	Where clean water is diverted away from construction and/or mining areas, its point of re-entry into the natural watercourse should be well protected against erosion. In addition, sediments should be effectively trapped before re- entry.	NWA GN 704 DWAF best Practise Guidelines Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	As soon as possible and implemented throughout
	Construction Operation Decommissioning		No wastewater may run freely into any of the surrounding environment or neighbouring properties. The contractor shall implement the storm water design in accordance with the approved Storm Water Management Plan. The Applicant and Contractor(s) shall ensure compliance with the requirements of the National Water Act and GN 704		

	Construction Operation Decommissioning Rehabilitation and Closure		All areas susceptible to erosion shall be protected by ensuring that there is no undue soil erosion resultant from construction and/or mining activities. Berms shall be constructed where necessary to direct all runoff into the stormwater system. Care must be taken		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			to avoid scouring and erosion and suitable measures should be placed in areas where runoff concentrates, in order to detain the sediment load and slow down the runoff. All erosion damage shall be repaired as soon as possible as directed by the ECO.		
	Construction Operation Decommissioning Rehabilitation and Closure		All storm water and erosion control mechanisms must be inspected frequently and shall be maintained on a regular basis to ensure they remain effective. Appropriate remedial action, including the rehabilitation of eroded areas, shall be undertaken under direction from the ECO.		
	Construction		Materials capable of resulting in poor quality leachate will not be used for the construction of haul roads. This will entail testing for acid generation potential.		

	Construction		Where possible, the disturbance of land during the construction phase will be confined to areas which are disturbed for the operation of the mine.		
	Construction Operation		Soil stockpiles must be stabilised with vegetation to reduce erosion and		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			siltation into streams and dams.		
	Construction Operation Decommissioning Rehabilitation and Closure		Hydrocarbon spills will require immediate attention and should be disposed of at a reputable facility. All used hydrocarbons will be collected and recycled.		
	Construction Operation Decommissioning Rehabilitation and Closure		All licenses and permits required as per the National Water Act will be applied for as per the relevant water uses and mining will adhere to regulations stipulated in the water license.		
	Construction Operation Decommissioning Rehabilitation and Closure		The small-scale mine shall ensure soil erosion control measures are established in all high risk areas to reduce silt-loading in storm water runoff. Construct a down-stream drain and silt traps at the outlet of water diversion areas. Clean out silt build up in trenches and silt traps over dry season or more frequently if needed.		

			Conduct construction activities in the dry winter months as far as possible.		
	Construction Operation		Storm water runoff will be diverted around the opencast pit on the upslope side but the area enclosed within these		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			boundaries will be kept as small as possible.		
	Construction Operation		The small-scale mine shall ensure that water management facilities are operating adequately and will remain operational during a 50 year 24 hr. storm event until such time that all disturbed areas are stabilized.		
	Rehabilitation and Closure		On gentle slopes, water will be encouraged to flow off the rehabilitated surface, as surface flow, as quickly as possible without causing erosion. This will ensure that water does not infiltrate too deeply and come into contact with carbonaceous material. On steeper slopes, water will be encouraged to infiltrate slightly to help prevent soil erosion.		
Wetlands					
Maintenance and operation of site infrastructure and facilities	Construction	Impacts on wetlands are considered to be highly significant due to the sensitivity of these	The small-scale mine shall limit the extent of the development footprint to exclude aquatic resources as far as possible.	NWA GN 704 Shall adhere to the ESMS Framework guided by Equator Principles, and	Throughout
Opencast mining	Construction Operation		The small-scale mine shall take the necessary precautions to avoid any		Throughout

				IFC Performance	

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment	Decommissioning Rehabilitation and Closure	areas. Impacts can range from localised to impacts which are large in extent	impacts to wetlands outside of the required construction and/or mining footprint. These areas should be considered as no-go areas, and the restriction should be enforced.	Standards	
	Construction Operation Decommissioning Rehabilitation and Closure		The small-scale mine shall set up a 100 m buffer zone around sensitive areas, including pans, wetlands and streams. These areas should be considered as no-go areas, and the restriction should be enforced.		Throughout
	Construction Operation Decommissioning Rehabilitation and Closure		Any wetlands impacted during the construction or mining process on site should be rehabilitated in accordance with the principles and guidelines presented in this EMPR.		Throughout
	Construction Operation Decommissioning Rehabilitation and Closure		Re-vegetate all bare wetland areas not directly within the footprint of the developments as soon as possible. The extent of the disturbance should be limited to a minimum.		Throughout

	Rehabilitation and Closure		Regular monitoring of the success of wetland rehabilitation measures must be undertaken. Where required, the necessary adjustments should be made to ensure the complete re-		Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			establishment of the natural vegetation.		
	Constructio n Operation		Construction of a low berm, approximately 1m high by 2-3m wide between the stockpiles and the wetlands. These berms would serve to intercept flows containing suspended sediments and create a depositional environment. They should be located outside the wetland boundaries and should be created prior to construction and vegetation clearing on the stockpile footprint commencing.		Throughout
	Construction Operation Decommissioning Rehabilitation and Closure		Inform all construction contractors and other personnel to not disturb the fauna and flora in wetland areas and not to wash or bath in local streams.		Throughout
	Construction Operation Decommissioning Rehabilitation and Closure		Control dust emissions to prevent dust from settling in the wetland areas.		Throughout

	Construction Operation Decommissioning Rehabilitation and		The small-scale mine shall implement an aquatic bio-monitoring and water quality programme. Where target endpoints are not met,		Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Closure		recommendations should translate directly into follow-up action that is recorded and auditable.		
	Construction Operation Decommissioning Rehabilitation and Closure		No dirty water may be discharged into any wetland or water resource on site unless treated to the required standards.		Throughout
	Construction Operation Decommissioning Rehabilitation and Closure		No stockpiling of material may take place within the wetland areas and temporary construction camps and infrastructure should also be located away from these areas, with a minimum buffer of 100 m maintained from delineated wetland boundaries. In cases where historical mining activities have encroached within 100 m of wetlands, exemption must be obtained for the provisions of GN 704 and the necessary protection measures shall be implemented to minimise the impact on wetlands as far as is possible.		Throughout
	Construction Operation		No abstraction of water from the wetlands or dams should be allowed		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning Rehabilitation and Closure		unless expressly authorised in the Water Use License.		
	Construction Operation Decommissioning Rehabilitation and Closure		Where storm water and/or diverted clean water is discharged into wetlands, appropriate measures such as gabions should be constructed to contain erosion.		Throughout
Topography and Landform					
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on topography tend to be large in extent and can have a significant effect on the environment	Levelling out of the mine site area will be supervised by a qualified engineer in conjunction with an environmental consultant.	In accordance with Rehabilitation and Closure Plan Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
			Where possible, natural drainage lines will be followed to reduce loss of water in the natural catchments.		
			A post mining topographical plan should be developed during the start of the project in order to ensure compliance during and after mining. This plan must be adhered to at all stages of the project.		

Post closure monitoring and maintenance			Overburden will be temporarily stockpiled and will be placed back into the pit once the Coal has been		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment			mined out, therefore attempting to maintain the natural topography.		
			The overburden should be replaced in a manner that replicates the previous topography, and ensures that the final topography has a surface that is free-draining.		
			There will be checks to ensure that the planned post mining topography is being followed.		
			All heavy machinery operators and truck drivers should be instructed to stay in designated areas, such as operation sites and roads.		
			Soils should be stockpiled separately according to their forms and their potentials.		
			During ongoing rehabilitation, soil horizons should be replaced in the same order as they occur in nature to prevent mixing of soil horizons.		

			Topsoil depth should be related to the proposed post-mining land capability plans.		
			Rehabilitated areas should not be compacted more than is necessary,		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			and activity, particularly that of heavy machinery and vehicles, on these areas should be limited.		
			Rehabilitated areas should be landscaped to prevent water logging and vegetated to prevent soil erosion.		
			Erosion control measures such as contour banks and cut off berms should be constructed and soil vegetated in rehabilitated areas.		
			Accidental hydrocarbon spillages should have sawdust applied immediately, and rehabilitated or if this is not possible then the affected soil should be removed and the area rehabilitated.		
			Final profiling of the last cut will take place to ensure the area is rehabilitated as close to its natural state as possible.		
			Additional debris and soil will be brought in if required.		
			The area where pans once were will require additional attention to help		

			restore its functions and form.		
			Regular surveyance to ensure the rehabilitation conforms to the final		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			topographical plan and that no final void will be left.		
Transportation, Infrastructure and Traffic					
Mining Permit area site preparation Opencast mining Site establishment – Contractors Camp Site establishment Water management Infrastructure construction	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance	The small-scale mine shall ensure that the internal haul roads are adequately maintained, including monthly scraping where required. Together with road maintenance, the storm water system to direct storm water that falls within the roads shall be kept maintained and settlement ponds shall be cleared of silt on a regular basis. On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation on site, and to minimise disruption of traffic.	Road Traffic Act OHSA MHSA	Throughout

			In the case of dual or multiple use of access roads by other users, arrangements for multiple responsibility must be made with the other users. If not, the maintenance of access roads will be the responsibility of the Applicant		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			and/or Contractor(s). Road condition must be assessed regularly for signs of damage.		
			Damage caused to public roads as a result of the construction and/or mining activities shall be repaired in consultation with the relevant municipal authorities.		
			Materials for the haul road will be sourced locally from a legal source and the Department of Roads and Transport will be consulted with regard to the construction of haul roads.		
			All intersections with main tarred roads will be clearly signposted.		
			Road signs and safety features such as rumble strips will be maintained to ensure the writing is legible and the haul road crossings are visible to motorists.		

			All construction and mining vehicles using public roads shall be in a roadworthy condition and their loads secured. They must adhere to the speed limits and all local, provincial and national regulations with regards to		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			road safety and transport.		
Visual					
General surface rehabilitation Mining Permit area site preparation Opencast mining Site establishment	Rehabilitation and Closure	Visual impacts have an impact on the perception and sense of place in the area and although hard to quantify can have a significant impact over a large extent of the area	Final shaping will be implemented, such that, the final profile of the rehabilitated mining areas are formed to emulate natural contours of the area.	In accordance with Rehabilitation and Closure Plan Closure and final land use objectives	Throughout
	Construction Operation Decommissioning		Directional lighting and soft lighting will be utilised to ensure that only areas required to be lit are lit. Screens will be considered if I&AP complaints are received.		
	Construction Operation Decommissioning		Where possible, and in consideration of the rehabilitation plan and objectives, the mine shall create screening using soil stockpiles, berms and natural vegetation to reduce the visual impact of the mining operations and infrastructure.		
	Construction Operation Decommissioning Rehabilitation and Closure		Dust suppression methods must be applied when necessary to restrict the visual impact of dust emissions.		

Blasting and Vibration					
Op enc ast mi nin g	Operation	Blasting and	Prior to mining commencing, local	MHSA	Throughout

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		Vibration can have a significant impact which increases in significance with proximity to the blast	infrastructure should be inspected to determine and document the extent of existing damage. These properties will be periodically evaluated to determine any damage. Records of blasting times and distance to properties will also be used to determine likelihood of damage.	Explosives Act No. 26 of 1956 and amended No. 15 of 2003 United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration	Operation
			The reduction of ground vibration is fundamental in different ways and shall include the following measures: • Detailed blast design for each blast with consideration the effects from blasting i.e. ground vibration and air blast. • Calculate expected ground vibration levels for blast to be done and if necessary re-design to reduce charge mass per delay, use of electronic initiation of blast, drilling smaller diameter blastholes that will reduce charge per blasthole and per delay.		
			The reduction of air blast is fundamental in different ways and shall		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			include the following measures: • Detailed blast design for each blast with consideration the effects from blasting i.e. ground vibration and air blast. • Use of proper stemming lengths of between 25 and 30 blasthole diameters. • Use of crushed aggregate of 10% the blasthole diameter as stemming material • Record stemming lengths for each blast and correct if necessary prior to every blast blasted. • Monitor each blast done.		
			The small-scale mine should liaise with local residents on how best to minimise the impact of blasting. Information that should be provided to the potential sensitive receptor(s) includes: • Proposed blasting schedules. • How long the activity is anticipated to take place. • What is being done, or why the		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			activity is taking place. • Contact details of a responsible person where any complaints can be lodged should there be an issue of concern.		
			Groundwater		
Gen eral dec om miss ioni ng acti vitie s General surface rehabilitation	Construction Operation Decommissioning Rehabilitation and Closure	The mining impact on groundwater potentially affected a very large area and has a potentially high significance impact	The small-scale mine must take all reasonable measures to avoid and limit pollution of ground water resources as a result of site activities. Pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage, waste water containing organic waste, detergents, solid waste and litter etc. The Mining Permit holder and Contractor(s) shall comply with the requirements relating to hazardous materials and spill management presented in this EMPR.	NEMA Duty of care NWA GN 704 DWAF best practice guidelines Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout
Maintenance and operation of site infrastructure and facilities Mining Permit area	Construction Operation Decommissioning Rehabilitation and Closure		In the event of pollution caused as a result of construction or mining activities, the responsible party, according to Section 20 of the National Water Act (Act No. 36 of 1998) shall be responsible for all costs incurred by		

site preparation					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Re-vegetation Site establishment			organisations called to assist in pollution control and/or to clean up polluted areas.		
	Construction Operation		Materials capable of resulting in poor quality leachate will not be used for the construction of haul roads.		
	Operation		Water accumulating within the opencast workings will be pumped and it will be re-used in the operation.		
	Construction Operation Decommissioning Rehabilitation and Closure		The small-scale mine shall ensure that the ground water monitoring programme is implemented.		
	Operation Decommissioning Rehabilitation and Closure		The rehabilitation of mined cuts need to be done to minimise infiltration and then need to mine water. To achieve this, the area must be free draining in its entirety, the soil cover needs to be replaced and sufficient vegetation cover needs to be established.		

	Operation Decommissioning Rehabilitation and Closure		Water decanting from the opencast workings where the floor cannot be flooded will be collected and treated prior to release, unless monitoring indicates that the water quality meets the water management objectives.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Decommissioning					
General decommissioning activities General opencast management Filling opencast voids	Decommissioning	Decommissioning of infrastructure can result in negative impacts. The extent is localised to the extent of the infrastructure and mining footprint.	All infrastructure, equipment, plant, temporary housing and other items used during the mining period will be removed from the site (section 44 of the MPRDA). Infrastructure should be removed down to foundations to prevent loss of soil productivity. All vehicles, equipment and other assets belonging to the Mining Permit holder/Contractor(s) must be removed from the property upon completion of the mining operation, including any excess aggregate, gravel, stone, concrete, temporary fencing and the like.	MPRDA In accordance with Rehabilitation and Closure Plan Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	During decommissioning activities

			No discard materials of whatsoever nature shall be buried on the site, or on any vacant or open land in the area. Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the Mining Permit area and disposed of at a recognised landfill facility. It will not be		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			permitted to be buried or burned on the site.		
Rehabilitation					
General surface rehabilitation Re-vegetation	Rehabilitation and Closure	Rehabilitation has limited negative impacts. The scale of the impact is limited to the disturbance footprint.	An Integrated Rehabilitation and Closure Plan shall be developed by the small-scale mine early in the life of the operations (preferably prior to operation). The Plan must be viewed as a dynamic document and shall be subjected to independent review on an annual basis (together with the quantum for financial provision). As a minimum the Integrated Rehabilitation and Closure Plan shall include the following;	MPRDA In accordance with Rehabilitation and Closure Plan Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	As soon as possible in operational phase and implemented throughout Annually updated

			• Desired end land use objectives. • Methodology and proposed schedule for progressive rehabilitation to be undertaken concurrently with mining operations. • Details of soil preparation procedures including proposed measures to improve soil fertility (if		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			so required) and the sustainability thereof. • A list of the plant species that will be used in the rehabilitation process. Only indigenous species may be utilised and these species should be representative of the relevant vegetation unit/landscape type of the area. • Procedures for ensuring vegetation growth and survival (watering, fertilisation etc.). • Details of proposed storm water and erosion control measures to ensure re-vegetation is successful and not hampered by scouring and erosion. • Monitoring procedures that will be implemented to assess re-vegetation efforts (duration and frequency of monitoring, criteria for determining success of rehabilitation). • Procedures for preventing the establishment of alien invasive		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			vegetation in rehabilitated areas.		
			Upon completion of the mining operation and closure of the facility, the Mining Permit holder shall ensure that all cleared and/or disturbed areas (as a result of the activity) within and outside the boundaries of the site shall be rehabilitated in accordance with the Rehabilitation and Closure Plan.		
			Rehabilitation will include returning the slope to the minimum possible gradient (preferably less than 1:3), the topsoil will be replaced for vegetation re- establishment and contour drains will be built to prevent erosion if necessary.		

			The area must be rehabilitated using indigenous vegetation from the area in such a way that it will return as close as possible to the original production potential. Rehabilitation shall be overseen by a suitably qualified specialist who shall approve the indigenous seed mix to be used. The rehabilitated area must be returned to a self-sustaining ecosystem that is consistent with the original vegetation type.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			Any access road or portions thereof, constructed by the mine which will no longer be required by the landowner/tenant, shall be removed and/or rehabilitated to the satisfaction of the ECO and Regional Manager (DMRE).		
			Erosion control measures shall be implemented where necessary (such as berms, brush packing, silt fences etc.). Erosion control and silt prevention measures shall be inspected regularly and shall be maintained whenever required to ensure they remain effective.		
			No alien or invader plant species should be introduced on site during rehabilitation. The weed management plan shall be implemented throughout the rehabilitation and closure phase. Regular monitoring of the rehabilitated area shall be undertaken and all alien vegetation shall be eradicated and/or controlled prior to it setting seed. Weed		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			management shall be to satisfaction of the ECO and Regional Manager (DMRE). Where required, the necessary adjustments should be made to ensure the complete re-establishment of the natural vegetation.		
Closure					
Post closure monitoring and maintenance	Rehabilitation and Closure	Very limited potential for impacts during closure. The Mine remains responsible for the mining right area until such time as a closure certificate is obtained.	Following the expiration of the Mining Permit, the Mining Permit holder shall undertake the required closure process in accordance with Section 43 of the MPRDA.	MPRDA and Regulations	In accordance with legislated timeframes in force at the time of closure.
Post-Closure Monitoring					

Post closure monitoring and maintenance	Rehabilitation and Closure	Very limited potential for impacts during closure. The Mine remains responsible for the	The post-closure monitoring and management period following cessation of mining activities will be implemented by a suitable qualified independent party for a minimum of one (1) year unless otherwise specified by the	MPRDA and Regulations	Minimum of one (1) year post closure or as agreed upon with DMRE

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		mining permit area until such time as a closure certificate is obtained.	competent authority. The monitoring activities during this period will include but not be limited to: • Biodiversity monitoring. • Ground and surface water. • Air quality monitoring. • Re-vegetation of disturbed areas where required. Provision must be made to monitor any unforeseen impact that may arise as a result of the proposed Mining Permit activities and incorporated into post closure monitoring & management.		

31 FINANCIAL PROVISION

The requirement for final rehabilitation, decommissioning and closure stems primarily from the legislative requirements of the MPRDA and NEMA. On 20th November 2015 the Minister promulgated the Financial Provisioning Regulations under the NEMA. The Regulations aim to regulate the determination of financial provision as contemplated in the NEMA for the costs associated with the undertaking of management, rehabilitation and remediation of environmental impacts from prospecting, mining or production operations through the lifespan of such operations and latent or residual environmental impacts that may become known in the future. These regulations provide for, inter alia:

- Determination of financial provision: An Applicant or holder of a right or permit must determine and make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of prospecting, mining or production operations, as contemplated in the Act and to the satisfaction of the Minister responsible for mineral resources.
- Scope of the financial provision: Rehabilitation and remediation; decommissioning and closure activities at the end of operations; and remediation and management of latent or residual impacts.
- Regulation 6: Method for determining financial provision – An applicant must determine the financial provision through a detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for:
    - Annual rehabilitation – annual rehabilitation plan.
    - Final rehabilitation, decommission and closure at end of life of operations – rehabilitation, decommissioning and closure plan.
    - Remediation of latent defects.
- Regulation 10: An applicant must-
    - ensure that a determination is made of the financial provision and the plans contemplated in regulation 6 are submitted as part of the information submitted for consideration by the Minister responsible for mineral resources of an application for environmental authorisation, the associated environmental management programme and the associated right or permit in terms of the Mineral and Petroleum Resources Development Act, 2002.

- Provide proof of payment or arrangements to provide the financial provision prior to commencing with any prospecting, mining or production operations.

• Regulation 11: Requires annual review, assessment and adjustment of the financial provision. The review of the adequacy of the financial provision including the proof of payment must be independently audited (annually) and included in the audit of the EMPR as required by the EIA Regulations.

Appendix 4 of the Financial Provisioning Regulations provides the minimum content of a final rehabilitation, decommissioning and closure plan (FRDCP).

Figure 33: Financial Provision

CALCULATION OF THE QUANTUM

Applicant: Tornowize PTY (LTD)
Evaluator: **Singo Consulting (Pty) Ltd**

Ref No.: **MP 30/5/1/1/3/13557 MP**
Date: **31/07/2023**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and pow erlines)	m3	0	19	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	271	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	400	1	1	0
3	Rehabilitation of access roads	m2	0,05	49	1	0,01	0,0245
4 (A)	Demolition and rehabilitation of electrified railw ay lines	m	0	471	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railw ay lines	m	0	257	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	542	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	4,99	284292	0	1	0
7	Sealing of shafts adits and inclines	m3	0	146	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0,36	189528	0	1	0
8 (B)	Rehabilitation of processing w aste deposits and evaporation ponds (non-polluting potential)	ha	0	236054	1	1	0
8 (C)	Rehabilitation of processing w aste deposits and evaporation ponds (polluting potential)	ha	0	685612	1	1	0
9	Rehabilitation of subsided areas	ha	0	158701	1	0,01	0
10	General surface rehabilitation	ha	4,99	150138	1	1	749188,62
11	River diversions	ha	0	150138	1	1	0
12	Fencing	m	0	171	1	1	0
13	Water management	ha	0,104	57087	1	0,01	59,37048
14	2 to 3 years of maintenance and aftercare	ha	4,99	19980	1	1	99700,2
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
					Sub Total 1		848948,215

No.	Description		weighting factor 2	Amount
1	Preliminary and General	101873,7858	1	101873,7858
2	Contingencies	84894,8215		84894,8215
			Subtotal 2	1035716,82
			VAT (15%)	155357,52
			Grand Total	**1191074**

Signed
Date 31/07/2023

31.1 Other Guidelines

The following additional guidelines which relate to financial provisioning and closure have been published in the South African context:

Best Practice Guideline G5: Water Management Aspects for Mine Closure: This guideline was prepared by the DWS and aims to provide a logical and clear process that can be applied by mines and the competent authorities to enable proper mine closure planning that meets the requirements of the relevant authorities. This guideline is aimed mining activities, however certain principles related to closure and water management are relevant. The following technical factors which should be considered during closure, and which are likely to relate to mining activities, have been considered:

- Land use plan: directly interlinked with water management issues insofar as water is required to support the intended land use- in this regard the surrounding communities and the land uses implemented rely on available ground and surface water to be sustained. Management of water quality and quantity has been identified as an aspect to be covered in the FRDCP.

- Public participation and consultation: consultation is fundamental to closure and there is a need for full involvement of stakeholders in the development of the final closure plans, and in the agreement of closure objectives- in this regard this FRDCP has been made available through the Basic Assessment public participation process for comment by relevant stakeholders.

- Guideline for the Evaluation of the Quantum of Closure Related Financial Provision Provided by a Mine: The objectives of the guideline include the need to improve the understanding of the financial and legal aspects pertaining to the costing of remediation measures as a result of mining activities. Whilst this guideline predates the recent NEMA Financial Provisioning Regulations, it does contain certain principles and concepts that remain valid and have been considered in the FRDCP.

32 DESCRIBE THE CLOSURE OBJECTIVES AND THE EXTENT TO WHICH THEY HAVE BEEN ALIGNED TO THE BASELINE ENVIRONMENT DESCRIBED UNDER THE REGULATION

The closure objectives are aimed at re-instating the landform, land use and vegetation units to the same as before mining operations take place unless a specific, reasonable alternative land use is requested by the landowner. As such, the intended end use for the disturbed Mining Permit area and the closure objectives will be defined in consultation with the relevant landowner. Proof of such consultation will be submitted together with the Application for Closure Certificate. The overall aim of the rehabilitation plan is to rehabilitate the environment to a condition as close as possible to that which existed prior to mining. This shall be achieved with a number of specific objectives *(a)* Making the area safe, i.e. decommission mining activities to ensure that the environment is safe for people and animals. This entails refilling the excavations.

(b) Recreating a free draining landform. This entails earthworks infilling, reshaping, levelling, etc. to recreate as close as possible the original topography and to ensure a free draining landscape.

(c) Re-vegetation. This involves either reseeding or allowing natural succession depending on the area, climate etc.

(d) Storm water management and erosion control. Management of stormwater and prevention of erosion during rehabilitation (e.g. cut off drains, berms etc. and erosion control where required).

(e) Verification of rehabilitation success (entails monitoring of rehabilitation).

(f) Successful closure (obtain closure certificate).

33 CONFIRM SPECIFICALLY THAT THE ENVIRONMENTAL OBJECTIVES IN RELATION TO CLOSURE HAVE BEEN CONSULTED WITH LANDOWNER AND INTERESTED AND AFFECTED PARTIES

The Public Participation Process (PPP) is a requirement of several pieces of the South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their opinions are taken into account and a record included in the reports submitted to 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 which forms part of the Mining Permit application needs to be managed sensitively and according to best practises in order to ensure and promote:

- Compliance with national legislation.
- Establish and manage relationships with key stakeholder groups.
- Encourage 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 environmental authorisations required.
- Explain the environmental studies already completed and yet to be undertaken (where applicable).

- Determine and record 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.
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximise and/or promote positive environmental impacts associated with the project.

Landowners and I&APs were consulted and provided an opportunity to comment on the draft Basic Assessment Report, EMPR including all decommissioning, closure and rehabilitation plans. Their comments have be included in this final BAR and EMPR for consideration by the DMRE as part of their decision-making.

34 REHABILITATION PLAN

34.1 Integrated Rehabilitation and Closure Plan

The main aim in developing this rehabilitation plan is to mitigate the impacts caused by the mining activities and to restore land back to a satisfactory standard. It is best practice to develop the rehabilitation plan as early as possible so as to ensure the optimal management of rehabilitation issues that may arise. It is important that the project's closure plan is defined and understood before starting the process and is complementary to the rehabilitation goals. Rehabilitation and closure objectives need to be tailored to the project and be aligned with the EMPR.

The overall rehabilitation objectives for this project are as follows:

Maintain and minimise impacts to the ecosystem within the study area.

- Re-establishment of the pre-developed land capability to allow for a suitable post-mining land use.
- Prevent soil, surface water and groundwater contamination.
- Comply with the relevant local and national regulatory requirements.
- Maintain and monitor the rehabilitated areas.

Successful rehabilitation must be sustainable, requires an understanding of the basic baseline environment and project management to ensure that the rehabilitation program is a success.

It is noted that an application for environmental authorisation must be submitted for closure in accordance with Listing Notice 1 Activity 22:

The decommissioning of any activity requiring –

(a) A closure certificate in terms of Section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) or

(b) A prospecting right, mining permit, production right or exploration right, where the throughput of the activity has reduced by 90% or more over a period of 5 years excluding where the competent authority has in writing agreed that such reduction in throughput does not constitute closure.

34.2 Phase 1: Making Safe

The Mining activity will result in an open pit. The purpose of rehabilitation will be to ensure the site becomes safe for humans and animals. The open pit will be filled with overburden. The overburden will be loaded, trucked and placed into the pit, and the topography in the area adjacent to the pit shaped to ensure that a free draining topography results.

Once the pit has been backfilled, 300mm thick topsoil or soft overburden in place of soil will be spread on rehabilitated areas. Once placed, the "growth medium" should then be fertilised, ripped and revegetated. A small topsoil stockpile should be left for remedial work.

The following actions are required to meet the objectives of this phase:

- Remove all the facilities and equipment from the site.
- Inert waste with a salvage value to individuals such as scrap metal, building materials, etc. will be removed and disposed of at a proper facility.
- The company contracted to supply fuel will be requested to remove all fuel storage and reticulation facilities.
- Those sections of haul road where a lot of Coal spillage has occurred, will be picked up and the waste material taken back to the discard dump.
- Remove or control residual hazardous materials. Identify any potential toxic overburden or exposed strata and manage them so as to prevent environmental damage.
- Access roads around the site should be ripped for all areas except those needed to access the facilities for inspection after closure. Roads that can and will be used by other users post closure should, however, be left provided this is agreed upon by all parties concerned. For the rehabilitation of roads, a cost has been allocated to rip the area, add 300 mm topsoil and vegetate.
- Negotiations will take place with landowners to establish which sections of haul road they will require. The extra portions not required will be left and the remainder ripped. This would

normally mean that the edges or verges are ripped and the centre portion remains. They will be responsible for maintaining the roads after closure.

34.3 Phase 2: Landform Design, Erosion Control and Revegetation

Landform, erosion control and re-vegetation are important parts of the rehabilitation process. Landform and land use are closely interrelated, and the landform should be returned as closely as possible to the original landform. Community expectations, compatibility with local land use practices and regional infrastructure, or the need to replace natural ecosystems and faunal habitats all support returning the land as closely as possible to its original appearance and productive capacity.

This requires the following:

- Deep rip compacted surfaces to encourage infiltration, allow plant root growth and key the topsoil to the subsoil, unless subsurface conditions dictate otherwise.
- Reinstate natural drainage patterns disrupted by mining wherever possible.
- Characterise the topsoil and retain it for use in rehabilitation. It is preferable to reuse the topsoil immediately rather than storing it in stockpiles. Only discard if it is physically or chemically undesirable, or if it contains high levels of weed seeds or plant pathogens.
- If topsoil is unsuitable or absent, identify and test alternatives substrates, e.g. overburden that may a suitable substitute after addition of soil improving substances.
- Lime and superphosphate are applied to the surface.
- These ameliorants are then incorporated by deep ripping, which penetrated 100 mm through the soil into the underlying overburden material.
- Fertilizer is applied as part of seedbed preparation.
- Consider spreading the cleared vegetation on disturbed areas.
- Re-vegetate the area with plant species consistent with the post mining land use.
- The site is then mulched together with an indigenous grass seed mix. This is to stimulate the long term establishment of indigenous vegetation and to reduce erosion during early plant growth.

34.4 Phase 3: Monitoring and Maintenance

The post-operational monitoring and management period following decommissioning of mining activities must be implemented by a suitable qualified independent party for a minimum of one (1) year unless otherwise specified by the Competent Authority.

Maintenance will specifically focus on annual fertilising the rehabilitated area (where required), control of all other alien plants and general maintenance, including rehabilitation of cracks, subsidence and erosion gullies. Continuous erosion monitoring of rehabilitated areas and slopes should be undertaken and zones with excessive erosion should be identified. The cause of the erosion should be identified, and rectified. Zones with erosion will need to be repaired with topsoil.

The monitoring activities during this period will include but not be limited to:

- Biodiversity monitoring.
- Re-vegetation of disturbed areas where required.

Provision must be made to monitor any unforeseen impact that may arise as a result of the proposed mining activities and incorporated into post closure monitoring and management. The small-scale mine shall continue to monitor and manage rehabilitation areas until the vegetation is self-sustaining and meets the requirements of the landowner or land manager, until their management can be integrated into the management of the surrounding area.

34.5 Post-Closure Monitoring and Maintenance

Prior to decommissioning and rehabilitation activities, a monitoring programme shall be developed and submitted to the relevant authority for approval, as a part of the Final Rehabilitation Plan. The programme is to include proposed monitoring during and after the closure of the trench site and related activities.

It is recommended that the post-closure monitoring include the following:

- Confirmation that any waste, wastewater or other pollutants that is generated as a result of decommissioning will be managed appropriately, as per the detailed requirements set out in the Final Rehabilitation Plan.
- Confirmation that all de-contaminated sites are free of residual pollution after decommissioning.
- Confirmation that acceptable cover has been achieved in areas where natural vegetation is being re- established. 'Acceptable cover' means re-establishment of pioneer grass communities over the disturbed areas at a density similar to surrounding undisturbed areas, non-eroding and free of invasive alien plants.
- Confirmation that the Mining Permit site is safe and is not resulting in a pollution hazard.

Annual environmental reports will be submitted to the Designated Authority and other relevant Departments for at least one year post-decommissioning. The frequency and duration of this reporting period may be increased to include longer term monitoring, at intervals to be agreed with the Designated Authority.

The monitoring reports shall include a list of any remedial action necessary to ensure that infrastructure that has not been removed remains safe and pollution free and that rehabilitation of project sites are in a stable, weed and free condition.

35 EXPLAIN WHY IT CAN BE CONFIRMED THAT THE REHABILITATION PLAN IS COMPATIBLE WITH THE CLOSURE OBJECTIVES

The rehabilitation plan is compatible with the closure objectives in that is seeks to ensure that negative impacts on the receiving environment that could not be prevented or mitigated during mining are rehabilitated. The use of indigenous species during re-vegetation will ensure that ecosystem restoration is initiated and prevent invasion by alien species. The appropriate disposal of waste will ensure that land is usable, in alignment with surrounding land uses and that no hazardous materials are left on-site post-mining.

36 CALCULATE AND STATE THE QUANTUM OF THE FINANCIAL PROVISION REQUIRED TO MANAGE AND REHABILITATE THE ENVIRONMENT IN ACCORDANCE WITH THE APPLICABLE GUIDELINE

Figure 33 details the quantum for financial provision for the Final Rehabilitation, Decommissioning and Closure Plan.

37 CONFIRM THAT THE FINANCIAL PROVISION WILL BE PROVIDED AS DETERMINED

The amount will be provided from the operating expenditure.

Quantum for financial provision

CALCULATION OF THE QUANTUM

Applicant: Tornowize PTY (LTD)
Evaluator: **Singo Consulting (Pty) Ltd**

Ref No.: **MP 30/5/1/1/3/13557 MP**
Date: **31/07/2023**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	19	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	271	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	400	1	1	0
3	Rehabilitation of access roads	m2	0,05	49	1	0,01	0,0245
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	471	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	257	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	542	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	4,99	284292	0	1	0
7	Sealing of shafts adits and inclines	m3	0	146	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0,36	189528	0	1	0
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	236054	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	685612	1	1	0
9	Rehabilitation of subsided areas	ha	0	158701	1	0,01	0
10	General surface rehabilitation	ha	4,99	150138	1	1	749188,62
11	River diversions	ha	0	150138	1	1	0
12	Fencing	m	0	171	1	1	0
13	Water management	ha	0,104	57087	1	0,01	59,37048
14	2 to 3 years of maintenance and aftercare	ha	4,99	19980	1	1	99700,2
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
					Sub Total 1		848948,215

No.	Description	Amount	weighting factor 2	Amount (Rands)
1	Preliminary and General	101873,7858	1	101873,7858
2	Contingencies		84894,8215	84894,8215
			Subtotal 2	1035716,82
			VAT (15%)	155357,52
			Grand Total	**1191074**

Signed
Date 31/07/2023

38 MECHANISMS FOR MONITORING COMPLIANCE

Table 25: Mechanisms for monitoring compliance.

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
General surface rehabilitation Mining Permit area site preparation Opencast mining Site establishment Infrastructure	Alteration of topography	Topography and Landform	Construction Operation Decommissioning Rehabilitation and Closure	Control through site planning and design	Original topography and landform serve as a reference for rehabilitation
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Site establishment	Altered drainage patterns	Topography and Landform	Construction Operation Decommissioning Rehabilitation and Closure	Control through proper soil management procedures	Rehabilitation and closure plan DWAF best practice Guidelines

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Post closure monitoring and maintenance			Operation Decommissioning Rehabilitation and Closure	design and planning (depth of mining, safety factors, overburden and rock qualities)	in consultation with DWA/DMRE
Opencast mining	Impact on geology	Geology	Operation	Modify through mine planning, design and rehabilitation	MPRDA Rehabilitation and Closure Plan
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure	Erosion and sedimentation	Soils	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	CARA

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure	Soil compaction	Soils	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMPR mitigation measures	Principles of CARA Rehabilitation and Closure Plan

General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation	Soil pollution/contamination	Soils	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. bunding and spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	Hazardous Substances Act NWA NEMA Duty of Care NEMWA Incident reporting procedures

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure					DWAF minimum standards for waste disposal
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment	Loss of soil fertility (denitrification, loss of soil nutrient store and organic carbon stores) and loss of land capability	Land Capability	Construction Operation Decommissioni ng Rehabilitation and Closure	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and organic matter applications)	CARA Rehabilitation and Closure Plan

Infrastructure					
General surface rehabilitation Infrastructure removal	Loss of soil resource and its utilisation potential	Land Capability	Constructio n Operation	Avoid through preventative measures (e.g. limit area of disturbance)	CARA Rehabilitation and Closure Plan

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure			Decommissioning Rehabilitation and Closure	Remedy through soil remediation if required (e.g. fertilizer and organic matter applications)	
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance	Damage/disruption of services	Land use	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMPR mitigation measures (e.g. service detection and communication with landowners) Remedy through repair or reinstatement of services if required	Stakeholder Engagement Plan Rehabilitation and Closure Plan

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Site establishment Infrastructure					
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure	Interference with existing land uses	Land use	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMPR mitigation measures (e.g. communication with landowners)	Stakeholder Engagement Plan Rehabilitation and Closure Plan
General surface rehabilitation	Direct and indirect mortality of flora and fauna	Fauna and Flora	Planning and Design Construction	Control through implementation of EMPR mitigation	NEMBA TOPS

Infrastructure removal Maintenance and operation of site			Operation Decommissioning	measures (e.g. limit area of disturbance, training) Avoid/Stop through	

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure			Rehabilitation and Closure	relocation of threatened or protected species	
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining	Habitat fragmentation and blockage of seasonal and dispersal movements	Fauna and Flora	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMPR mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	NEMBA

Post closure monitoring and maintenance Site establishment					

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Infrastructure					
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure	Introduction/invasion of alien (non-native) species	Fauna and Flora	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Control through implementation of EMPR mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	NEMBA TOPS Alien Vegetation Management Plan Hazardous Substances Act SANS 10206

General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities	Pollution of surface water resources/decreased water quality	Surface Water	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management)	NWA GN 704 WUL Conditions NEMA Duty of Care NEMA Polluter Pays Principle

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure				Control through implementation of mitigation measures	DWF Best Practice Guidelines
Maintenance and operation of site infrastructure and facilities Water management Infrastructure construction	Decrease in surface water availability	Surface Water	Constructio n Operation	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimisation of water usage and recycling)	NWA GN 704 WULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF Best Practice Guidelines

General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site	Dewatering of groundwater aquifers	Groundwater	Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	NWA GN 704 WULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF Best Practice Guidelines

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure					
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance	Pollution of groundwater/decreased water quality	Groundwater	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (progressive rehabilitation)	NWA GN 704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF Best Practice Guidelines Rehabilitation and Closure Plan

Site establishment Infrastructure					
Post closure monitoring	General Environmental	Environmental Pollution	Rehabilitation and Closure	Avoid through	MPRDA

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
and maintenance	Pollution			implementation of suitable progressive rehabilitation and soil management Control/Remedy through interception of decant and treatment of polluted water where required	NWA NEMA Duty of Care NEMA Polluter Pays Principle NEMWA GN 704 DWF Best Practice Guidelines Rehabilitation and Closure Plan
General decommissioning activities Infrastructure removal	General Environmental Pollution	Environmental Pollution	Planning and Design Construction Operation Decommissioning	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal	Hazardous Substances Act NWA MSDS OHSA MHSA

			Rehabilitation and Closure	Modify through soil treatment if required	NEMA Duty of Care NEMWA Incident Reporting Procedures DWAF Minimum Standards for Waste Disposal
General surface rehabilitation	Hydrocarbon spills/contaminati on	Environmental Pollution	Planning and Design	Avoid through preventative measures (e.g. bunding,	Hazardous Substances Act

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure			Construction Operation Decommissioning Rehabilitation and Closure	spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	NWA OHSA MHS A NEMA Duty of Care NEMWA Incident Reporting Procedures DWAF Minimum Standards for Waste Disposal
Opencast mining	Discovery and preservation of fossils	Heritage	Operation	Avoid and control through implementation of preventative measures Modify through removal and curation of fossils	

General surface rehabilitation Infrastructure removal Maintenance and operation of site	Destruction/damage of palaeontological resources	Heritage	Constructio n Operation Rehabilitation and Closure	Avoid and control through implementation of preventative measure Modify through removal and curation of fossils	NEMA MPRD A NHRA SAHRA permitting requirements Human Tissue Act

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure					IFC Performance Standard 8: Cultural Heritage
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining	Destruction/damage of heritage resources	Heritage	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	NEMA MPRD A NHRA SAHRA permitting requirements Human Tissue Act IFC Performance Standard 8: Cultural Heritage

Post closure monitoring and maintenance Site establishment					

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Infrastructure					
General construction management General opencast management	Crime and violence	Social	Constructio n Operation Decommissioning Rehabilitation and Closure	Avoidance and control through preventative measures (e.g. site security, code of conduct)	ESMS MHS A OHSA Code of Conduct
General construction management General opencast management Mining Permit area site preparation Opencast pit mining	Influx of migrant workers	Social	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism)	Labour Act Basic Conditions of Employment Act IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement
General surface rehabilitation Infrastructure removal	Sense of place	Social	Construction Operation Decommissioning	Modify through reduction of visual impact	Rehabilitation and Closure Plan

Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation			Rehabilitation and Closure		

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure					
General construction management General opencast pit management Maintenance and operation of site infrastructure and facilities Opencast mining	Social vices	Social	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct) Stakeholder engagement plan	Labour Act Basic Conditions of Employment Act IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement Grievance Mechanism Code of Conduct

General Construction Management General opencast management Opencast mining	Employment opportunities	Socio-Economic	Construction Operation Decommissioni ng Rehabilitation and Closure	Minimise impacts of job loss through skills development and livelihood restoration	IFC Performance Standard 5 Land Acquisition Involuntary Resettlement
Opencast mining	Coal supply to the market	Socio-Economic	Operation	Maximise security of Coal supply through	ESMS

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
				sound and responsible mine management	
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure	Health and safety	Health and Safety	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMPR	OHSA MHSA IFC Performance Standard 4: Community Health, Safety, and Security Grievance Mechanism

General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities	Fire and explosion hazard	Health and Safety	Constructio n Operation	Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management	Explosives Act MHSA OHSA MPRD A United States Bureau of Mines (USBM) criteria for safe blasting for ground

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure					vibration and recommendations on blasting
Opencast mining	Fly rock	Health and Safety	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast

					Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure	Damage to road infrastructure	Transportation, Infrastructure and Traffic	Construction Operation Decommissioning	Avoid and control through implementation of EMPR mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	National Road Traffic Act OHSA MHSA

General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation	Increased traffic	Transportation, Infrastructure and Traffic	Constructio n Operation	Avoid and control through implementation of EMPR mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	National Road Traffic Act OHSA MHSA

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure					
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance	Visual impact of mine infrastructure, stockpiles and dust	Visual	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMPR mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	Rehabilitation and Closure Plan Final Land-use Objectives

Site establishment Infrastructure					
General surface rehabilitation	Greenhouse gas emissions	Air Quality	Construction Operation	Avoid and control through implementation of EMPR	NEMAQA Equator Principles

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure			Decommissioning Rehabilitation and Closure	mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	IFC Performance Standard 3: Resource Efficiency and Pollution Prevention
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and	Fugitive emissions (Dust)	Air Quality	Constructio n Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMPR mitigation measures (e.g. dust	Road Traffic Act NEMAQA Dust Regulations

facilities Mining Permit area site preparation Opencast mining Post closure monitoring				suppression)	

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
and maintenance Site establishment Infrastructure					
General surface rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mining Permit area site preparation Opencast mining Post closure monitoring and maintenance Site establishment Infrastructure	Disturbing and/or nuisance noise		Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMPR mitigation measures (e.g. Noise abatement measures)	ECA Noise Regulations SANS 10103 OHSA MHSA

Opencast mining	Blasting	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring,	Explosives Act MHSA OHSA MPRDA United States Bureau of

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
				communication with landowners, emergency response procedures)	Mines (USBM) Criteria for Safe Blasting for Ground Vibration Blast Procedures Emergency Response Procedure IFC Performance Standard 4: Community Health, Safety, and Security

Opencast mining	Ground vibration and human perception	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures and monitoring, communication with landowners and emergency response procedures)	Explosives Act MHSA OHSA MPRD A United States Bureau of Mines (USBM) Criteria for Safe Blasting for Ground Vibration Blast Procedures Emergency Response Procedure IFC Performance Standard 4: Community Health, Safety, and Security

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Opencast mining	Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. structural surveys, blast procedures, monitoring and communication with landowners)	Explosives Act MHSA OHSA MPRD A United States Bureau of Mines (USBM) Criteria for Safe Blasting for Ground Vibration Blast Procedures Emergency Response Procedure IFC Performance Standard 4: Community Health, Safety, and Security

Opencast mining	Noxious fumes	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. structural surveys, blast procedures, monitoring, and communication with landowners)	Explosives Act MHSA OHSA MPRD A United States Bureau of Mines (USBM) Criteria for Safe Blasting for Ground Vibration Blast Procedures Emergency Response

Activity	Potential impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
					Procedure IFC Performance Standard 4: Community Health, Safety, and Security

39 FREQUENCY OF THE SUBMISSION OF THE PERFORMANCE ASSESSMENT/ENVIRONMENTAL AUDIT REPORT

The result of environmental monitoring and compliance to the approved EMPR will be undertaken every second year and submitted to the DMRE in the form of an environmental performance assessment. Included in the report will be the following relevant information:

- The period when the performance assessment was conducted.
- The scope of the assessment.
- The procedures used for conducting the assessment.
- Interpreted information gained from monitoring the EMPR.
- Evaluation criteria used during the assessment.
- Results of the assessment are to be discussed and mention must be made of any gaps in the EMPR and how it can be rectified.
- Yearly updated layout plans.

Any emergency or unforeseen impacts will be reported immediately to the DMRE and other relevant government departments.

40 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

Management of operational risk is a key consideration for mines/pits operating within the social and economic context of South Africa. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. Operational risks and impacts are usually managed through the implementation of the Environmental and Social Management System (ESMS) and Safety, Health and Environmental (SHE) system. A formal, effective ESMS is an important requirement for establishing and maintaining effective environmental management and should be undertaken during the planning phase of the Project. As such the Applicant shall be required to appoint a suitably qualified specialist to develop the ESMS to be implemented on the mine. Adequate resources (people, financial and technical) need to be made available to ensure effective establishment, implementation, maintenance and continual improvements of the ESMS. The roles and responsibilities for these key environmental personnel should be clearly defined and communicated throughout the organisation. The ESMS should include the requirement to constantly monitor environmental performance and assess the adequacy of environmental resources provided for the Mine. If required, the Mine would need to procure further environmental resources to ensure the successful implementation of the ESMS and EMPR. The development and implementation of an ESMS is a requirement in terms of compliance with international standards of best practise such as the IFC Performance Standards and Equator principles

40.1 ESMS Framework

The ESMS will be based on:

- South African legal requirements.
- Mining best practice.

The ESMS to be developed for the Mine should incorporate and provide for:

- A project specific environmental policy.
- Organizational capacity and competency
- The ESMS shall identify roles and responsibilities of key role players.
- The ESMS shall incorporate a mechanism for ongoing identification of risks and impacts (e.g. Impacts and aspects register of an ISO system).
- Integration of the ESMS with the SHE management system may be undertaken to form a holistic SHE risk management system.
- The ESMS shall comprise appropriate management plans and procedures to ensure effective operational control.
- The ESMS shall provide for emergency response and also make provision for emergency protocols.
- Effective communication (both internal and external) is a key requirement for successful implementation of the ESMS and an appropriate communication procedure to this effect shall be developed.
- The ESMS shall involve engagement between the client, its workers, local communities directly affected by the project (the affected communities) and where appropriate, other stakeholders. It is therefore imperative that there is integration between Stakeholder Engagement procedures and the ESMS.
- The ESMS shall make provision for ongoing compliance monitoring and environmental audits.
- The ESMS shall make provision for internal auditing and continual improvement which should be incorporated into internal management review processes. The ESMS should provide for setting and reviewing objectives and targets to demonstrate continual SHE improvements associated with the project.

Ultimately an effective ESMS should provide for effective management of social and environmental risks and impacts whilst maintaining legal compliance and meeting international standards of best practise where these are feasible and appropriate.

40.2 Stakeholder Engagement

Social impacts occur immediately in the planning phase of a project and as such it is imperative to start with stakeholder engagement as early in the process as possible. Stakeholder engagement is required on an ongoing basis throughout the operation of the mine. As such, the mine will need to develop and implement a detailed Stakeholder Engagement Plan, designed to work as a living document for implementation over the entire duration of the project.

The following stakeholder engagement framework outlines the principles and objectives for stakeholder engagement during all phases of the mining operation.

- To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and the small-scale mine.
- To improve relations between mine staff and the people living in the local communities.
- To provide a guideline for the dissemination of information crucial to the local communities in a timely, respectful and efficient manner.
- To provide a format for the timely recollection of information from the local communities in such a way that the communities are included in the decision making process.

This stakeholder engagement plan will assist the mine to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a plan cannot be considered a once off activity and should be updated on a yearly basis to ensure that it stays relevant and to capture new information. The Stakeholder Engagement Plan should be compiled in line with IFC Guidelines (IFC) and should consist of the following components:

- Stakeholder Identification and Analysis – time should be invested in identifying and prioritising stakeholders and assessing their interests and concerns. Information Disclosure – information must be communicated to stakeholders early in the decision- making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project.
- Stakeholder Consultation – each consultation process should be planned out, consultation should be inclusive, the process should be documented and follow-up should be communicated.
- Negotiation and Partnerships – add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter into good faith negotiations that satisfy the interest of all parties.
- Grievance Management – accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project.

- Stakeholder Involvement in Project Monitoring – directly affected stakeholders must be involved in monitoring project impacts, mitigation and benefits. External monitors must be involved where they can enhance transparency and credibility.
- Reporting to Stakeholders – report back to stakeholders on environmental, social and economic performance, both those consulted and those with more general interests in the project and parent company.
- Management Functions – sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress.

It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase

40.3 Grievance Mechanism

In accordance with international good practice the mine shall establish a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation that judges that they have been adversely affected by the project during any stage of its development. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts. The IFC standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities, and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

The proposed grievance mechanism shall be based on the following principles:

- Transparency and fairness.
- Accessibility and cultural appropriateness.
- Openness and communication regularity.
- Written records.
- Dialogue and site visits.
- Timely resolution.

Based on the principles described above, the grievance mechanism process involves four stages:

- Receiving and recording the grievance.
- Acknowledgement and registration.
- Site inspection and investigation.

- Response.

40.4 Internal Grievance Procedure

The mine shall develop a detailed internal grievance mechanism designed to receive and facilitate resolution of workplace concerns and grievances raised by employees (and their organizations, where they exist). Employees must be informed of the grievance mechanism at the time of recruitment and it must be made easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any retribution. The mechanism should also allow for anonymous complaints to be raised and addressed. The mechanism should not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

Document Control

A formal document control system should be established during the development of the ESMS. The document control system must provide for the following requirements:

- Documents are approved for adequacy prior to use.
- Review and update documents as necessary and re-approve documents.
- Ensure that changes and the current version status of documents are identified.
- Ensure that relevant versions of applicable documents are available at points of use.
- Ensure that documents remain legible and readily identifiable.
- Ensure that documents of external origin necessary for the ESMS are identified and their distribution controlled.
- Prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

40.5 Record Keeping

It is essential that an official procedure for control of records be developed to ensure records required to demonstrate conformity to environmental and social standards are maintained. This project is therefore required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention and disposal of records as part of the ESMS. Records must be legible, identifiable and traceable.

40.6 Auditing and Reporting Procedures

The Mining Permit holder shall develop and auditing and reporting procedure, for conveying information from the compliance monitoring activities and to ensure that management is able to take rapid corrective action should certain thresholds be exceeded. The sections below present a framework for the development of the necessary procedures. Different reporting mechanisms may include:

- Inspections
- Accidents and emergencies
- Measuring performance indicators and interpreting and acting on the indicators
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes
- Training programmes and evidence of appropriate levels/amount of skills/capacities created
- All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. The Mining Permit holder must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The EMPR should be viewed as a dynamic document aimed at continual environmental performance improvement.

The following auditing and reporting shall be required throughout the operation phase:

- Weekly Compliance Reports: These reports must be prepared by the designated Pit EO and must aim to monitor and report on-site environmental performance
- Quarterly Compliance Audit Reports: The ECO must compile quarterly compliance audit reports which are to be submitted to the Mining Permit holder for his review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified.

40.7 Responding to Non-Compliances

Non-compliance will be identified and managed through the following four key activities including:

- Inspections of the site and activities across the site
- Monitoring of selected environmental quality variables
- Audits of the site and relevant documentation as well as specific activities
- Reporting on a monthly basis

An environmental non-conformance and incident register must be prepared and maintained by the ECO throughout the lifespan of the small-scale mine in order to monitor environmental concerns, incidents, and non- conformances. The register must include details of date, location, description of the NC or Incident, applicable environmental commitment/standard, corrective action taken, adequacy of corrective action, date rectified, etc.

Non-compliance with the EMPR or any other environmental legislation, specifications or standards shall be recorded by the ECO in the non-conformance register. This register shall be maintained by the ECO and will be sent to the Mining Permit holder and Contractor on a regular basis (quarterly), and the Mining Permit holder shall ensure that the responsible party takes the necessary corrective actions. Non-conformances may only be closed out in the register by the ECO upon confirmation that adequate corrective action has been taken. The register should be utilised to measure overall environmental performance.

40.8 Environmental Incidents

For the purposes of this project, an environmental incident can be divided into three levels, i.e. major, medium and minor. All major and medium environmental incidents shall be recorded in the incident register. Minor incidents do not need to be reported but require immediate rectification on site. Definitions and examples of environmental incidents are provided in Table 32.

Table 26: Description of incidents and non-conformances for the purpose of the project.

Non-Conformance	Any deviation from work standards, practices, procedures, regulations, management system performance etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, or a combination of these.
Major Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread, long-term, irreversible significant negative impact on the environment and/or has a high risk of legal liability.

	A major environmental incident usually results in a significant pollution and may entail risk of public danger. Major environmental incidents usually remain an irreversible impact even with the involvement of long-term external intervention i.e. expertise, best available technology, remedial actions, excessive financial cost etc. Major environmental incidents may be required to be reported to the authorities. The ECO shall make the final decision as to whether a particular incident should be classified as a Major incident. An example of a Major environmental incident would be a significant spillage (e.g. 500 litres) of fuel into a watercourse.
Medium Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread or localised, short term, reversible significant negative impact on the environment and/or has a risk of legal liability. A medium environmental incident may be reported to the authorities, can result in significant pollution or may entail risk of public danger. The impact of medium environmental incidents should be reversible within a short to medium term with or without intervention. The ECO shall make the final decision as to whether a particular incident should be classified as a Medium incident. An example of a Medium environmental incident would be a large spill of fuel (e.g. 20 – 50 litres) onto land.
Minor Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, where the environmental impact is negligible immediately after occurrence and/or once-off intervention on the day of occurrence. An incident where there is unnecessary wastage of a natural resource is also classified as a minor environmental incident. An example would be leaking water pipes that result in the wastage of water. A minor environmental incident is not reportable to authorities. An example of a minor incident is day to day spills of fuel or oil onto the ground where the spill is less than one or two litres.

The following incident reporting procedures shall apply to this project:

- All environmental incidents shall be reported to Contractor’s EO and Pit EO who shall ensure that the appropriate rectification is undertaken.
- The Pit EO shall record all medium and major incidents in the incident register and advise on the appropriate measures and timeframes for corrective action.
- An incident report shall be completed by party responsible for the incident for all medium and major incidents and the report shall be submitted to the Pit Manager and Pit EO within 5 calendar days of the incident.
- The Pit EO shall investigate all medium and minor incidents and identify any required actions to prevent a recurrence of such incidents.

In the event of an emergency incident (unexpected sudden occurrence), including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed, the Applicant shall notify the relevant authorities in accordance with legal requirements (e.g. Section 30 of NEMA and Section 20 of the NWA). In the event of a dispute in terms of the classification of a such an incident, the Applicant shall engage the ECO to advise on the potential reporting requirements in terms of the above.

41 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

No Training and environmental awareness is an integral part of a complete EMPR. The overall aim of the training will be to ensure that all site staff is informed of their relevant requirements and obligations pertaining to the relevant authorisations, licences, permits and the approved EMPR and protection of the environment.

The applicant and contractor must ensure that all relevant employees are trained and capable of carrying out their duties in an environmentally responsible and compliant manner and are capable of complying with the relevant environmental requirements. To obtain buy-in from staff, individual employees need to be involved in:

- Identifying the relevant risks.
- Understanding the nature of risks.
- Devising risk controls.
- Given incentive to implement the controls in terms of legal obligations.

The applicant shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. All training must be formally recorded and attendance registers retained. The environmental training should, as a minimum, include the following:

- General background and definition to the environment.
- The environmental impacts, actual or potential, of their work activities.
- Compliance with mitigation measures proposed for sensitive areas.
- The environmental benefits of improved personal performance.
- Their roles and responsibilities in achieving compliance with the environmental policy and procedures and with the requirement of the applicant's environmental management systems, including emergency preparedness and response requirements.
- The potential consequences (legal and/or other) of departure from specified operating procedures.
- The mitigation measures required to be implemented when carrying out their work activities.
- All operational risks must be identified and processes established to mitigate such risk, proactively. Thus, the applicant needs to inform the employees of any environmental risks that may result from their work, and how these risks must be dealt with in order to avoid pollution and/or degradation of the environment.
- In the case of new staff (including contract labour) the contractor / applicant shall keep a record of adequate environmental induction training. he importance of compliance with all environmental policies.

Manner in Which Employees will be Informed of Environmental Risks

Environmental awareness could be fostered by induction course for all personnel on site, before commencing site visits. Personnel should also be alerted to particular environmental concerns associated with their tasks for the area in which they are working. Courses must be given by suitably qualified personnel and in a language and medium understood by personnel. The environmental awareness training programme will include the following:

- Occupational Health and Safety Training (OHS).
- Environmental Awareness Training EMPR management actions.

Environmental awareness training will focus on the following specific aspects and be undertaken in "Tool box talk "topics prior to site access:

- Waste collection and disposal.
- EMPR management options and application.

41.1 Manner in which Risks will be Dealt with to Avoid Pollution or Degradation

The broad measures to control or remedy any causes of pollution or environmental degradation as a result of the proposed mining activities taking place are provided below:

- Contain potential pollutants and contaminants (where possible) at source.
- Handling of potential pollutants and contaminants (where possible) must be conducted in bunded areas and on impermeable substrates.
- Ensure the timeous clean-up of any spills.
- Implement a waste management system for all waste present on site.
- Investigate any I&AP claims of pollution or contamination as a result of mining activities.
- Implement the impact management objectives, outcomes and actions, as described in Section 12 above.

It is of critical importance that the broad measures to control or remedy any causes of pollution or environmental degradation are applied during onsite mining activities.

42 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

No additional information was requested or is deemed necessary.

43 ENVIRONMENTAL MONITORING

43.1 Functional Requirements of Monitoring Programmes

The purpose of monitoring is not merely to collect data, but to provide information necessary to make informed decisions on managing and mitigating potential impacts. Monitoring therefore serves the following functions:

- Serve as early warning system to detect any potential negative impacts.
- To provide information to feedback into management controls to avoid, prevent or minimise potential negative impacts.
- Provide quantitative data that can serve as evidence for the presence of negative impacts or the lack thereof.
- Allows for trending, modelling and prediction of future conditions or potential impacts.

Based on the above, the small-scale mine must ensure that monitoring programmes comprise of the following (at a minimum) in order to obtain valuable environmental data:

- Environmental aspect monitoring must be a formalised procedure.
- All equipment used in monitoring must be correctly calibrated and serviced regularly.
- Samples required for analysis will be sent to an independent and accredited laboratory.
- Monitoring data must be stored.
- Data must be checked and interpreted and tending undertaken on a quarterly basis.
- Both the date and reports on environmental monitoring must be kept on record for the life of mine and where relevant provided to I&APs.
- The general and site-specific parameters to be monitored must be identified by an independent specialist, the authorities and where relevant I&APs.

43.2 List of Aspects that Require Monitoring Plans

The list of aspects that require on-going environmental monitoring includes the following:

- Air quality.
- Blasting and vibration.
- Surface water.
- Groundwater.
- Noise.
- Traffic.
- Rehabilitation.

As mines/pits and the environment are both dynamic it is likely that future scenarios may require the monitoring of additional or unforeseen impacts. As such, the list provided is by no means conclusive and must instead be used as a guideline for the impacts that require monitoring.

43.3 Monitoring Plans for Environmental Aspects

The monitoring of various environmental aspects and the impact on them as a result of the proposed project shall take place by means of both quantitative and qualitative techniques in order to determine whether or not the requirements of the Environmental Management Programme are being complied with. The importance and value of detailed environmental monitoring networks cannot be overstated.

Environmental monitoring serves as a tool to track compliance, assist with potential liability identification, and mitigation throughout the life of the proposed project. This is achieved through the provision of actual evidence-based monitoring and reporting thereof. In essence, monitoring is a continuous data-gathering, data interpreting, and control procedure that ranges from visual inspection to in-depth investigative monitoring and reporting. These monitoring plans need to be drawn into standalone plans that can be updated and amended as per authority requirements and additional data requirements identified during the mining activities. These plans need to include the site-specific roles and responsibilities for actions.

44 UNDERTAKING

- The EAP herewith confirms:

  (a) The correctness of the information provided in the reports.

  (b) The inclusion of comments and inputs from stakeholders and I&APs.

  (c) The inclusion of inputs and recommendations from the specialist reports where relevant.

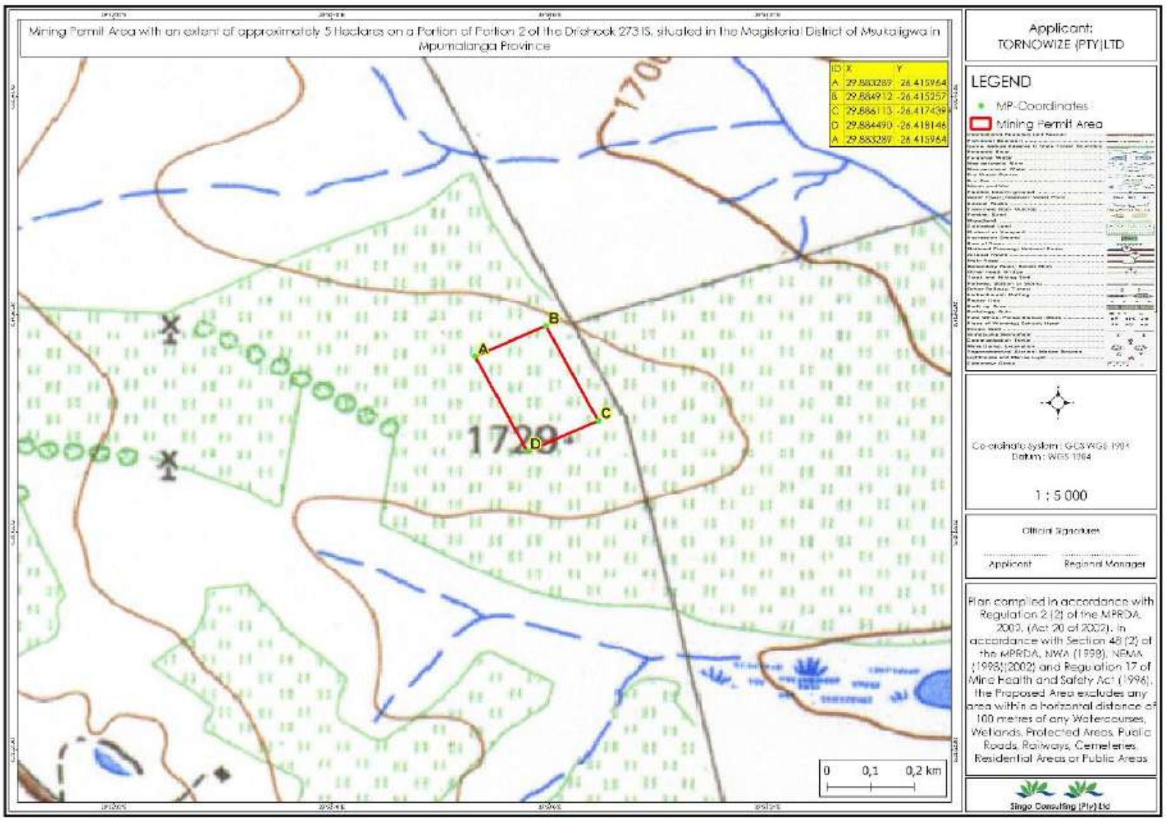
  (d) That the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein.

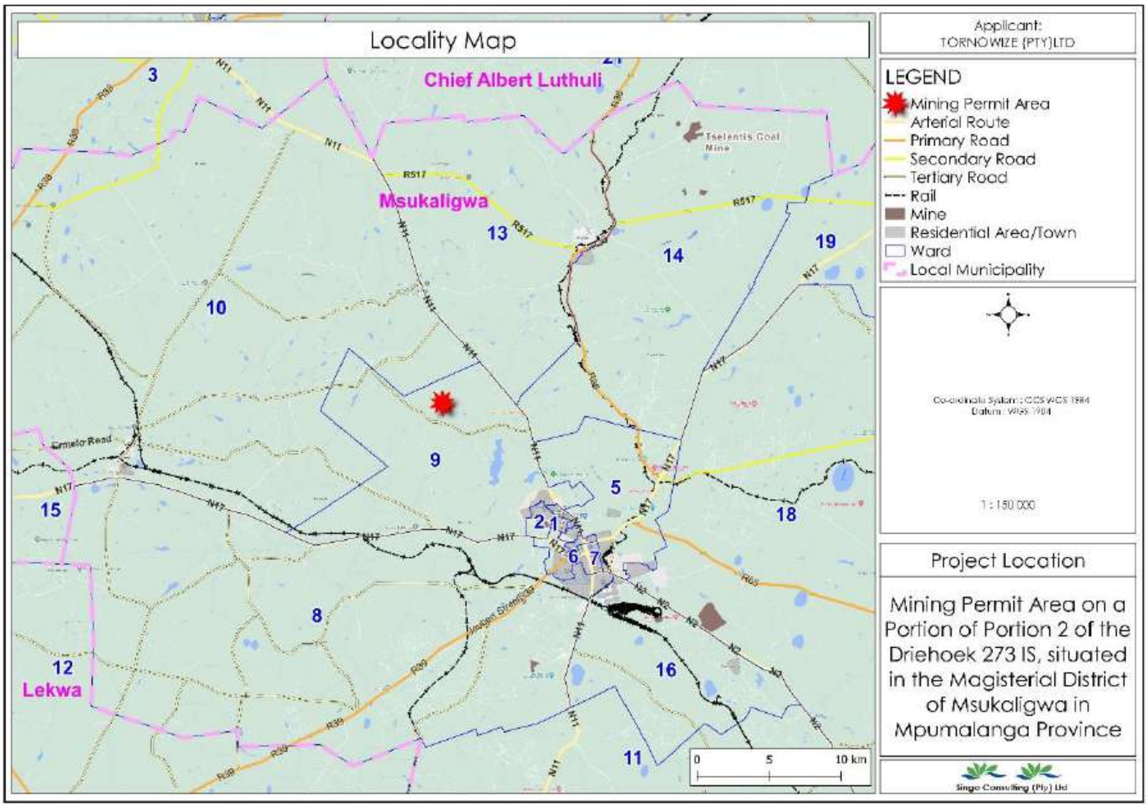
Signature of the environmental assessment practitioner

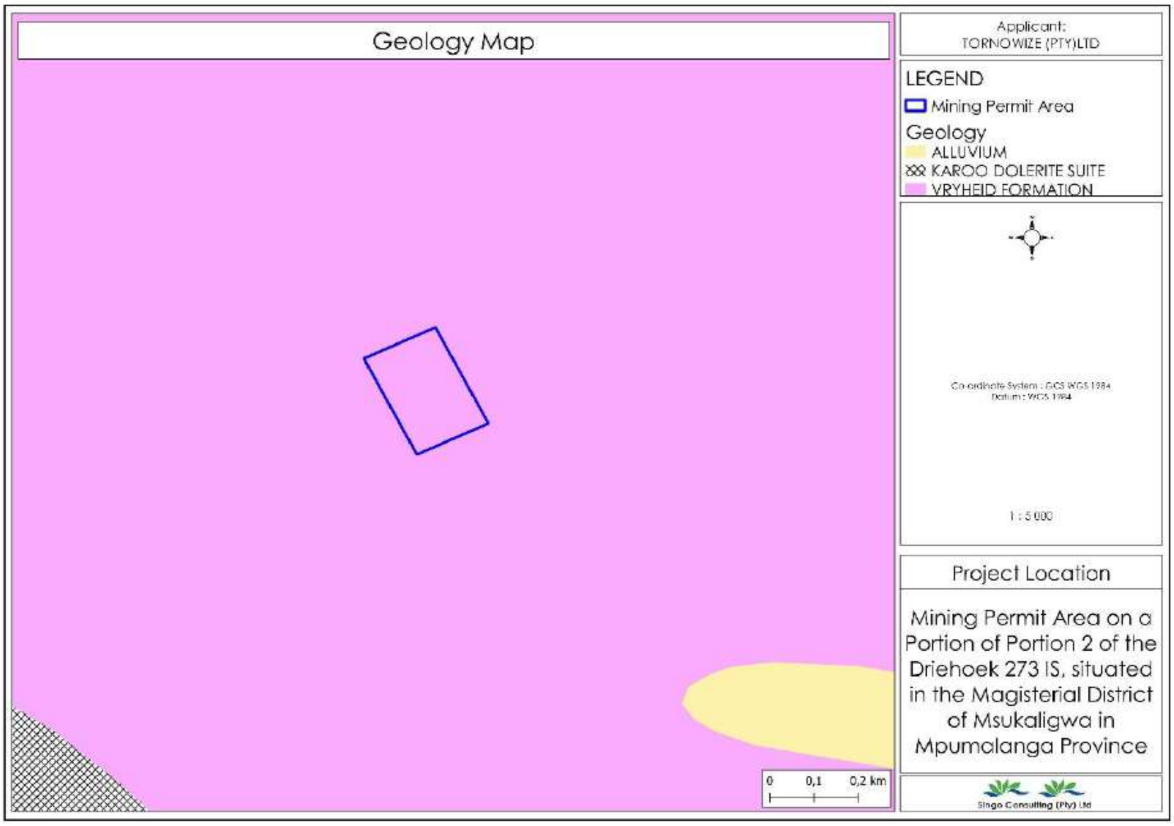
Name of company (if applicable):

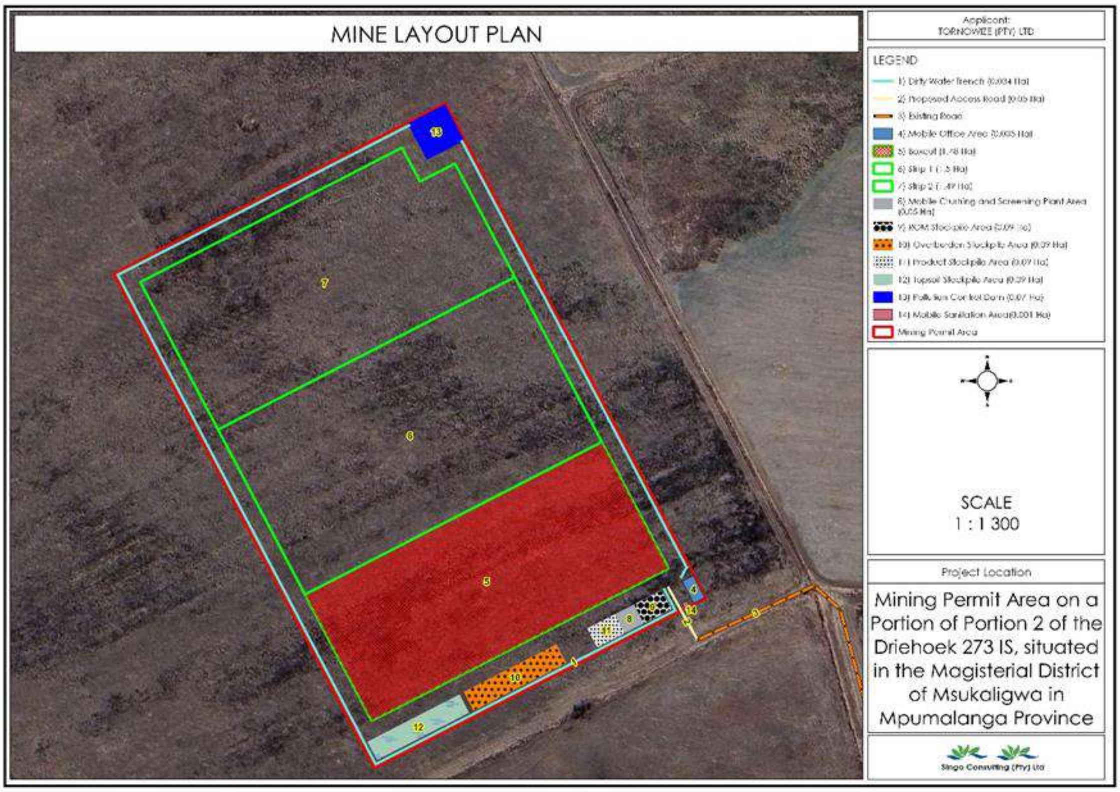
Date

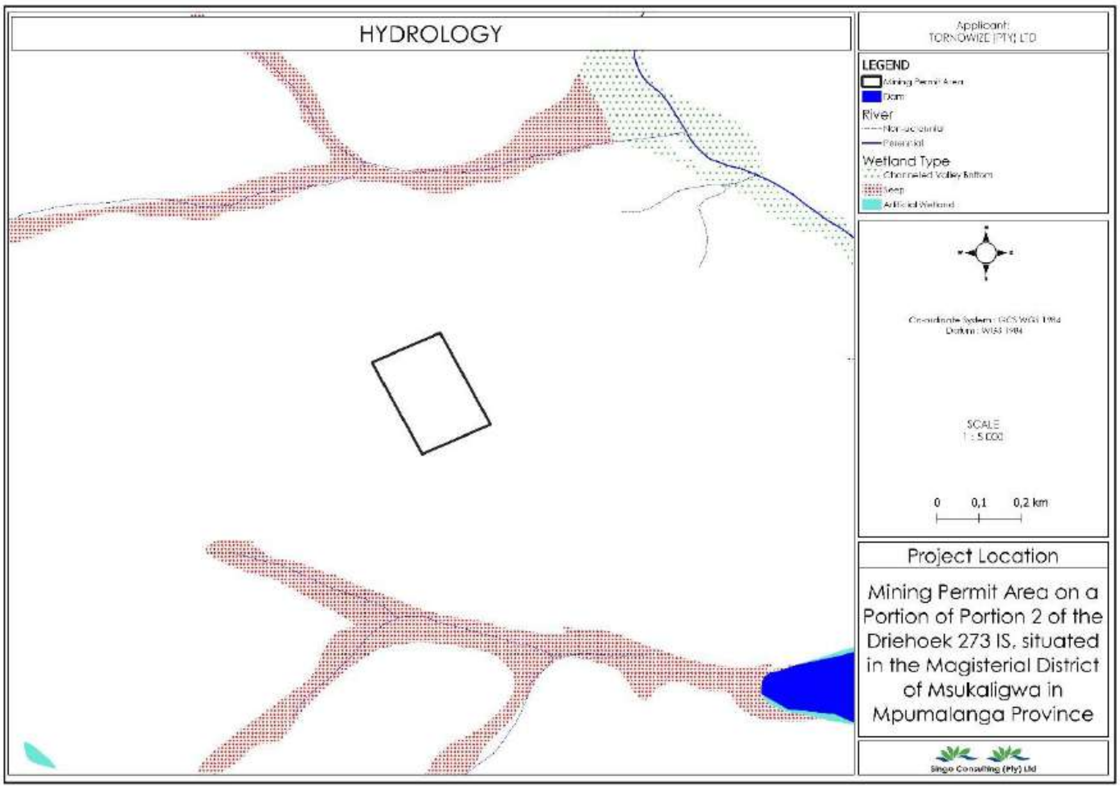
Appendix 1: Project Maps

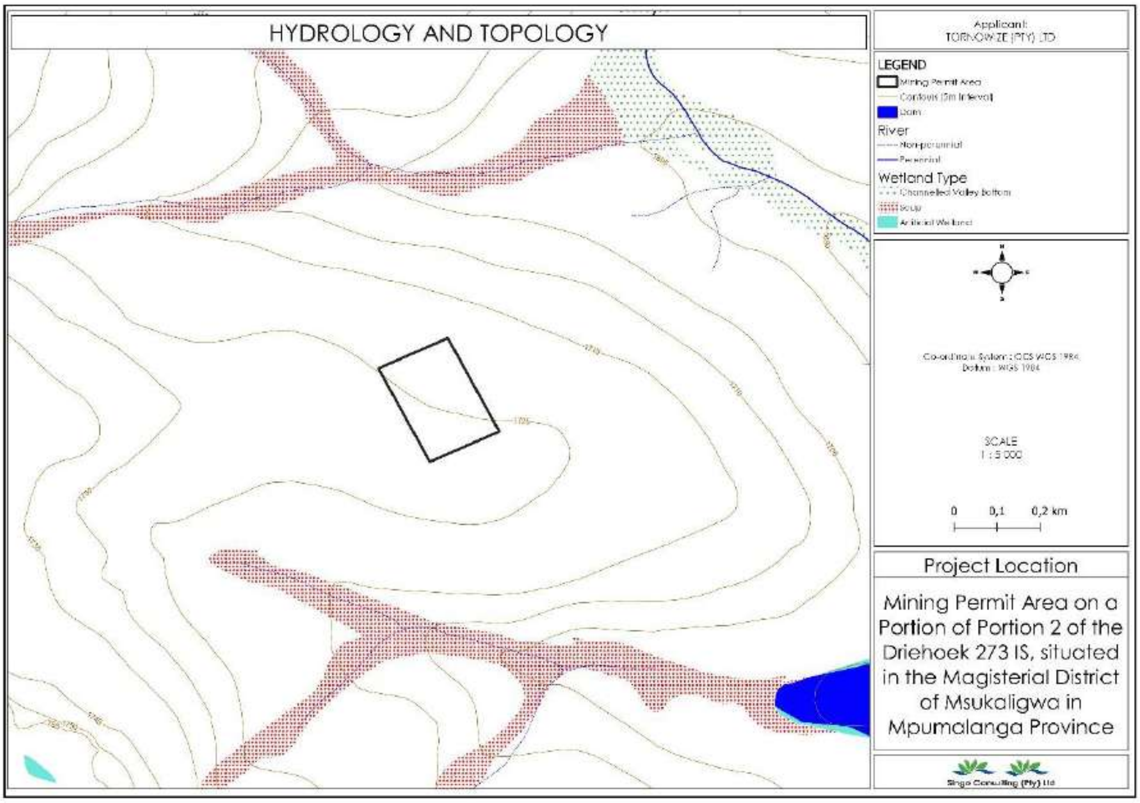


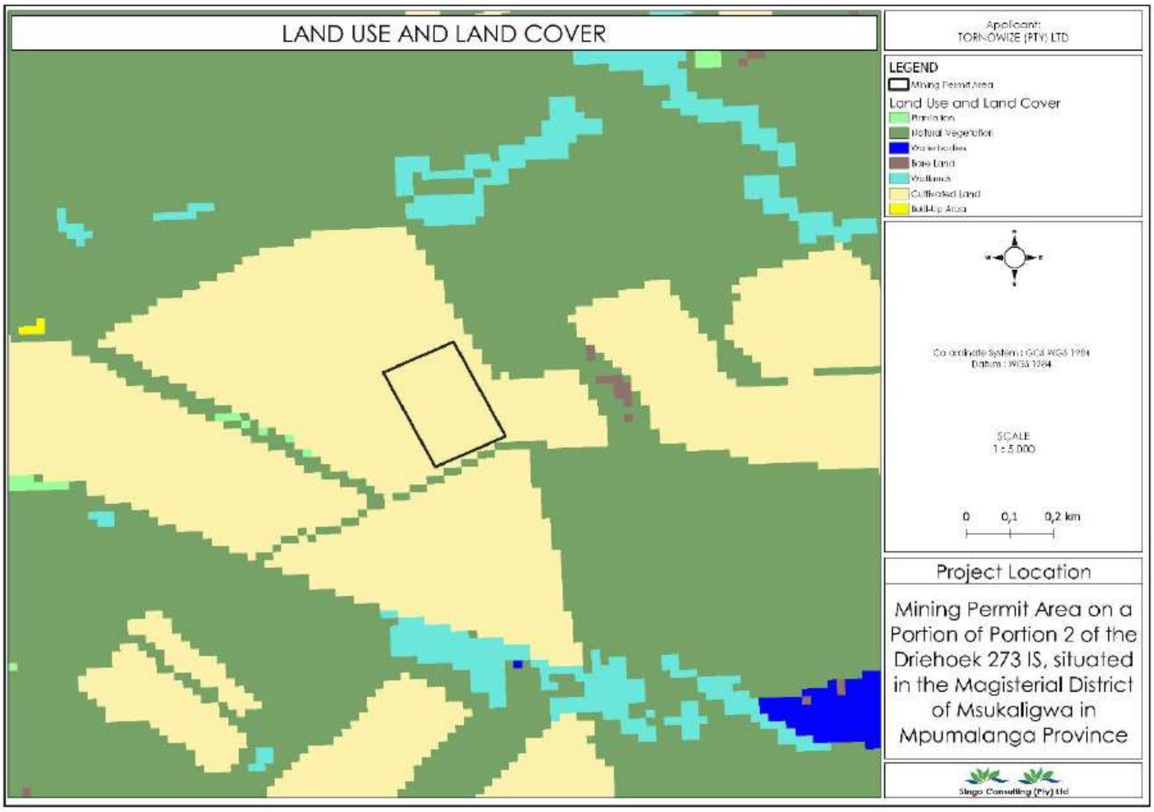


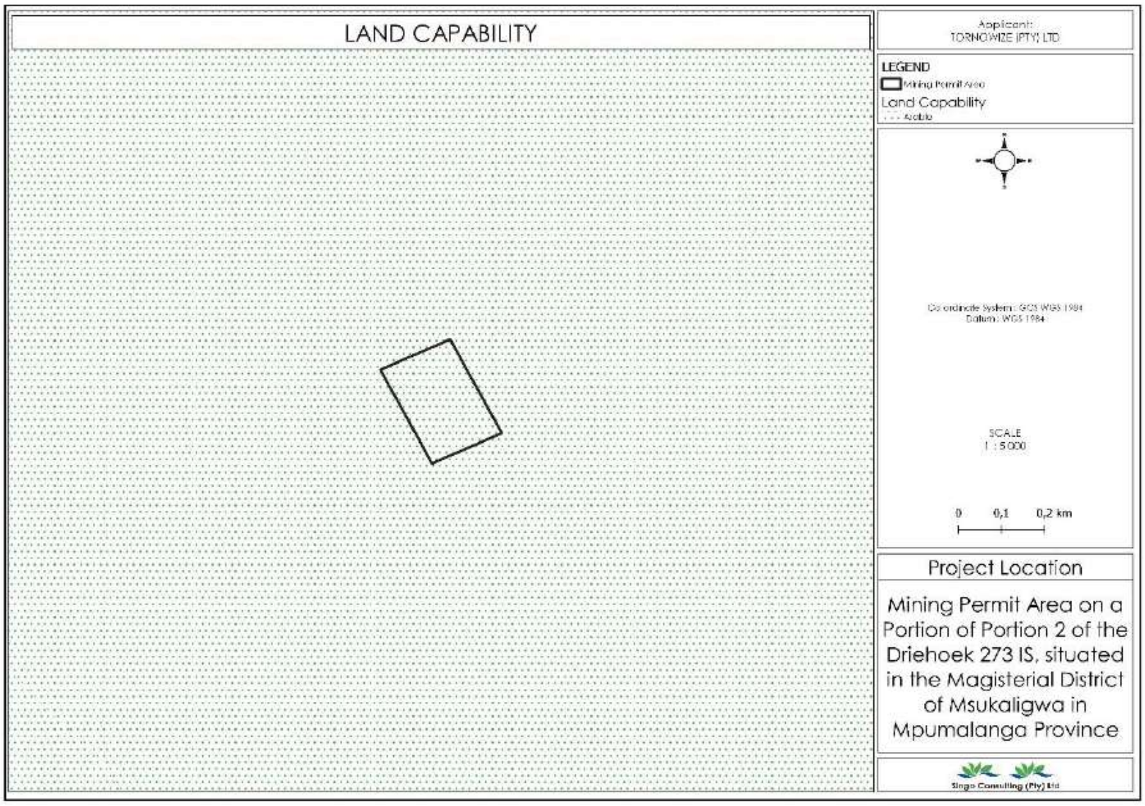

Geology Map
Applicant:
TORNOWIZE (PTY)LTD
LEGEND
Mining Permit Area
Geology
ALLUVIUM
KAROO DOLERITE SUITE
VRYHEID FORMATION
Co-ordinate System : GCS WGS 1984
Datum : WGS 1984
1 : 5 000
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
0 0,1 0,2 km
Singo Consulting (Pty) Ltd

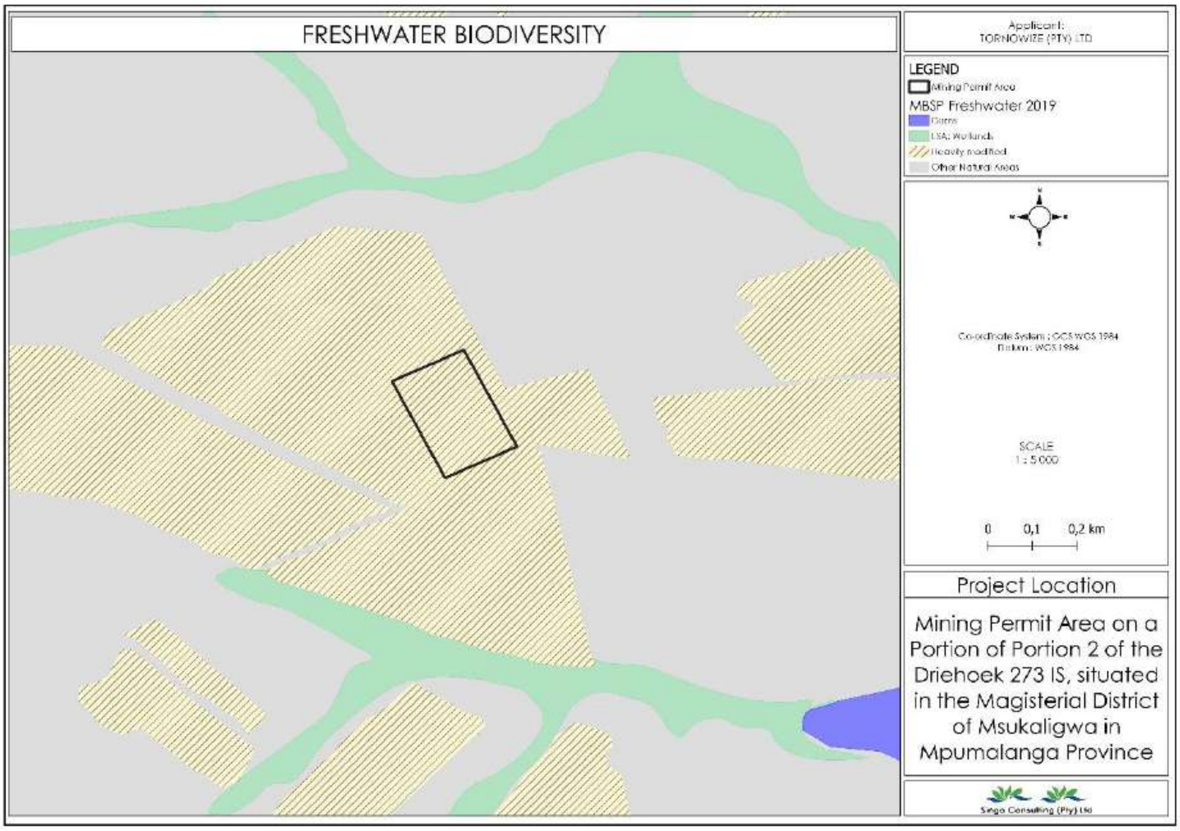

MINE LAYOUT PLAN
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
1) Dirty Water Trench (0.004 Ha)
2) Proposed Access Road (0.05 Ha)
3) Existing Road
4) Mobile Office Area (0.005 Ha)
5) Boxcut (1.78 Ha)
6) Slip 1
7) Slip 2
8) Mobile Crushing and Screening Plant Area (0.05 Ha)
9) ROM Stockpile Area (0.09 Ha)
10) Overburden Stockpile Area (0.09 Ha)
11) Product Stockpile Area (0.09 Ha)
12) Topsoil Stockpile Area
13) Pollution Control Dam (0.07 Ha)
14) Mobile Sanitation Area (0.001 Ha)
Mining Permit Area
SCALE
1 : 1 300
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

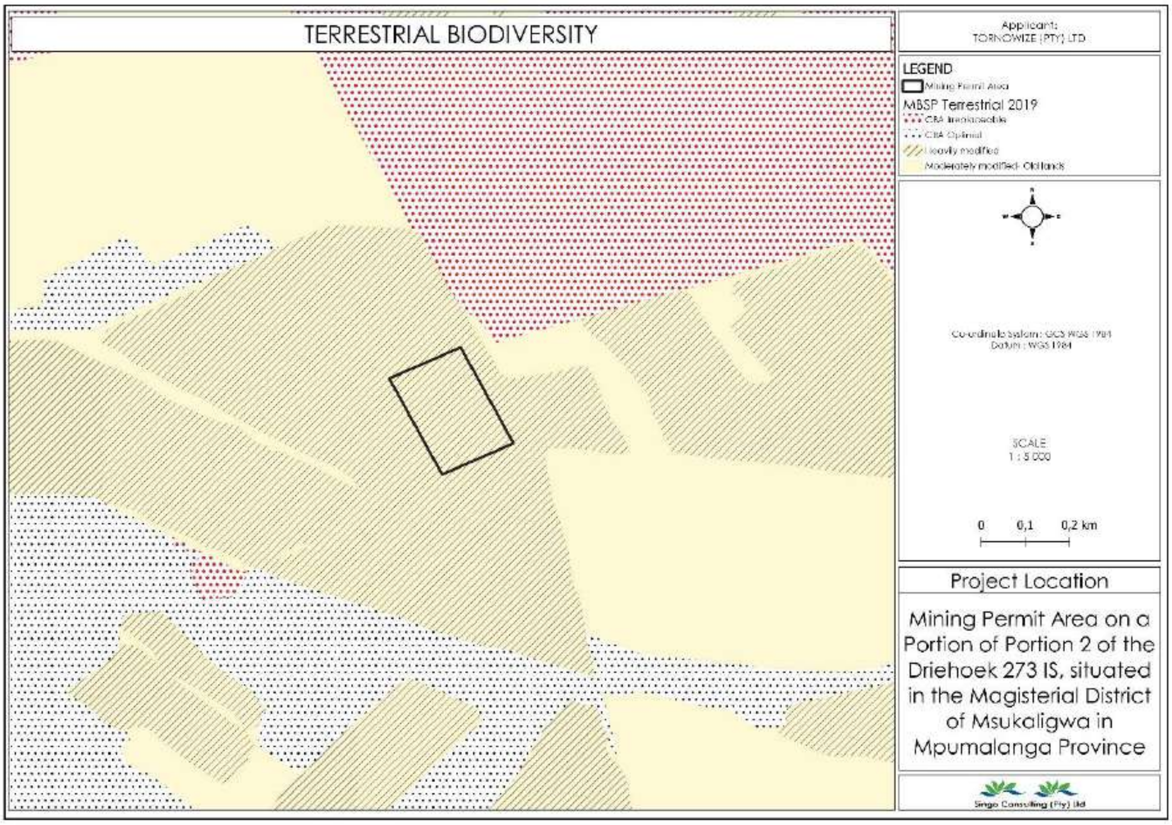

HYDROLOGY
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Dam
River
Non-perennial
Perennial
Wetland Type
Channelled Valley Bottom
Seep
Artificial Wetland
Co-ordinate System: GCS WGS 1984
Datum: WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

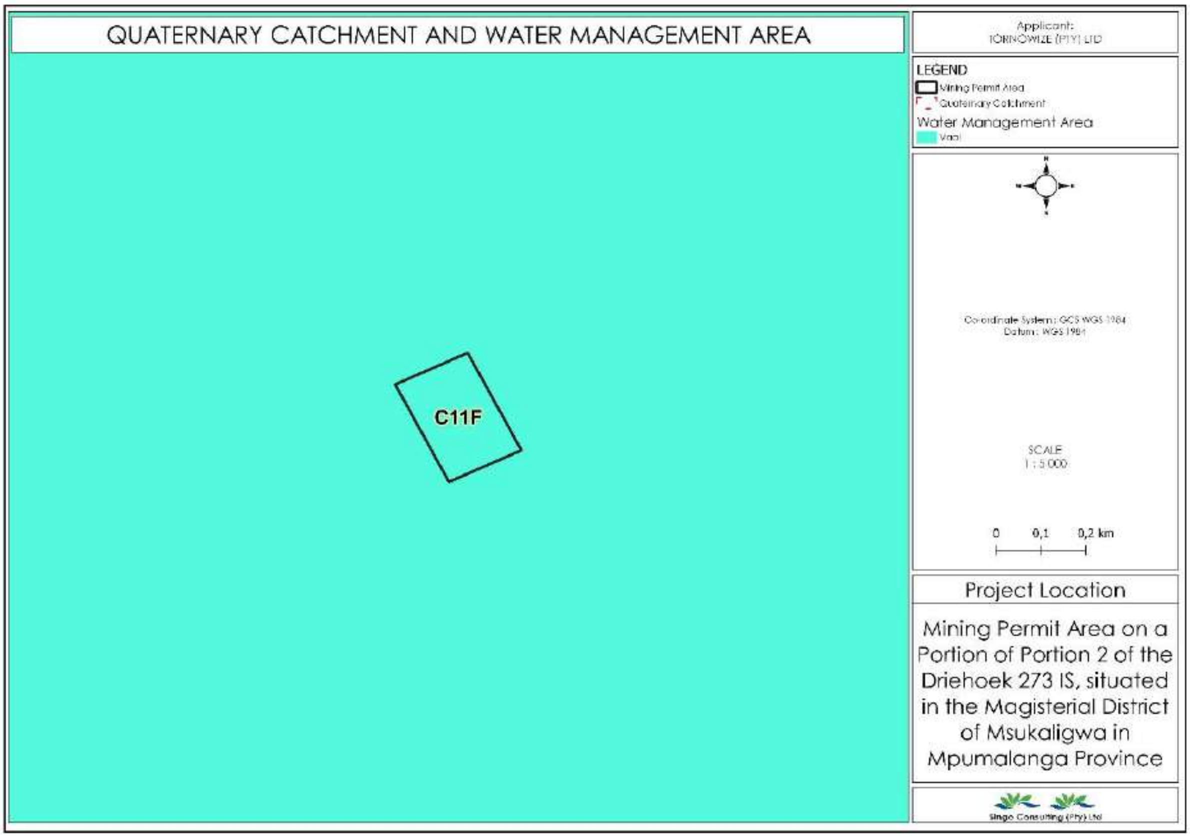

HYDROLOGY AND TOPOLOGY
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Contours (5m Interval)
Dam
River
Non-perennial
Perennial
Wetland Type
Channelled Valley Bottom
Seep
Artificial Wetland
Co-ordinate System: GCS WGS 1984
Datum: WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

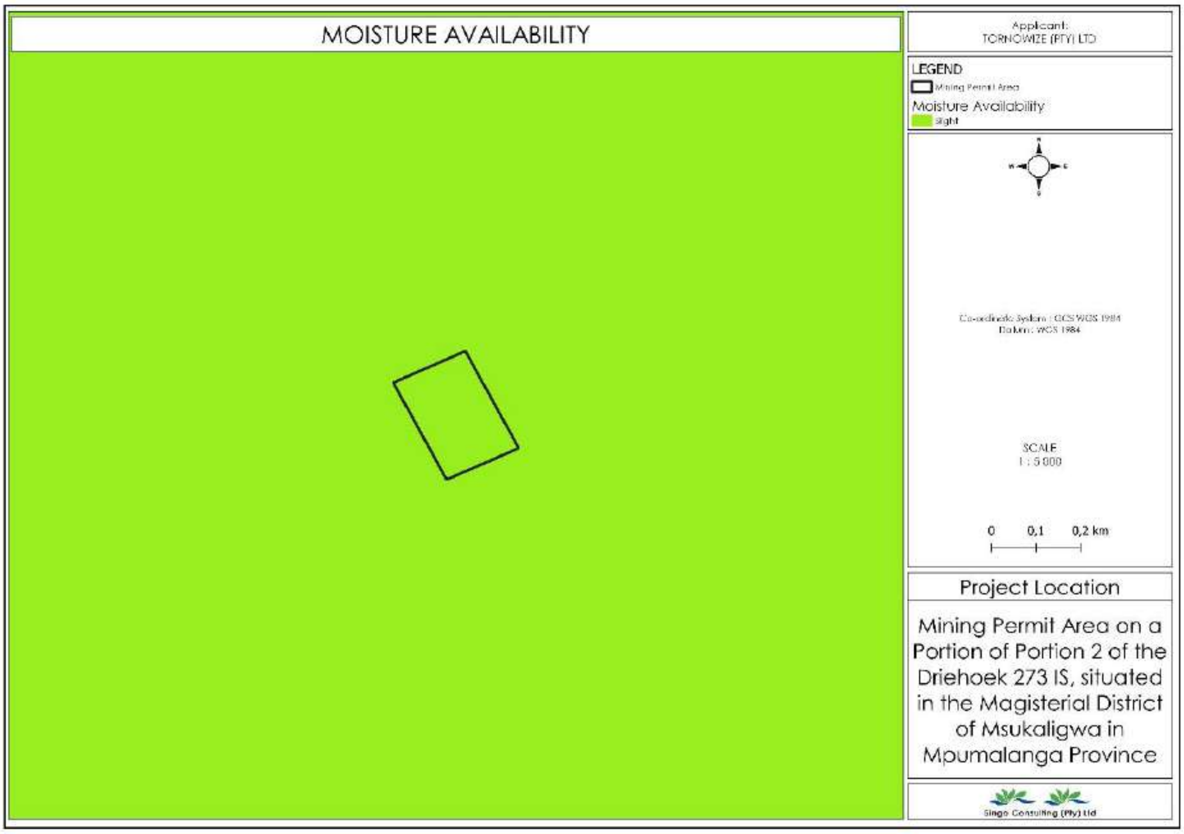

LAND USE AND LAND COVER
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Land Use and Land Cover
Plantation
Natural Vegetation
Waterbodies
Bare Land
Wetlands
Cultivated Land
Built-Up Area
Co ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

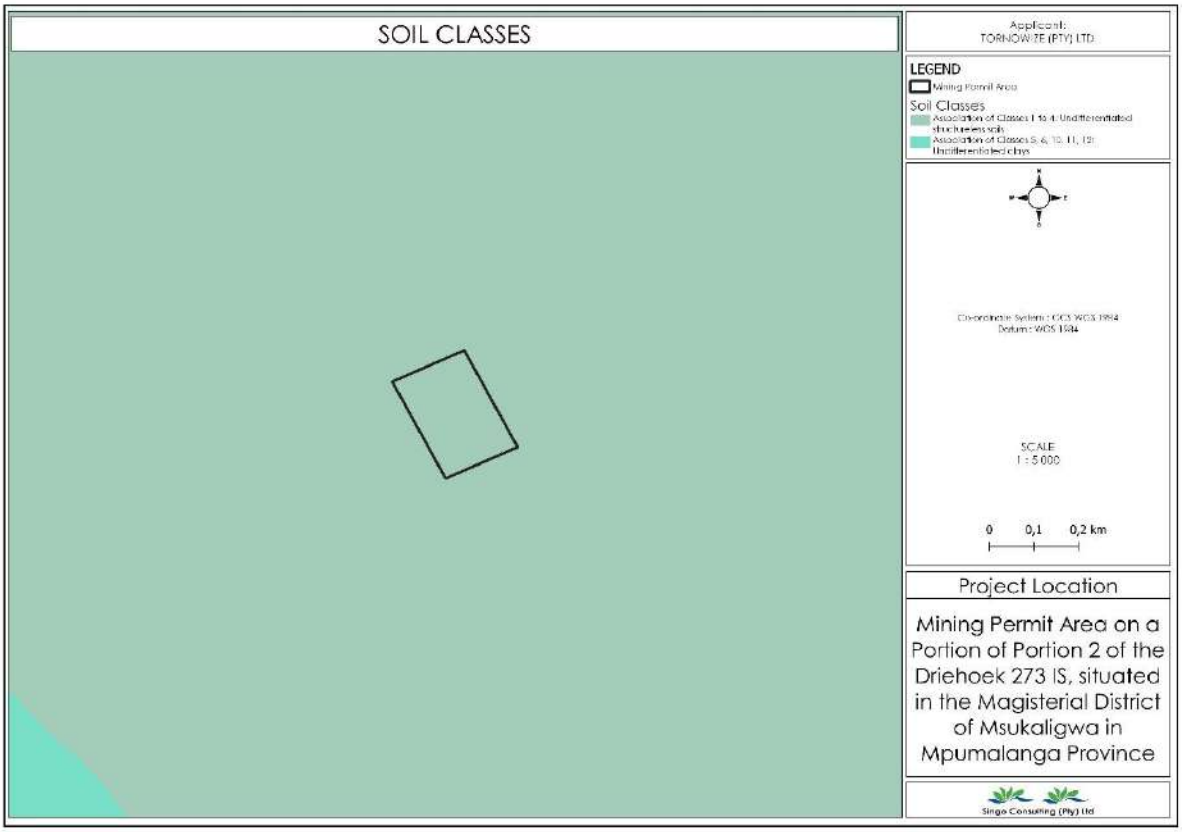

LAND CAPABILITY
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Land Capability
Arable
Co ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

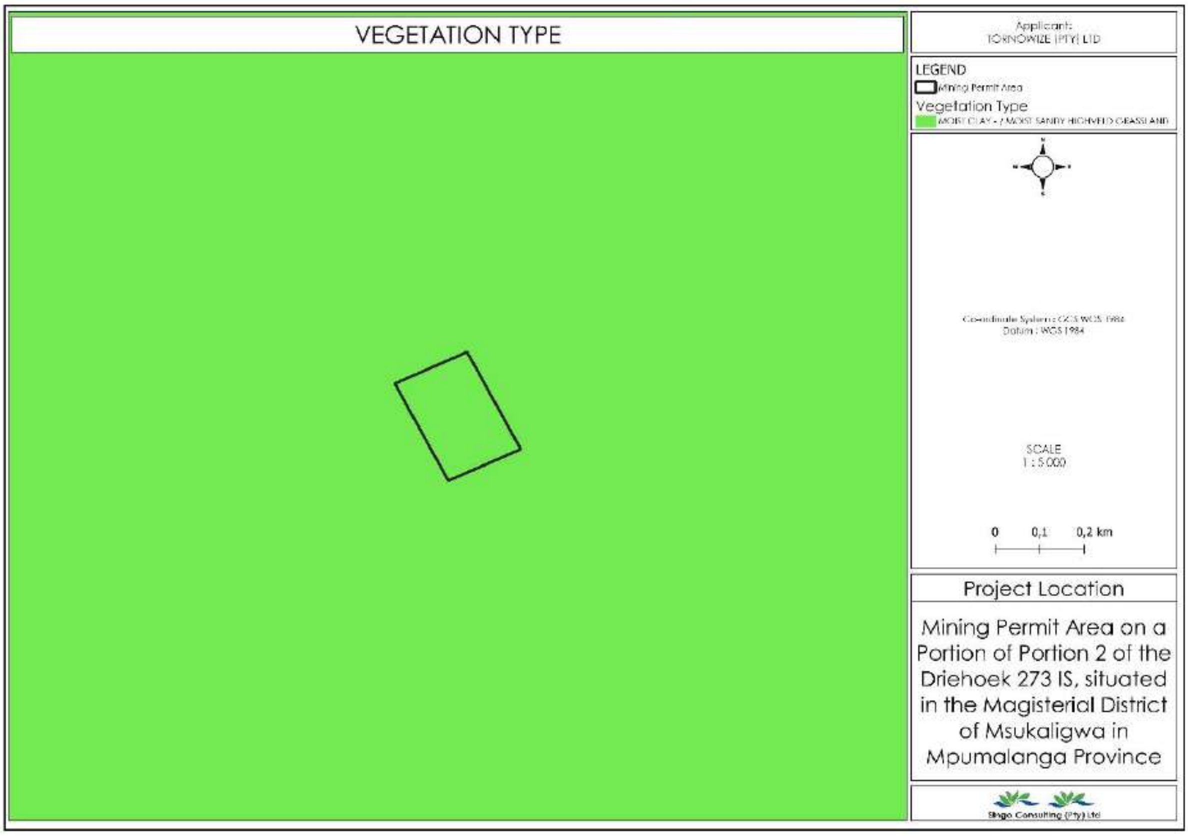

FRESHWATER BIODIVERSITY
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
MBSP Freshwater 2019
ESA: Wetlands
Heavily modified
Other Natural Areas
Co-ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

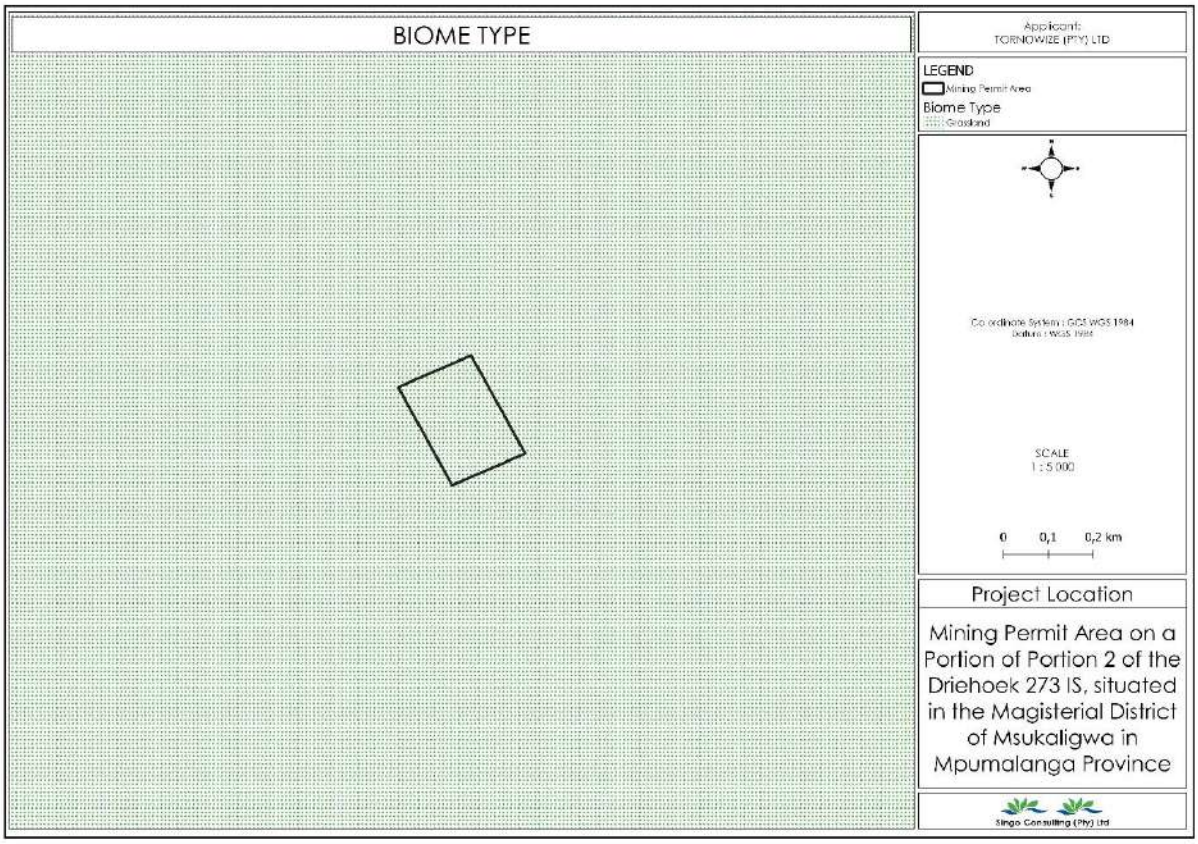

TERRESTRIAL BIODIVERSITY
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
MBSP Terrestrial 2019
CBA Irreplaceable
CBA Optimal
Heavily modified
Moderately modified- Old lands
Co-ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

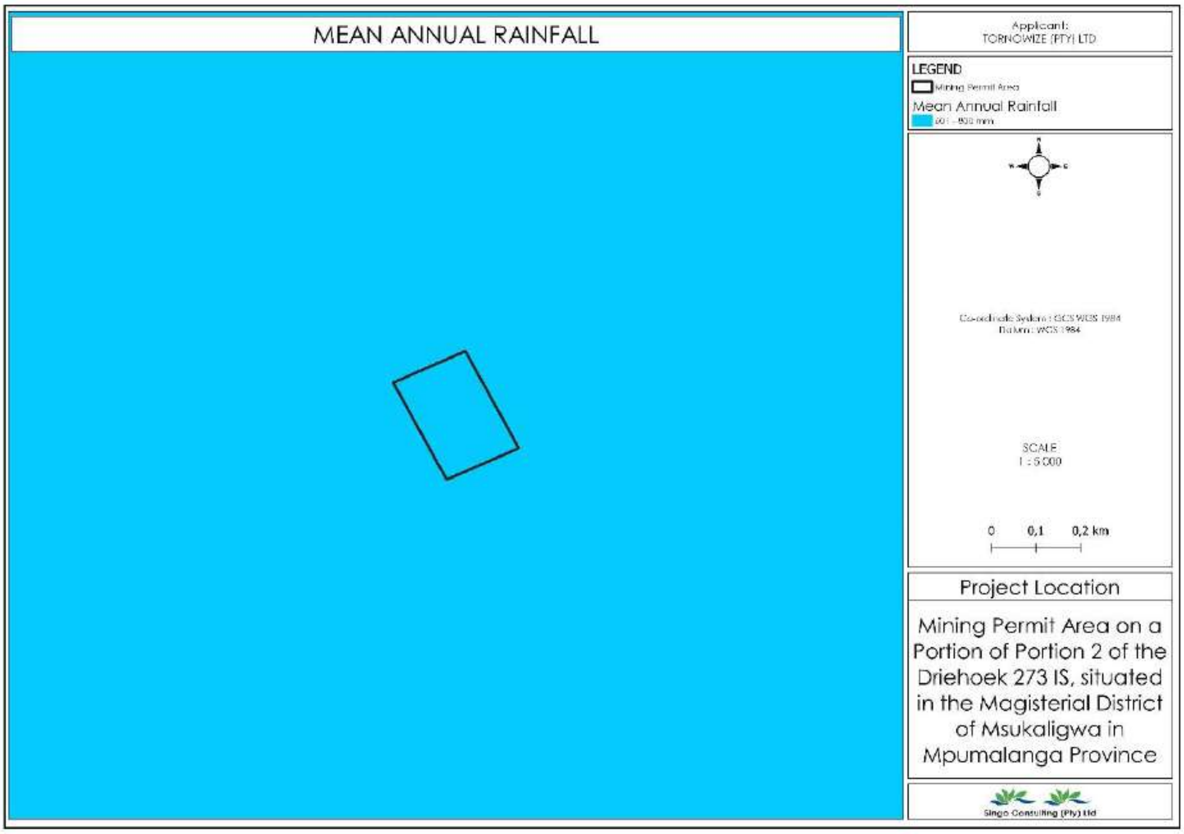

QUATERNARY CATCHMENT AND WATER MANAGEMENT AREA
C11F
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Quaternary Catchment
Water Management Area
Vaal
Co-ordinate System: GCS WGS 1984
Datum: WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

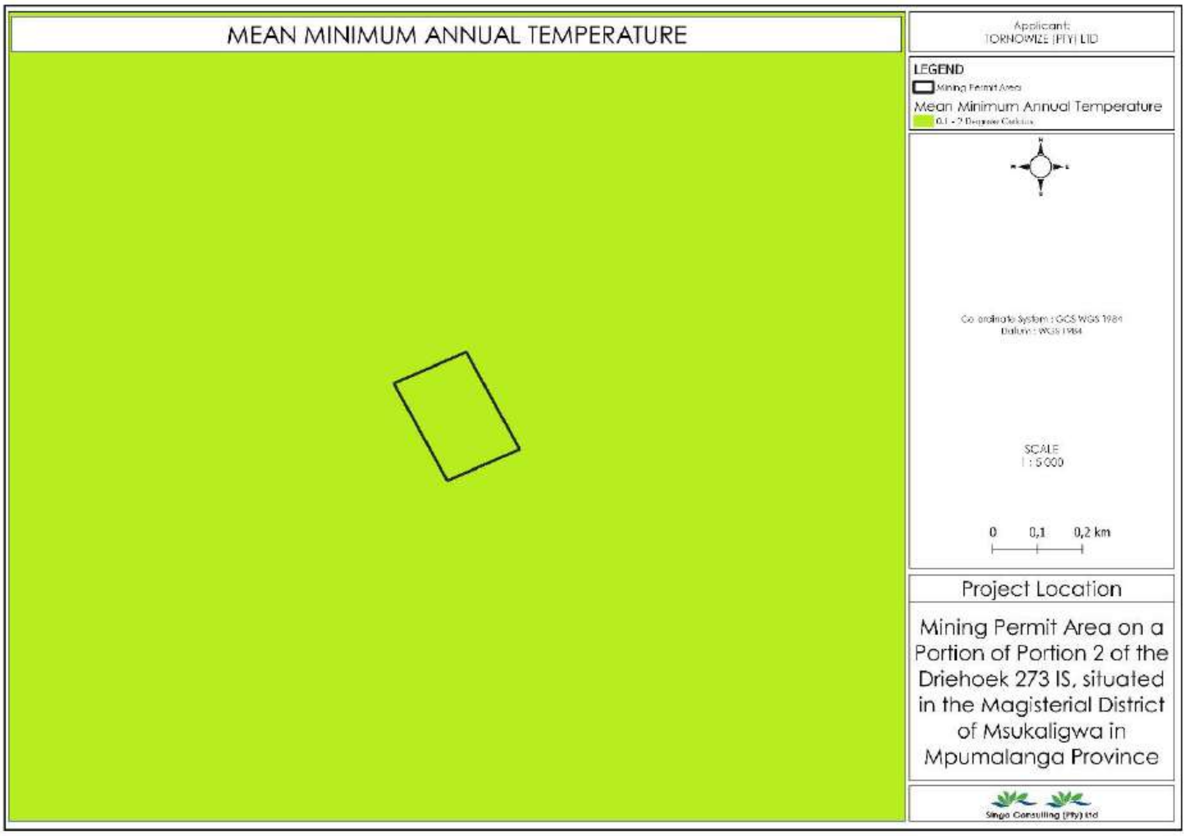

MOISTURE AVAILABILITY
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Moisture Availability
Slight
Co-ordinate System: GCS WGS 1984
Datum: WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

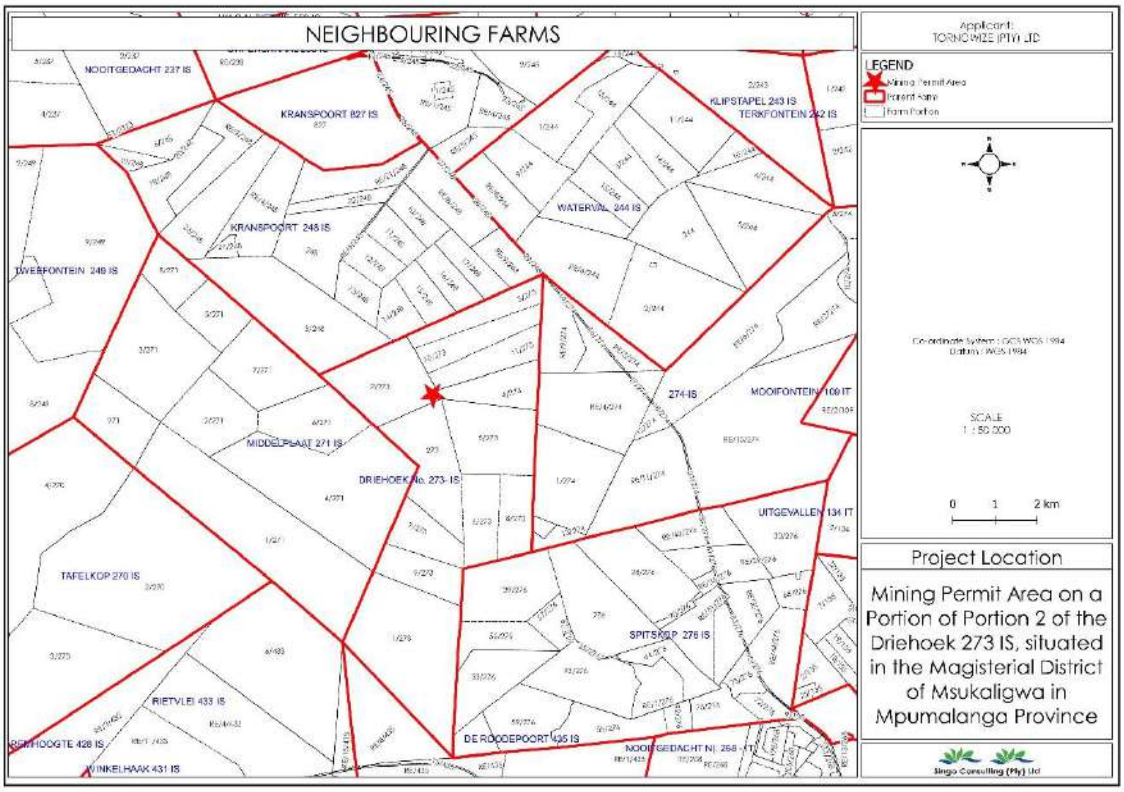

SOIL CLASSES
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Soil Classes
Association of Classes 1 to 4: Undifferentiated structureless soils
Association of Classes 5, 6, 10, 11, 12: Undifferentiated clays
Co-ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd

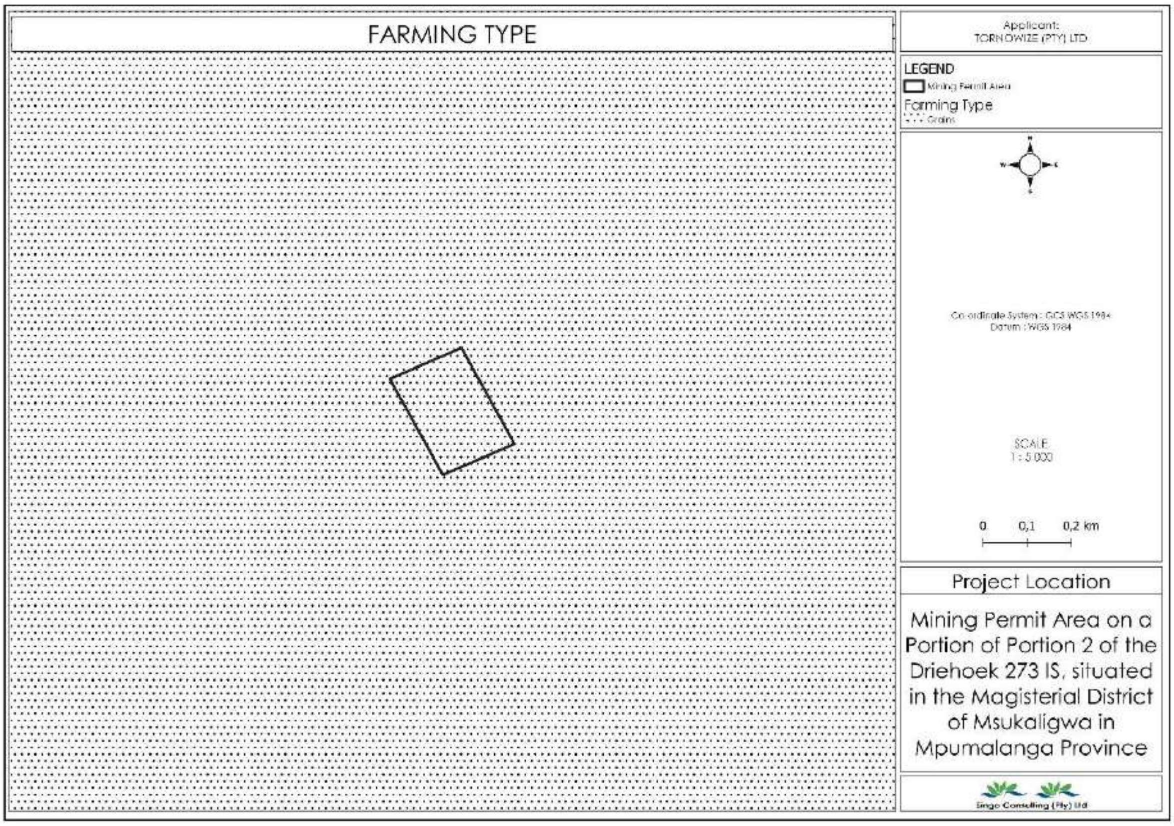

VEGETATION TYPE
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Vegetation Type
MOIST CLAY - / MOIST SANDY HIGHVELD GRASSLAND
Co-ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd


BIOME TYPE
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Biome Type
Grassland
Co-ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0
0,1
0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd


MEAN ANNUAL RAINFALL
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Mean Annual Rainfall
Co-ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0
0,1
0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd


MEAN MINIMUM ANNUAL TEMPERATURE
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Mean Minimum Annual Temperature
SCALE
1 : 5 000
0 0,1 0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd


NEIGHBOURING FARMS
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Parent Farm
Farm Portion
SCALE
1 : 50 000
0 1 2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd
NOOITGEDACHT 237 IS
KRANSPOORT 827 IS
KLIPSTAPEL 243 IS
TERKFONTEIN 242 IS
KRANSPOORT 248 IS
WATERVAL 244 IS
TWEEFONTEIN 249 IS
MIDDELPLAAT 271 IS
DRIEHOEK No. 273- IS
MOOIFONTEIN 109 IT
UITGEVALLEN 134 IT
TAFELKOP 270 IS
SPITSKOP 276 IS
RIETVLEI 433 IS
DE ROODEPOORT 435 IS
WINKELHAAK 431 IS



FARMING TYPE
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
Mining Permit Area
Farming Type
Grains
N
W
E
S
Co-ordinate System : GCS WGS 1984
Datum : WGS 1984
SCALE
1 : 5 000
0
0,1
0,2 km
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province

Appendix 2: Background Information Document

BACKGROUND INFORMATION DOCUMENT

APPLICANT:

Tornowize PTY (LTD)

Physical address: 50 Toerien Street, Klipfontein, eMalahleni, 1035

Contact person: Sonwabo Debedu

Tel.: +27 13 692 4378

Email: sonwabo@tornowize.co.za

DMRE Ref.: MP 30/5/1/1/3/13557 MP

CONSULTANT:

Singo Consulting (Pty) Ltd

Office 870, 5 Balalaika Street,

Tasbet Park Ext 2, Witbank,1040

EAP.: Miss Takalani Rakuambo

Cell No.: +27 82 767 4011

Tel No.: +27 13 6920 041

Fax No.: +27 86 5144 103

Email:

takalani@singoconsulting.co.za

INTRODUCTION AND THE PURPOSE OF THIS DOCUMENT

Singo Consulting (Pty) Ltd has been appointed as an independent Environmental Consultant by **Tornowize (Pty) Ltd** to conduct Environmental Impact Assessment (EIA) through Basic Assessment, compile a Basic Assessment Report (BAR) and Environmental Management Programme report (EMPr) and undertake Public Participation Process (PPP). This is done for processes of acquiring Environmental Authorization for the proposed Mining Permit Application within **Portion of portion 2** of the **Farm Driehoek 273 IS**, situated in the Magisterial District of **Ermelo in Mpumalanga Province with DMRE Ref: MP 30/5/1/1/3/13557 MP.**

The Purpose of this Background Information Document (BID) is to provide a perfunctory description of the project and outline EIA processes to be followed and contributions from Interested and Affected Parties (I&APs) on the issues related to the project in question, allowing comments and concerns to be raised. Results of the EIA through basic assessment, both negative and positive, will be submitted and made available to the relevant departments such as the Department of Mineral Resources and Energy, and if requested the Department of Forestry, Fisheries and Environment , Department of Water and Sanitation, Landowners, and other interested stakeholders.

This BID therefore requests and invites I&APs to comment on the environmental, physical, social, and economic impacts associated with the proposed mining activities. Be assured that your comments are of great value as they ensure that relevant issues are taken into consideration. Attached at the end of this document is a registration form, kindly complete it and send it back to **Miss Takalani Rakuambo** through given means of communication also attached there.

Notice is hereby given in terms of the Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002) and EIA regulations 2014, published under Government Notice No. 982 in Gazette No. 3822 of 8 December 2014, amended on 7 April 2017, that **Tornowize (Pty) Ltd** has an intention to mine coal on the aforementioned portion.

PROJECT DESCRIPTION

Mining Permit Application has been submitted for the extraction of **Coal** resource on the property mentioned above. The Mining Permit area, as seen in figure 1 and figure 2 is situated within Msukaligwa approximately 27.5 km South West of Breyten, approximately 31 km West of Ermelo and approximately 94 km South East of Middelburg.

Mining activities will be undertaken over a period of two (2) years. This project will entail an open cast method of excavation. The mine design will be developed according to the dimension of the applied mineral deposit within the project area, but overall mining activities will be limited to an area of 5 Ha as per mining permit requirements. The topsoil will be stockpiled elsewhere on site preferably next to the farm boundary and will be used during rehabilitation period. Once a box cut has been made, the overburden and mineral resources where necessary will be loosened by blasting. The loosened material will then be loaded onto trucks by excavators. A haul road will be situated at the side of the open cast, forming a ramp up which trucks can drive, carrying ore and waste rock. Waste rock will be piled up at the surface, near the edge of the open cast (waste dump). The waste dump will be tiered and stepped, to minimize degradation. All the activities will be guided by the project's EMPr such that the project does not impact the environment negatively.

REGULATORY FRAMEWORK

The EIA process through BAR & EMPR to be undertaken will be conducted in accordance with the National Environmental Management Act (Act 107 of 1998) and Environmental Impact Assessment regulations as amended (April 2017).

The activity is to extract the existence and occurrence of the applied mineral; therefore, this will be conducted in accordance with Mineral and Petroleum Resources Development Act, (Act 28 of 2002). Other regulatory guidelines to be followed include National Water Act, 1998 (Act 36 of 1998), National Air Quality Standards (GN 1210: 2009) and National Dust Control Regulations (GN 827: 2013).

These all will accurately be followed to ensure that identified impacts are assessed and mitigated according to their significance so that the protection of the receiving environment and populations is met.

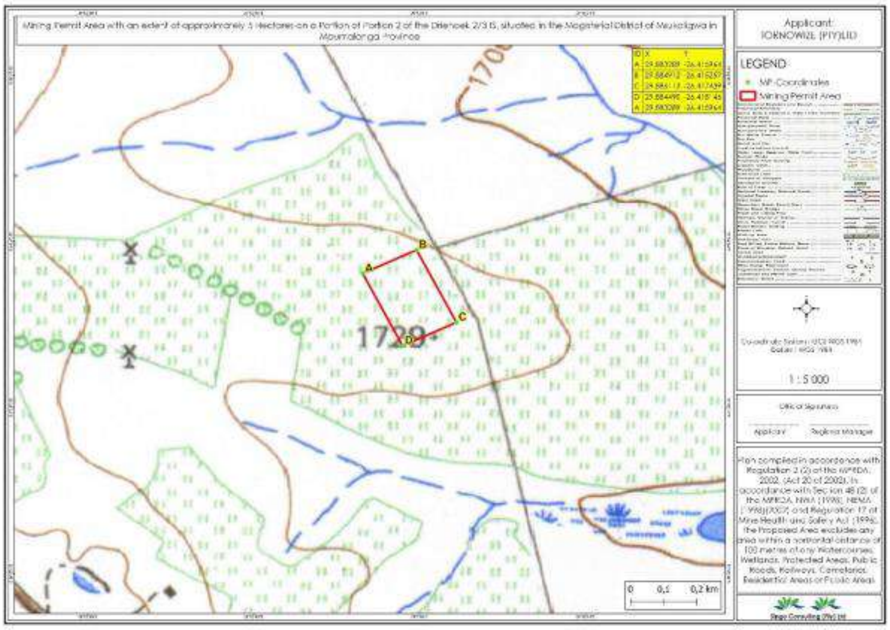


Figure 1: Regulation 2.2 map (A -26.415964, 29.883289)

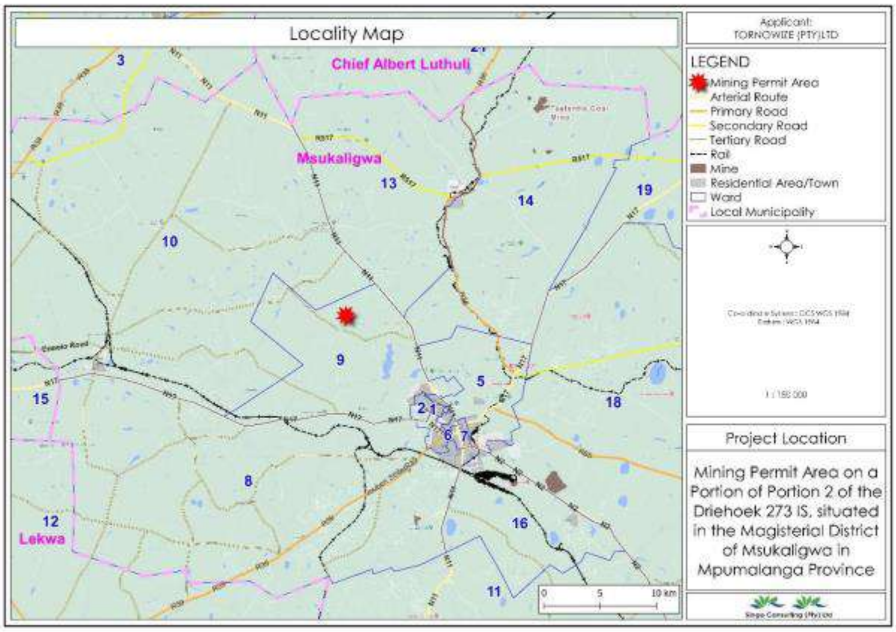


Figure 2: Locality Map

BASIC AND ENVIRONMENTAL IMPACT ASSESSMENT & PUBLIC PARTICIPATION PROCESS

These are planning and decision-making tools used in identifying potential environmental, economic, and social consequences of a proposed activity prior the commencement of the activity.

These together with the public issues and concerns are to be identified sufficiently early so that they can be assessed and incorporated into the final reports when/if necessary.

These tools are regarded crucial because they are utilized in order to demonstrate to the relevant stakeholders about the potential impacts, which in turn leads to the mining application process being a success or declined.

Public Participation remains a cornerstone of the Environmental Impact Assessment process. It ensures provision of relevant and enough information with openness and transparency. Public Participation Process (PPP) presents to I&APs, an opportunity to understand what the project is about, and affords them an opportunity to make valuable contributions towards the EIA process.

I&AP can be any person, group of persons or organization interested in or affected by the proposed activity, and any organ of state that may have jurisdiction over any aspect of the activity.

Kindly keep the following dates:

- Announcement of the project**: Friday the 07th of July 2023**
- Stakeholder engagement and consultation: **Ongoing Process**
- Review period of the draft BAR & EMPR: **Monday the 07th of August 2023 until Wednesday the 06th of September 2023**

Hard copies of the BAR & EMPr will be available at **Ermelo Library (-26.521709, 29.994143) and Msukaligwa Local Municipality (Cnr Kerk & Taute Streets, Ermelo 2350)** and soft copies (via emails) upon request from the EAP's contacts below.

All comments, concerns and issues raised need to be submitted to the EAP. by no later than the 06th of September 2023 so that they can be addressed and incorporated in the final BAR and EMPr.

Singo Consulting (Pty) Ltd

Address: Office 870, 5 Balalaika Street,
Tasbet Park Ext 2, Witbank
1040
Tel: +27 13 692 0041
Cell: +27 82 767 4011
Email: takalani@singoconsulting.co.za/
admin@singoconsulting.co.za

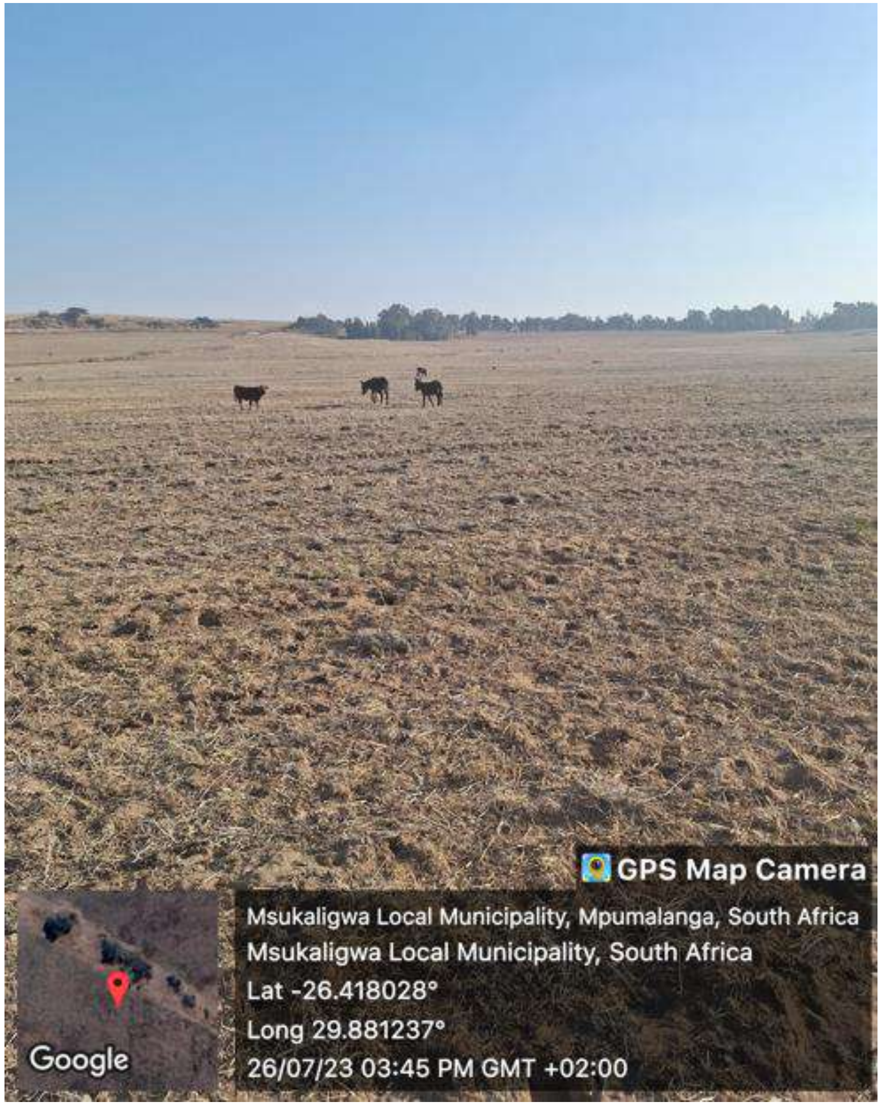
REGISTRATION & COMMENT SHEET- (MINING PERMIT DMRE REF.: MP 30/5/1/1/3/13557 MP)

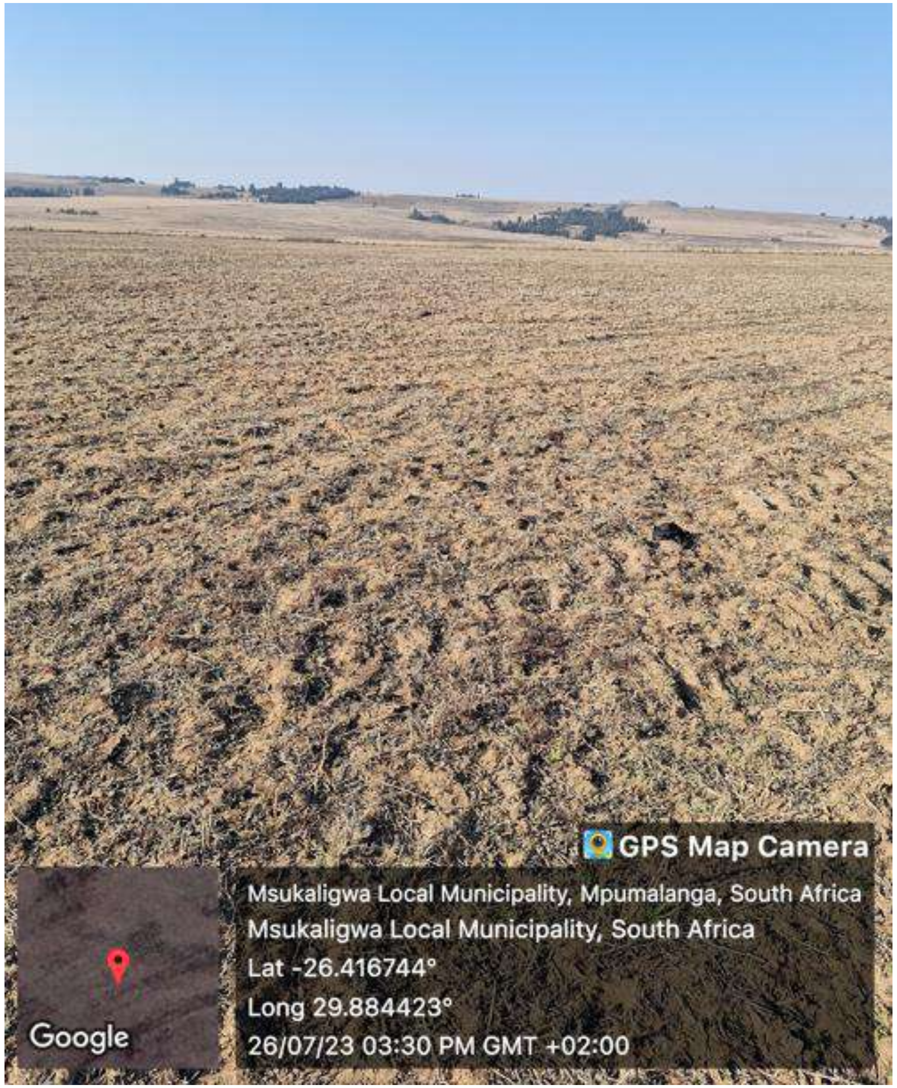
Title		Name		Surname	
Company					
Designation					
Address					
Tel No.				Fax No.	
E-mail				Cell No.	
I would like to receive my notifications be (mark with "X"):			Post	E-mail:	
				Fax:	

	Please indicate why you would have an interest in the above-mentioned project.
	Please provide your comments and questions here:
	Please feel free to attach a separate document
	Please add any person you think may be interested and affected parties:

Full name		Company	
Address			
E-mail		Contact No.	

Appendix 3: Site Condition and Site Notices






GPS Map Camera
Msukaligwa Local Municipality, Mpumalanga, South Africa
Msukaligwa Local Municipality, South Africa
Lat -26.416733°
Long 29.884284°
26/07/23 03:32 PM GMT +02:00
Google

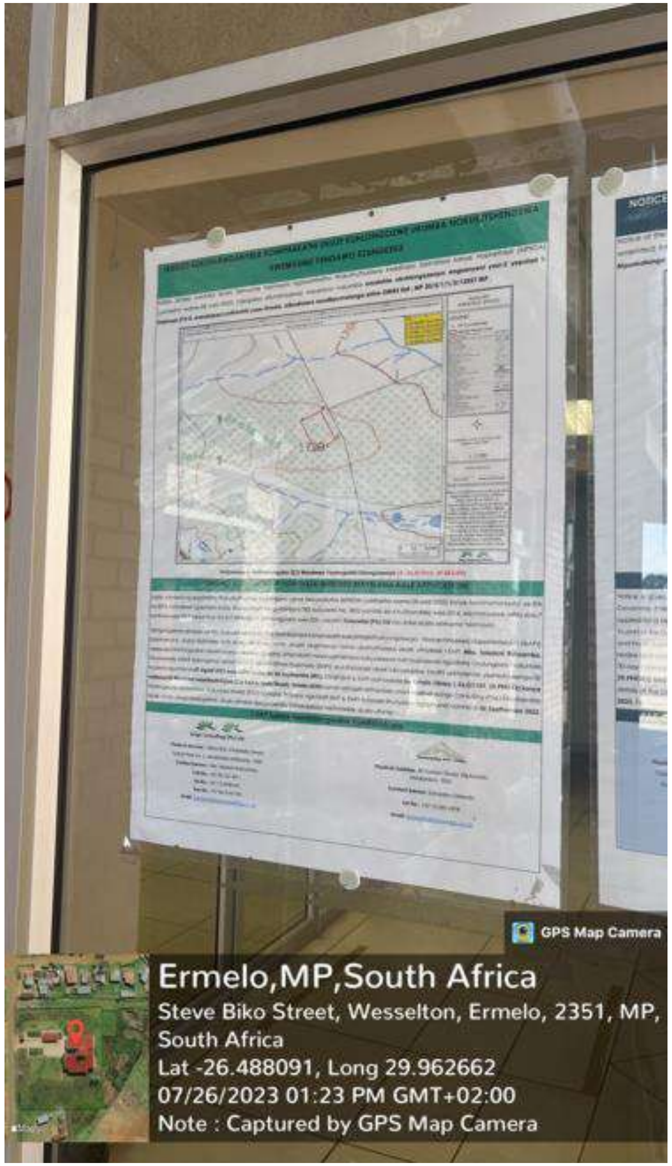

GPS Map Camera
Ermelo,MP,South Africa
Msukaligwa Rural, Ermelo, MP, South Africa
Lat -26.416332, Long 29.883652
07/26/2023 03:27 PM GMT+02:00
Note : Captured by GPS Map Camera

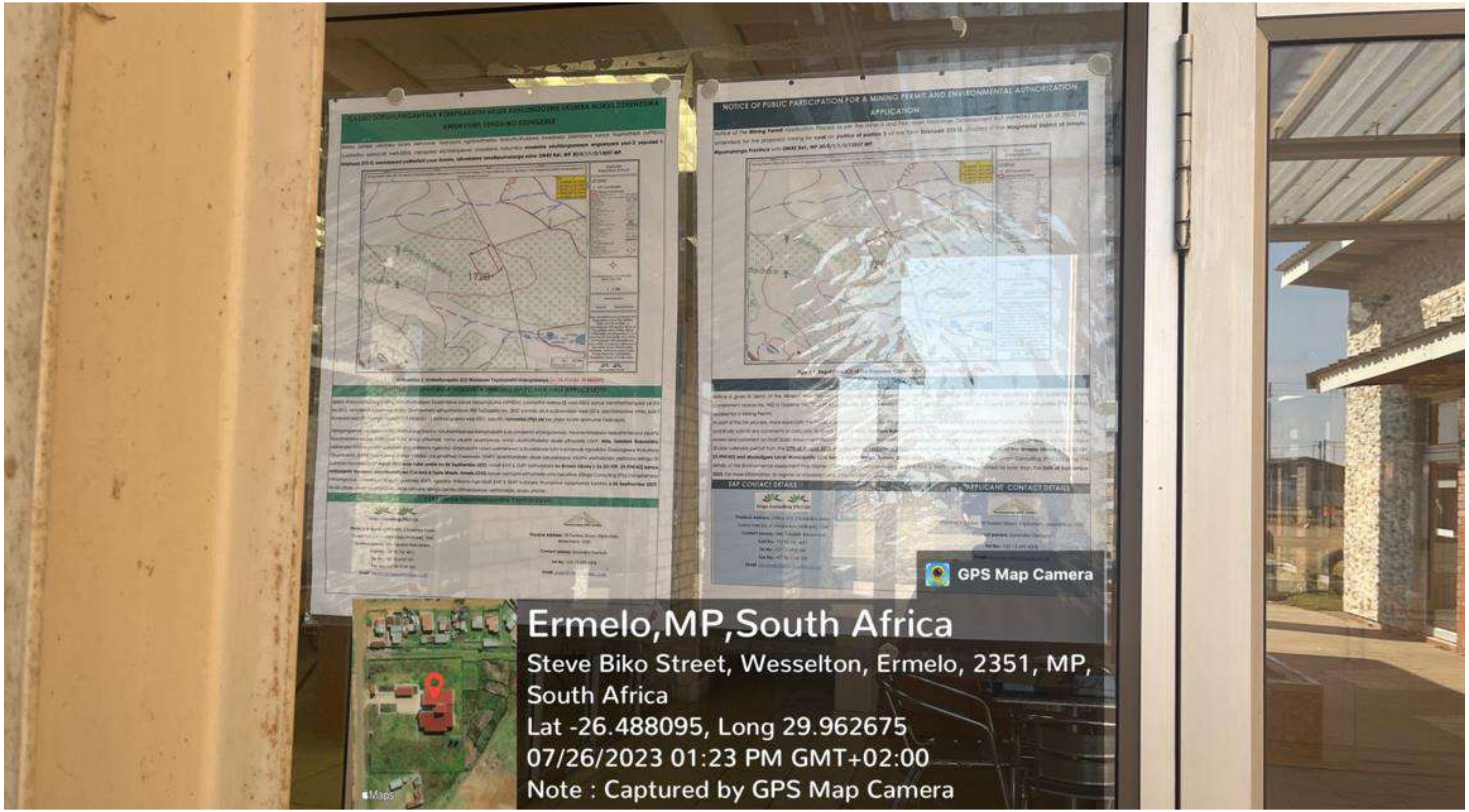

GPS Map Camera
Ermelo,MP,South Africa
Msukaligwa Rural, Ermelo, MP, South Africa
Lat -26.416333, Long 29.883671
07/26/2023 03:25 PM GMT+02:00
Note : Captured by GPS Map Camera


NOTICE OF PUBLIC PARTICIPATION FOR A MINING PERMIT AND ENVIRONMENTAL AUTHORIZATION APPLICATION
GPS Map Camera
Gert Sibande District Municipality, Mpumalanga, South Africa
Unnamed Road, South Africa
Lat -26.432879°
Long 29.920523°
26/07/23 05:06 PM GMT +02:00
Google


GPS Map Camera
Gert Sibande District Municipality, Mpumalanga, South Africa
Unnamed Road, South Africa
Lat -26.42413°
Long 29.871129°
26/07/23 04:26 PM GMT +02:00
Google


GPS Map Camera
Msukaligwa Local Municipality, Mpumalanga, South Africa
Msukaligwa Local Municipality, South Africa
Lat -26.417326°
Long 29.905073°
26/07/23 04:58 PM GMT +02:00
Google


GPS Map Camera
Ermelo,MP,South Africa
Steve Biko Street, Wesselton, Ermelo, 2351, MP, South Africa
Lat -26.488091, Long 29.962662
07/26/2023 01:23 PM GMT+02:00
Note : Captured by GPS Map Camera


NOTICE OF PUBLIC PARTICIPATION FOR A MINING PERMIT AND ENVIRONMENTAL AUTHORIZATION APPLICATION
GPS Map Camera
Ermelo,MP,South Africa
Steve Biko Street, Wesselton, Ermelo, 2351, MP, South Africa
Lat -26.488095, Long 29.962675
07/26/2023 01:23 PM GMT+02:00
Note : Captured by GPS Map Camera

Appendix 4: Financial Provision

CALCULATION OF THE QUANTUM

Applicant: Tornowize PTY (LTD)

Evaluator: **Singo Consulting (Pty) Ltd**

Ref No.: **MP 30/5/1/1/3/13557 MP**

Date: **31/07/2023**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and pow erlines)	m3	0	19	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	271	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	400	1	1	0
3	Rehabilitation of access roads	m2	0,05	49	1	0,01	0,0245
4 (A)	Demolition and rehabilitation of electrified railw ay lines	m	0	471	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railw ay lines	m	0	257	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	542	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	4,99	284292	0	1	0
7	Sealing of shafts adits and inclines	m3	0	146	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0,36	189528	0	1	0
8 (B)	Rehabilitation of processing w aste deposits and evaporation ponds (non-polluting potential)	ha	0	236054	1	1	0
8 (C)	Rehabilitation of processing w aste deposits and evaporation ponds (polluting potential)	ha	0	685612	1	1	0
9	Rehabilitation of subsided areas	ha	0	158701	1	0,01	0
10	General surface rehabilitation	ha	4,99	150138	1	1	749188,62
11	River diversions	ha	0	150138	1	1	0
12	Fencing	m	0	171	1	1	0
13	Water management	ha	0,104	57087	1	0,01	59,37048
14	2 to 3 years of maintenance and aftercare	ha	4,99	19980	1	1	99700,2
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
					Sub Total 1		848948,215
1	Preliminary and General		101873,7858		**weighting factor 2** 1		101873,7858
2	Contingencies		84894,8215				84894,8215
					Subtotal 2		1035716,82
					VAT (15%)		155357,52
					Grand Total		**1191074**

Signed

Date 31/07/2023

Appendix 5: Stakeholder Consultation

Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Monday, 10 July 2023 10:28
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	LANDOWNER INVITATION TO COMMENT ON MINING PERMIT APPLICATION ON PORTION OF PORTION 2 OF THE FARM DRIEHOEK 273 IS , DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	Landowner Notification Letter.pdf; Windeed Results.pdf; REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Tracking:

Recipient	Read
'HNetshakhuma@dalrrd.gov.za'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Rudzani	Read: 2023/07/10 10:30
Dr Singo, Kenneth	Read: 2023/07/10 11:39
Masindi, Nefale	Read: 2023/07/12 11:10

Good day,

Receive warm greetings from Singo Consulting (Pty) Ltd.

Tornowize (Pty) Ltd has lodged a Mining Permit Application for Coal on Portion of Portion 2 of the Farm **Driehoek 273 IS** situated in the Magisterial District of **Ermelo**, Mpumalanga Province with DMRE Ref: **MP 30/5/1/1/3/13557 MP**.

A windeed search was conducted to find out the Surface Landowner of the **Portion of Portion 2** of the Farm **Driehoek 273 IS**, and the outcomes shows that **National Government of the Republic of South Africa** own mentioned property as seen on attached windeed search result, which the Applicant has the interested with.

Please find the attached **Landowner Notification Letter**, **Windeed Search Result, Regulation 2(2) map, KML** and **Background Information Document (BID)** for brief description of the proposed project and timelines. Kindly forward your comments using contact details below.

Kind regards,

Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Friday, 07 July 2023 19:58
To:	
Cc:	kenneth@singoconsulting.co.za; rudzani@singoconsulting.co.za; 'Masindi, Nefale'
Subject:	INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Good day,

Receive warm greetings from Singo Consulting (Pty) Ltd.

Singo Consulting (Pty) Ltd has been appointed as an independent Environmental Assessment Practitioner by **Tornowize (Pty) Ltd** to manage the environmental authorisation process by conducting an Environmental Impact Assessment, Public Participation Process (PPP), and to compile a Basic Assessment Report & Environmental Management Programme report (BAR & EMPr) for the **Mining Permit Application** for the purpose of extracting **Coal** on **portion of portion 2** of the Farm **Driehoek 273 IS**, situated under Magisterial District of **Ermelo** in **Mpumalanga** Province with **DMRE Ref: MP 30/5/1/1/3/13557 MP**.

May you kindly find attached **Regulation map 2.2, KML** and **Background Information Document (BID)** for detailed information about the proposed project. A **Registration and Comment Form** is included for you to register as an Interested and Affected Party and raise your comments and concerns. Kindly complete this form so we can address the comments in the **Basic Assessment Report and Environmental Management Programme report** that will be shared with you to review for **30 calendar days** commencing on the **Monday the 07th of August 2023 until Wednesday the 06th of September 2023 (excluding Public Holidays).** if you know anyone who might be interested or affected by this project, kindly forward this email to that person.

Should you need any clarity in relation to this project, please do not hesitate to contact me using the contact details provided below.

Sent: Wednesday, August 2, 2023 12:03 PM
To: Takalani, Rakuambo <takalani@singoconsulting.co.za>
Cc: kenneth@singoconsulting.co.za; rudzani@singoconsulting.co.za; 'Masindi, Nefale' <masindi@singoconsulting.co.za>
Subject: RE: [CAUTION:EXTERNAL EMAIL] INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.

good morning

kindly receive response from Eskom Distribution.

Eskom

Takalani Rakuambo
Environmental Technician
SINGO Consultants
Office No. 870, 5 Balalaika Street
Tasbet Park Ext 2
EMalahleni,1040
Email: takalani@singoconsulting.co.za
Tel: 082 767 4011

Date: 27 July 2023

Our ref: LD-INV/E/SN/243/2023
Your ref: MP 30/5/1/1/3/13557 MP

Dear Takalani

INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.

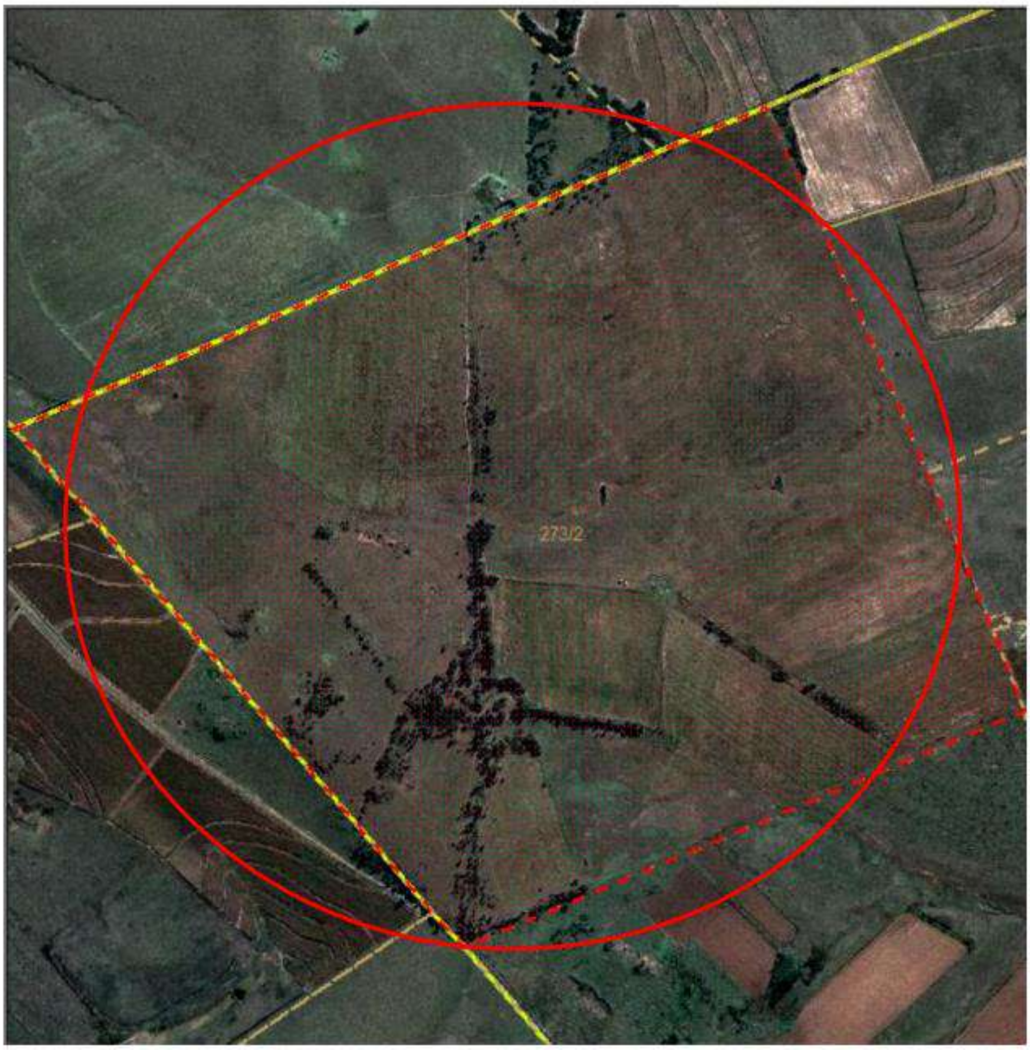
We refer to your application date 07 July 2023.

Eskom Distribution services are not affected by this application.

We thank you and hope that you find the above in order, and please don't hesitate to contact us should you've any queries or seek clarity.

Yours sincerely

100
1923-2023


273/2

Takalani Rakuambo

From:	Takalani Rakuambo <takalani@singoconsulting.co.za>
Sent:	Wednesday, 02 August 2023 13:58
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	RE: [CAUTION:EXTERNAL EMAIL] INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.

Tracking:

Recipient	Read
'Wayleavesmou'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Dr. Singo, Kenneth	Read: 2023/08/02 14:00
Masindi, Nefale	Read: 2023/08/02 14:17
Rudzani, Radebe (RRS)	Read: 2023/08/02 14:23

Good Day.

I hope this email may finds you well.

Kindly note that your email has been acknowledged, thank you for your proponent response and note that your comment will be aligned with the BAR & EMPr.

Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Friday, 07 July 2023 20:08
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Tracking:

Recipient	Read
'Elly Thulari'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Dr Singo, Kenneth	Read: 2023/07/07 20:26
Masindi, Nefale	Read: 2023/07/10 00:54
Rudzani	Read: 2023/07/10 11:01

Good day,

Receive warm greetings from Singo Consulting (Pty) Ltd.

Singo Consulting (Pty) Ltd has been appointed as an independent Environmental Assessment Practitioner by **Tornowize (Pty) Ltd** to manage the environmental authorisation process by conducting an Environmental Impact Assessment, Public Participation Process (PPP), and to compile a Basic Assessment Report & Environmental Management Programme report (BAR & EMPr) for the **Mining Permit Application** for the purpose of extracting **Coal** on **portion of portion 2** of the Farm **Driehoek 273 IS**, situated under Magisterial District of **Ermelo** in **Mpumalanga** Province with **DMRE Ref: MP 30/5/1/1/3/13557 MP**.

May you kindly find attached **Regulation map 2.2, KML** and **Background Information Document (BID)** for detailed information about the proposed project. A **Registration and Comment Form** is included for you to register as an Interested and Affected Party and raise your comments and concerns. Kindly complete this form so we can address the comments in the **Basic Assessment Report and Environmental Management Programme report** that will be shared with you to review for **30 calendar days** commencing on the **Monday the 07th of August 2023 until Wednesday the 06th of September 2023 (excluding Public Holidays).** if you know anyone who might be interested or affected by this project, kindly forward this email to that person.

Should you need any clarity in relation to this project, please do not hesitate to contact me using the contact details provided below.

Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Friday, 07 July 2023 20:12
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Tracking:

Recipient	Read
'Yuza Chabalala Transnet Freight Rail PTA'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Dr Singo, Kenneth	Read: 2023/07/07 20:26
Masindi, Nefale	Read: 2023/07/10 00:54
Rudzani	Read: 2023/07/10 11:01

Good day,

Receive warm greetings from Singo Consulting (Pty) Ltd.

Singo Consulting (Pty) Ltd has been appointed as an independent Environmental Assessment Practitioner by **Tornowize (Pty) Ltd** to manage the environmental authorisation process by conducting an Environmental Impact Assessment, Public Participation Process (PPP), and to compile a Basic Assessment Report & Environmental Management Programme report (BAR & EMPr) for the **Mining Permit Application** for the purpose of extracting **Coal** on **portion of portion 2** of the Farm **Driehoek 273 IS**, situated under Magisterial District of **Ermelo** in **Mpumalanga** Province with **DMRE Ref: MP 30/5/1/1/3/13557 MP**.

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Should you need any clarity in relation to this project, please do not hesitate to contact me using the contact details provided below.

Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Friday, 07 July 2023 20:15
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Tracking:

Recipient	Read
'TebogoM@gsibande.gov.za'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Dr Singo, Kenneth	Read: 2023/07/07 20:26
Masindi, Nefale	Read: 2023/07/10 00:54
Rudzani	Read: 2023/07/10 10:59

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Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Friday, 07 July 2023 20:19
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Tracking:

Recipient	Read
'tzwane@msukaligwa.gov.za'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Dr Singo, Kenneth	Read: 2023/07/07 20:26
Masindi, Nefale	Read: 2023/07/10 00:54
Rudzani	Read: 2023/07/10 10:59

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Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Friday, 07 July 2023 20:22
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Tracking:

Recipient	Read
'BCAdmin@environment.gov.za'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Dr Singo, Kenneth	Read: 2023/07/07 20:26
Masindi, Nefale	Read: 2023/07/10 00:54
Rudzani	Read: 2023/07/10 10:59

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Should you need any clarity in relation to this project, please do not hesitate to contact me using the contact details provided below.

Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Saturday, 08 July 2023 07:50
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	LAND CLAIM ENQUIRY ON PORTION OF PORTION 2 OF THE FARM DRIEHOEK 273 IS, DMRE REF : MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; Windeed Results.pdf; BID.pdf

Tracking:

Recipient	Read
'Lazarus.Masuku@dalrrd.gov.za'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Dr Singo, Kenneth	Read: 2023/07/08 12:46
Masindi, Nefale	Read: 2023/07/10 00:54
Rudzani	Read: 2023/07/10 09:17

Good day,

Receive warm greetings from Singo Consulting (Pty) Ltd.

You are kindly receiving this email as an enquiry for any possible land claim on **Portion of Portion 2 of the Farm Driehoek 273 IS**, situated in the **Magisterial District of Ermelo** in the **Mpumalanga Province DMRE REF : MP 30/5/1/1/3/13557 MP.**

Kindly review attached **Regulation map 2.2, KML, Windeed results and Background Information Document (BID)** for detailed description of proposed project. This is to ensure that all claimants are properly consulted and are given opportunity to:

- Register as an I&APs and to respond to the environmental compliance process;
- Raise issues of concern and provide suggestions for enhanced benefits;
- Contribute to local knowledge;
- Comment on the Draft Basic Assessment Report (BAR) & Environmental Management Programme report (EMPr); and
- Inform any other person / organization that they may feel should be informed about the project.

Your comments will be highly appreciated as they will assist us in developing a well-informed BAR and EMPr.

Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Monday, 10 July 2023 10:28
To:	
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	LANDOWNER INVITATION TO COMMENT ON MINING PERMIT APPLICATION ON PORTION OF PORTION 2 OF THE FARM DRIEHOEK 273 IS , DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	Landowner Notification Letter.pdf; Windeed Results.pdf; REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Tracking:

Recipient	Read
'HNetshakhuma@dalrrd.gov.za'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Rudzani	Read: 2023/07/10 10:30
Dr Singo, Kenneth	Read: 2023/07/10 11:39

Good day,

Receive warm greetings from Singo Consulting (Pty) Ltd.

Tornowize (Pty) Ltd has lodged a Mining Permit Application for Coal on Portion of Portion 2 of the Farm **Driehoek 273 IS** situated in the Magisterial District of **Ermelo**, Mpumalanga Province with DMRE Ref: **MP 30/5/1/1/3/13557 MP**.

A windeed search was conducted to find out the Surface Landowner of the **Portion of Portion 2** of the Farm **Driehoek 273 IS**, and the outcomes shows that **National Government of the Republic of South Africa** own mentioned property as seen on attached windeed search result, which the Applicant has the interested with.

Please find the attached **Landowner Notification Letter**, **Windeed Search Result**, **Regulation 2(2) map**, **KML** and **Background Information Document (BID)** for brief description of the proposed project and timelines. Kindly forward your comments using contact details below.

Kind regards,

Takalani, Rakuambo

From:	Takalani, Rakuambo <takalani@singoconsulting.co.za>
Sent:	Monday, 10 July 2023 15:01
Cc:	'Dr Kenneth, Singo'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	INVITATION TO REGISTER & COMMENT FOR TORNOWIZE (PTY) LTD, MINING PERMIT APPLICATION ON PTN OF PTN 2 OF THE FARM DRIEHOEK 273 IS WITH DMRE REF: MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; BID.pdf

Tracking:

Recipient	Read
'LekoaneJ@dws.gov.za'	
'Dr Kenneth, Singo'	
'rudzani@singoconsulting.co.za'	
'Masindi, Nefale'	
Dr Singo, Kenneth	Read: 2023/07/10 15:15

Good day,

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Sent:	Saturday, 08 July 2023 07:50
Cc:	'kenneth@singoconsulting.co.za'; 'rudzani@singoconsulting.co.za'; 'Masindi, Nefale'
Subject:	LAND CLAIM ENQUIRY ON PORTION OF PORTION 2 OF THE FARM DRIEHOEK 273 IS, DMRE REF : MP 30/5/1/1/3/13557 MP.
Attachments:	REG 2.2.pdf; Mining Permit Area.kml; Windeed Results.pdf; BID.pdf

Tracking:

Recipient	Read
'Lazarus.Masuku@dalrrd.gov.za'	
'kenneth@singoconsulting.co.za'	
'rudzani@singoconsulting.co.za'	
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Dr Singo, Kenneth	Read: 2023/07/08 12:46
Masindi, Nefale	Read: 2023/07/10 00:54
Rudzani	Read: 2023/07/10 09:17

Good day,

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You are kindly receiving this email as an enquiry for any possible land claim on **Portion of Portion 2 of the Farm Driehoek 273 IS,** situated in the **Magisterial District of Ermelo** in the **Mpumalanga Province DMRE REF : MP 30/5/1/1/3/13557 MP.**

Kindly review attached **Regulation map 2.2, KML, Windeed results and Background Information Document (BID)** for detailed description of proposed project. This is to ensure that all claimants are properly consulted and are given opportunity to:

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- Raise issues of concern and provide suggestions for enhanced benefits;
- Contribute to local knowledge;
- Comment on the Draft Basic Assessment Report (BAR) & Environmental Management Programme report (EMPr); and
- Inform any other person / organization that they may feel should be informed about the project.

Your comments will be highly appreciated as they will assist us in developing a well-informed BAR and EMPr.

Appendix 6: Proof of Submission

DMRE Ref: MP 30/5/1/1/3/13557 MP

Add new comment   Subscribe to: This post

CaseHeader | LocationInfo | Admin

Status: DRAFT

HeritageAuthority(s): SAHRA

Case Type: Section 38 (1) - Decision from Heritage Authority required

ProposalDescription:
Mining Permit Application within Portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province. The Mining Permit area, is situated within Msukaligwa approximately 27.5 km Southwest of Breyten, approximately 31 km West of Ermelo and approximately 94 km South East of Middelburg.

Expanded_Motivation:
Mining activities will be undertaken over a period of two (2) years. This project will entail an open cast method of excavation. The mine design will be developed according to the dimension of the applied mineral deposit within the project area, but overall mining activities will be limited to an area of 5 Ha as per mining permit requirements. The topsoil will be stockpiled elsewhere on site preferably next to the farm boundary and will be used during rehabilitation period. Once a box cut has been made, the overburden and mineral resources where necessary will be loosened by blasting. The loosened material will then be loaded onto trucks by excavators. A haul road will be situated at the side of the open cast, forming a ramp up which trucks can drive, carrying ore and waste rock. Waste rock will be piled up at the surface, near the edge of the open cast (waste dump). The waste dump will be tiered and stepped, to minimize degradation.

ApplicationDate: Thursday, July 20, 2023 - 12:06

CaseID: 21929

Applicants: Sonwabo Debedu

Consultants/Experts: SINGO KENNETH

OtherReferences:

CaseReference	Department	DeadlineDate
DMRE Ref: MP 30/5/1/1/3/13557 MP	Department of Mineral Resources - Mpumalanga	07/08/2023

ReferenceList:

AdditionalDocuments

1. BID.pdf

Appendix 7: DMRE Letters

mineral resources
& energy

Department
Minerals Resources and Energy
REPUBLIC OF SOUTH AFRICA

Private Bag X7279, Emalahleni, 1035, Tel: 013 653 0500, Fax 013 690 3288, Saveways Centre, First Floor, Mandela Drive, Emalahleni, 1035, Directorate: Mineral Regulation: Mpumalanga Region, **Enquiries:** V.S Mayekiso Email Address: Vuyo.Mayekiso@dmre.gov.za **Sub-directorate**: Mineral Laws, **Ref**: MP 30/5/1/1/3/**13557 MP.**

BY: Email/Fax

The Director/s
Tornowize (Pty) Ltd
PO Box 1035
Die Heuwel
Witbank
1035

Email: sonwabo@tornowize.co.za

ACCEPTANCE OF AN APPLICATION FOR MINING PERMIT IN TERMS OF SECTION 27 OF THE MINERAL AND PETROLEUM DEVELOPMENT ACT, 2002 (ACT 28 OF 2002) [HEREIN AFTER REFERRED TO AS THE ACT] AS AMENDED BY SECTION 23 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT AMENDMENT ACT, 2008 (ACT 49 OF 2008) [HEREINAFTER REFERRED TO AS THE AMENDMENT ACT].

1. Please be informed that your application for a mining permit to mine **Coal on Portion of Portion 2 of the farm Driehoek 273 IS, Magisterial District of Ermelo,** is hereby accepted in terms of Section 27 and 9(1) (b) of the Act.

2. **Further be informed that there is an application received prior to yours under file reference number 17475PR and should it become successful yours will automatically falls away.**

3. **Furthermore, note that acceptance of your application does not grant you the right to commence with mining operations. Your application will be evaluated/ processed and a recommendation will be made on either to issue or refuse your application. Any person operating without an issued mining**

permit will be in contravention of Section 5(4) of the MPRDA and would be guilty of an offence in terms of the relevant Act.

4. Should you wish to continue with the application **irrespective of the risk associated with Section 9(1)(b) of the Act.** Please take notice that in terms of Section 27(5) of the Act as amended by Section 23(e)(a) and Section 23(e)(b) of the Amendment Act, you are required to:-

   4.1. To consult in the prescribed manner with the landowner, lawful occupier and any interested and affected parties and the Land Restitution Commission including and to include the result of such consultation in the relevant environmental reports to be submitted and uploaded on the SAMRAD system.

5. **Please take note that failure to adhere to the timeframe stipulated above and to submit any documentation required in terms of this notice will result into non-compliance with the provision of the Act and the Amendment Act and will result in your application being processed for refusal.**

Yours Faithfully:

REGIONAL MANAGER
MPUMALANGA REGION
DATE: 05/06/2023

13557 MP- Acceptance

Appendix 8: Special Studies.

Appendix 9: EAP Curriculum Vitae

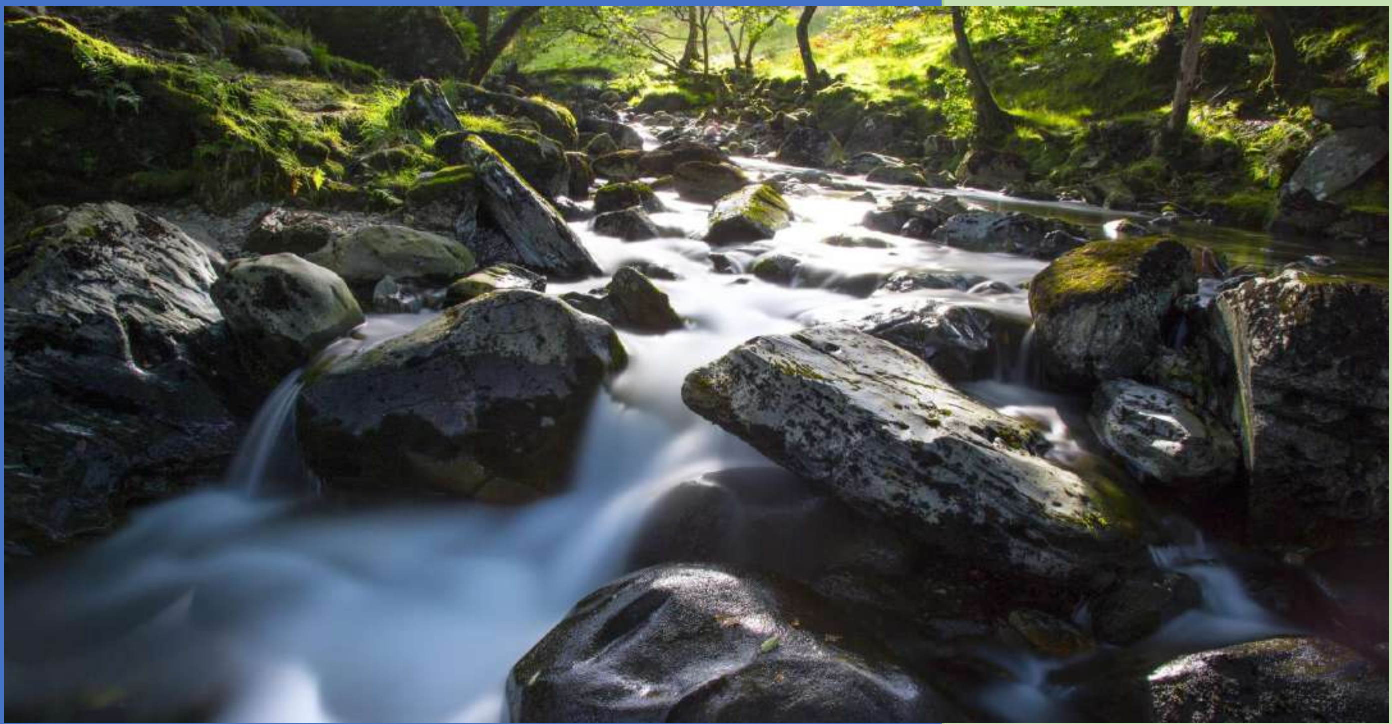
Due to the POPIA ACT the Curriculum Vitae will be made available to DMRE only.

Appendix 10: Screening Report

HYDROGEOLOGICAL STUDY REPORT

2023

DMRE REF: MP 30/5/1/1/3/13557 MP



Hydrogeological Report for the proposed Mining Permit Application on portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province

PREPARED BY:

Singo Consulting (Pty) Ltd

PREPARED FOR:

Tornowize PTY (LTD)

Report Credentials

Disclaimer:	***Copyright:***
The opinion expressed in this, and associated reports are based on the information provided Tornowize (Pty) Ltd to Singo Consulting (Pty) Ltd ("Singo Consulting") and is specific to the scope of work agreed with Tornowize (Pty) Ltd. Singo Consulting acts as an advisor to Tornowize (Pty) Ltd and exercises all reasonable skill and care in the provision of its professional services in a manner consistent with the level of care and expertise exercised by members of the environmental profession. Except where expressly stated, Singo Consulting has not verified the validity, accuracy or comprehensiveness of any information supplied for its reports. Singo Consulting shall not be held liable for any errors or omissions in the information given or any consequential loss resulting from commercial decisions or acts arising from them. Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the Tornowize (Pty) Ltd or their nominees during the visit, visual observations, and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Singo Consulting is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise. These views do not generally refer to circumstances and features that may occur after the date of this study, which were not previously known to Singo Consulting (Pty) Ltd or had the opportunity to assess.	

Project Information

Report type	**Hydrogeological Study for a Mining Permit**	
Project title	Hydrogeological Report on behalf of Tornowize (Pty) Ltd for the proposed mining permit application portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province	
Mineral (s)	Coal	
Client	Tornowize (Pty) Ltd	
Site location	Portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province	
Version	01	
Date	August 2023	
		Electronic signatures
Compiled by	Dineo Makhubela (Environmental Specialist) Singo Consulting (Pty) Ltd (Candidate Natural Scientist, SACNASP Reg No: 158858)	
Reviewed by	Mutshidzi Munyai (Hydrogeologist) Singo Consulting (Pty) Ltd (Water Resources Science (Professional Natural Scientist), Environment Science (South African Council for Natural Scientific Professions) (SACNASP Registration Number 122464)	
Final review and approval	Dr. Kenneth Singo (Principal Consultant of Singo Consulting (Pty) Ltd)	

Table of Contents

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1. INTRODUCTION

1.1 Background information

Tornowize (Pty) Ltd has appointed Singo Consulting (Pty) Ltd as an independent consulting company to conduct a hydrogeological study. The hydrogeological study is being conducted in support of a mining permit application for coal mineral within portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermeloin Mpumalanga Province

The proposed activity has a potential to contaminate the groundwater through possible accident of leakage and infiltration to the sub-surface. The proposed study area is in the residential zone and any possible groundwater pollution will have impact on down-gradient located external user's boreholes.

Chapter 3 of the National Water Act (Act 36 of 1998) requires that a person who owns, control, occupies, uses the land is responsible for preventing pollution of water resources and is also responsible to remedy (correct) the effects of the pollution. It is with this Act that the hydrogeological report was deemed necessary for the site to gather all relevant information related to groundwater and its related potential impacts.

Facilities on site within the mining permit area include but not limited to:

- Pollution control Dam
- Mobile Sanitation
- Mobile crushing and screening unit
- ROM stockpile area
- Overburden stockpile area
- Product Stockpile area
- Topsoil and Subsoil stockpile area

The aim of this study is:

- To assess the quality condition of surface and groundwater within and around the mining permit area, and to draft a water monitoring programme for the project site and provide recommendations.
- Prediction of the environmental impact of the proposed mining activity on the geohydrological regime of the area.
- Forecasting the effects of the activity on the receiving environment

1.2 Proposed Activities

The activities to take place are categorized based on phases of the life of the mine.

Construction phase:

- Clearing of vegetation
- Hardening surfaces to create roads
- Installation of mobile machinery such as crusher.

Operational Phase:

- Movement of machinery
- Stripping of overburden
- Coal processing which include but not limited to crushing

1.3 Scope of work

- Description of the baseline groundwater regime:
  - Conduct hydrocensus of existing boreholes, including groundwater use type and volume.
  - Identification of monitoring boreholes during which hydrogeological data such as depth to water strike and groundwater quality will be monitored.
  - Laboratory testing of samples for physical, chemical, and biological parameters.

- Environmental impact assessment using 3D numerical flow and contaminant transport modelling to calculate:
  - Groundwater inflow volumes into the mining area over the life of mine.
  - The cone of dewatering that forms due to mine dewatering and its development over time. This includes the impact on surrounding groundwater users.
  - Contaminant transport away from point and diffuse sources within the mining area and the impacts on surrounding aquifers and users.

- Reporting:
  - Using the above components, a final hydrogeological report is compiled.

- Information Sourcing and Literature review.

  To determine the baseline climatic and hydrological parameters of the site and surroundings, research on multiple information sources was conducted:
  - QGIS was used to identify streams, wetlands.
  - Scientific journals and scientific books

- Department of water affairs for the document on aquifer classification of south Africa.
- Aerial imagery of the world map (Google earth).

- **Legislation and policy context:**

  The following legislation was considered during the compiling of this assessment.

  - **The National Water Act (Act 36 of 1998**):

    The NWA governs water resource management in South Africa. As guardians of water, the Department of Human Settlements, Water and Sanitation (DHSWS) must guarantee that resources are used, preserved, safeguarded, developed, managed, and controlled in a sustainable manner for the benefits of all people of south Africa and the environment. Key provisions applying to the current study include:

    - **Catchment Areas** - Any disturbance to a watercourse, such as the construction and operation of surface mining infrastructure, may require authorisation from DWS.

  - **Regulations on the use of Water for Mining and Related Activities:**

    Government Notice 704 or GN704 was established to provide regulations on the use of water for mining and related activities aimed at the protection of water resources. The four main regulations of GN704 applicable to this project are:

    - **Condition 4** – indicates that no person in control of a mine or activity may locate or place any residue deposit, dam, reservoir, together with any structure of another facility within the 1:100-year flood line or within a horizontal distance of 100-metres from any watercourse
    - **Regulation 5** - 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.
    - **Regulation 6** - 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 of the flows of a 1:50-year recurrence event. Clean and dirty water systems should not spill into each other more frequently than once in 50 years. Any dirty water dams should have a minimum freeboard of 0.8m above full supply level
    - **Regulation 7** - 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.

2. TERMS OF REFERENCE

The baseline hydrogeological assessment for the project area is mainly constructed by a combination of desktop study and site-specific field study. Most of the information used for this study was compiled with an aid of nearby study sites information and experience from similar geohydrological settings. All collected data will be compiled to construct a conceptual geohydrological model.

The objective of the study:

- ❖ To collect hydrogeological and geochemical baseline information to address the subsequent environmental impact assessment for the coal mining permit.
- ❖ To draft management and mitigation measures for identified impacts outlined for the construction, operational, decommissioning, and post-mining phase of the project and associated monitoring programme.

The following aspects covered in this hydrogeological study:

Table 1: Hydrogeological aspects in the study.

Aspect	Description
Desktop Study	❖ Project Initiation and Data Collection ❖ Review available site specific hydrogeological and hydrological information to conceptualize the different aquifer systems and their interaction with surface water features in the area.
Site visits	❖ Site visit is the most significant part of the investigation, a site visit was conducted to collect water samples and conducting hydrocensus at the surrounding firms (within 2kms) of the project area.
Groundwater levels	❖ A water level meter was used to measure the water level at all the boreholes within the study site
Aquifer classification	❖ Aquifers will be classified into either minor or major aquifer types and dominant water source will be identified
Hydrogeological Modelling	❖ Interpret geochemical analyses of water samples conducted by Regen waters Lab. ❖ Numerical Groundwater Flow and Transport Model o Model inputs o Model Calibration o Scenario Modelling o Hydrogeological Impact Assessment

Reporting	❖ Writing a comprehensive geohydrological report outlining all the findings and existing environment of the proposed project area. This groundwater specialist report compiles all methodologies, findings, quantitative analysis (geochemical assessment and modelling outcomes), impact assessments, recommendations (proposed monitoring programme and recommended mitigation measures for predicted impacts) and conclusions. Appendices to the specialist report will include laboratory results.

3. METHODOLOGY

3.1 Hydrocensus

Hydrocensus' literally means, 'water census'. A hydrocensus is a task that involves gathering information on water features, water supply sources and sources of potential water pollution in a particular site or area (Alana, Kerry, and Irene, 2004).

A hydrocensus aims to:

- Identify details of water-related features (e.g., storm water channels, erosion gullies, weirs, diversion embankments), and disused or abandoned boreholes and wells.
- Identify features where water could collect in rainy periods (quarries, borrow pits, seasonal puddles, etc.).
- Identify potential sources of contamination (latrines, waste disposal sites, animal kraals, defecation sites, animal watering points, soak-away pits and drains, etc.).
- Identify visible features and symptoms (e.g. borehole casing rusted away at the surface, presence of algal blooms in stagnant water) that indicate the potential for water contamination.
- Identify water sources and, where possible, indicate the flow rate and the quality.

3.2 Sampling and chemical analysis

The data was collected using a variety of equipment, including a water level meter, a handheld GPS, a measuring tape, and a bailer. On site, these tools were employed on a variety of boreholes. For each borehole that was being monitored, the hand GPS was utilized to determine the longitudinal, latitude, and elevation. The measuring tape was used to take all collar height measurements of the boreholes after recording the GPS coordinates. The water levels were measured using a level meter and a measuring tape.

3.2.1 Surface water sampling

- **Sampling using sampling Vessels**

Before sampling, the sampler must thoroughly clean the sampling vessel on site by rinsing it with water three to four times. Care must be taken to avoid contaminating the water used for sampling during rinsing. Gently submerge the collecting vessel, fill it with the water sample, and securely close it. If the obtained water sample can be frozen, leave some room for expansion equal to around 10% of the sampling vessel (Singh, 2015).

3.2.2 Groundwater sampling

- **Bailer**

A bailer is a hollow tube used to collect samples of groundwater from wells for monitoring. Bailers are tied to a dip meter and lowered into the water column by a piece of rope, or a piece of wire connected to the dip meter. When lowered, the bailer uses a simple ball check valve to seal a sample of the groundwater table at the bottom to raise it up. The bailers are made of polyethylene, PVC, FEP or stainless steel and can be disposable or reusable (Singh, 2015).

Bailers are easy and relatively inexpensive devices to use. In addition, bailers can be lowered to any depth although the depth of the well is sharply limited by pumps. Aeration of the water when the sample is collected, which could release volatile organic compounds that need to be tested, is the main downside to using bailers. This can also conflict with the proper seating of the ball check valve if there is a high volume of sediment or turbidity (Singh, 2015).

Figure 1: Bailer used to sample borehole water.

- **Water Level Meter (Dip Meter)**

Water level meters are best used to measure water levels in piezometers, monitoring wells, and bore holes. Designed to be very accurate to great distances, they can also be used to determine total well depth before or after installation. Most of these meters have probes that detect the water via fluid conductivity. A typical example of a water level meter is shown in Figure 2

Figure 2: Solinst Dip Meter used to sample borehole water.

3.3 Groundwater modelling

The chosen software is MODFLOW. During model setup, the conceptual model is translated into a numerical model. This stage entails selecting the model domain, defining the model boundary conditions, discretizing the data spatially and over time, defining the initial conditions, selecting the aquifer type, and preparing the model input data. The above conditions together with the input data are used to simulate the groundwater flow in the model domain for pre steady state conditions.

Conceptual model

A conceptual model is a simplification of the complex real system down to familiar aspects that can easily be solved. This conceptual model is just a step prior to a solution model which can either be analytical or numerical.

Numerical model

Numerical groundwater modelling consists of flow and transport modelling types. Groundwater flow modelling can be represented by finite difference method or finite element. In this project a finite difference method is used.

3.4 Groundwater availability assessment

The availability of groundwater as a water source depends largely upon surface and subsurface geology as well as climate. The porosity and permeability of a geologic formation control its ability to hold and transmit water. Porosity is measured as a ratio of voids to the total volume of rock material and is usually described as a percentage.

Shallow, weathered and/or fractured rock and relatively low yielding aquifer systems are underlain over 80 percent of South Africa. By contrast, appreciable quantities of groundwater can be abstracted at relatively high rates from dolomitic and quarzitic aquifer systems located in the northern and southern parts of the country respectively, as well as from a number of primary aquifers situated along the coastline.

Groundwater systems

Aquifer types

The aquifer systems in South Africa can be divided into two major types: **primary** and **secondary** aquifers.

Primary aquifers: The primary aquifers are: 1. Coastal Coal and unconsolidated material along the South African coast, such as areas along the west coast at Port Nolloth, Doringbaai, Lambertsbaai, Langebaan, Atlantis, Cape Flats, Gansbaai, Bredesdorp, Stilbaai, Alexandria, Boesmansriviermond, Kidds beach, Richards bay; 2. Coal along stream beds such as those along the Crocodile and Caledon rivers, at De Aar, De Doorns, Rawsonville, Pietersburg (Polokwane), Messina, and Makatini Flats (Kok, 1991).

Characteristics of Primary Aquifers include but not limited to:

- Usually, shallow unconfined systems and groundwater surface in the aquifer is at atmospheric pressure (100 kPa).
- Mostly consist of unconsolidated material, usually less than 30 m thick.
- Contain 1 to 20 percent water by aquifer volume
- Recharge rate is generally high. Some 15 to 30 percent of rainfall would infiltrate into aquifers.
- Geohydrological characteristics of aquifer do not vary greatly over short distances.
- The transportation of contaminants in the primary aquifers is slow because of high effective porosity.

Secondary aquifers: The degree of fracturing of rocks in South Africa is dependent upon the tectonic history of rocks as well as the rock composition. For example, competent rocks, such as dolerite and quartzite and sandstones, fracture more readily than incompetent or ductile rocks, such as dolomite and shale. The magnitude of fracturing does not necessarily determine how much water an aquifer can transmit. It is estimated that at depths greater than 60 m, about less than one percent of the fractures transmit significant amounts of water. However within quartzite rocks, significant yields are possible at greater depths.

Typical characteristics of secondary or fracture flow aquifers are:

- Fractured flow aquifers are either confined or unconfined aquifers. The confined aquifers are overlain by sediments or rock of confining nature, which limits direct recharge from rainfall.
- They belong to shallow systems, usually less than 60 m thick and in exceptional circumstances can be about 200 m thick.
- Characteristics of aquifers as well as borehole yields vary greatly over short distances.
- Mpumalanga is characterized by primary and secondary aquifers. Groundwater accumulates in the fractures of the sandstone and contact zones between different lithologies.

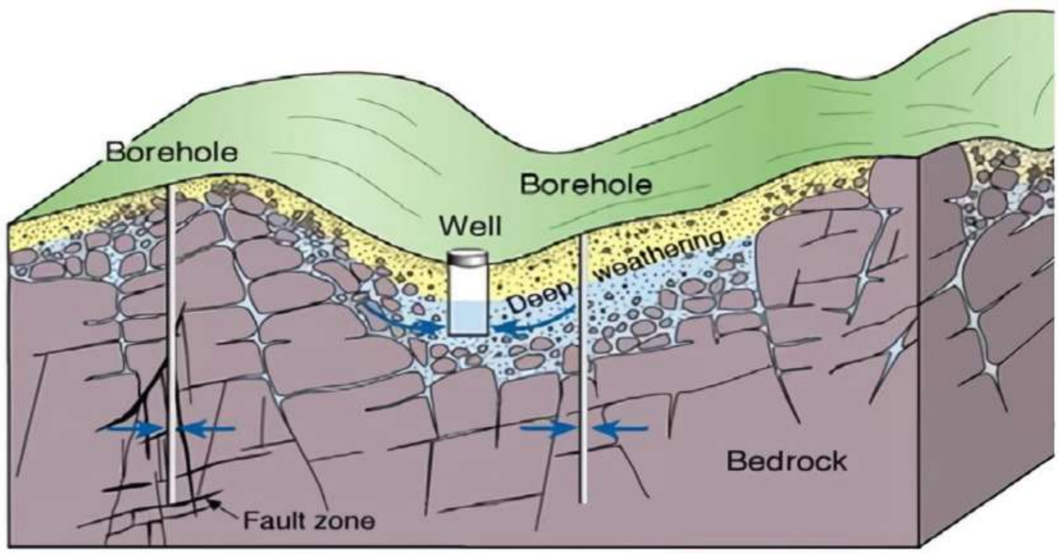

Figure 3: Fractured aquifer regime in the study area (Source: (Akhtar, et al., 2020)).

3.5 Groundwater recharge calculations

Chloride Mass Balance (CMB)

The method compares total chloride deposition (through precipitation) at the surface with chloride concentrations in groundwater as measured in samples from wells/boreholes. Chloride in the precipitation originates from sea salt. Chloride inputs from atmospheric deposition are conserved in the soil zone and concentrated due to loss of moisture by evapotranspiration.

Chloride ion is often used as a tracer for the investigation of water and solute movement in the unsaturated zone and aquifers. Tracers should be conservative behaviour, i.e. the tracer movement is not slowed or decreased in concentration by interaction with the solid phase and that it is not produced in the soil nor introduced by external sources.

Assumptions:

- All chloride in ground water is derived from precipitation, no other sources
- Chloride is concentrated by evaporation prior to recharge.
- Chloride is conservative in the system
- Runoff after precipitation is negligible (most the precipitation that reaches the ground recharges infiltrates into the unsaturated zone contributing to recharge)

Basic equation for chloride mass balance method (Wood and Sanford, 1995)

$$\mathbf{q} = \mathbf{P} \times \frac{\mathbf{Clwap}}{\mathbf{Clgw}}$$

Where: **q** is the flux recharge (units of precipitation); **P** is the average annual precipitation; **Clwap** - is the weight-average chloride concentration in precipitation (a conservative value of 1 mg/l is often assumed) and **Clgw** – chloride concentration in the groundwater. **Recharge** is often expressed as % of rainfall.

4. PHYSIOGRAPHICAL AND GEOLOGICAL SETTING

4.1. Project Location

The proposed coal mining permit covers an area of approximately 5 hectares and is situated within portion of portion 2 of the Farm Driehoek 273 IS, within ward 9 under the Magisterial District of Ermelo as shown by a red ribbon on Figure 4 below. The permit area is located approximately 9.30 km North-East of Spitskop farm.

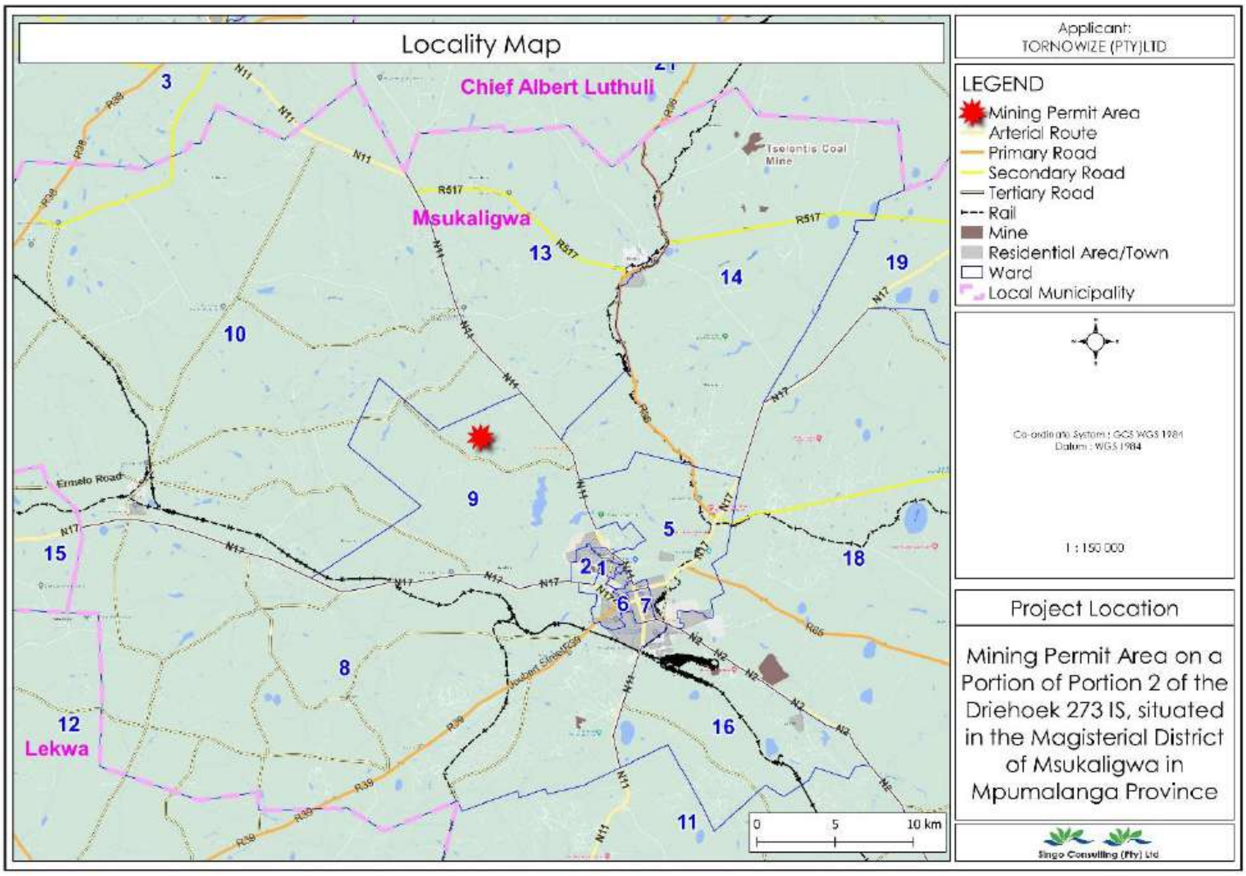

Figure 4: Locality map of the study area. (Singo Consulting, 2023)

4.2. Climate

Climate is the state of the atmosphere over a long period of time, such as over years, decades, centuries or greater and weather is defined as atmospheric conditions of an area over a short period of time (Naomi, 2004). Climate for the purpose of the study is chosen based on the fact that it does not change over a long period of time whereas weather conditions fluctuate more rapidly, and its data cannot be relied upon.

In Ermelo, the wet season is comfortable and partly cloudy and the dry season is cool and mostly clear. Over the course of the year, the temperature typically varies from -1°C to 23°C and is rarely below -4°C or above 26°C (https://weatherspark.com/, n.d.).

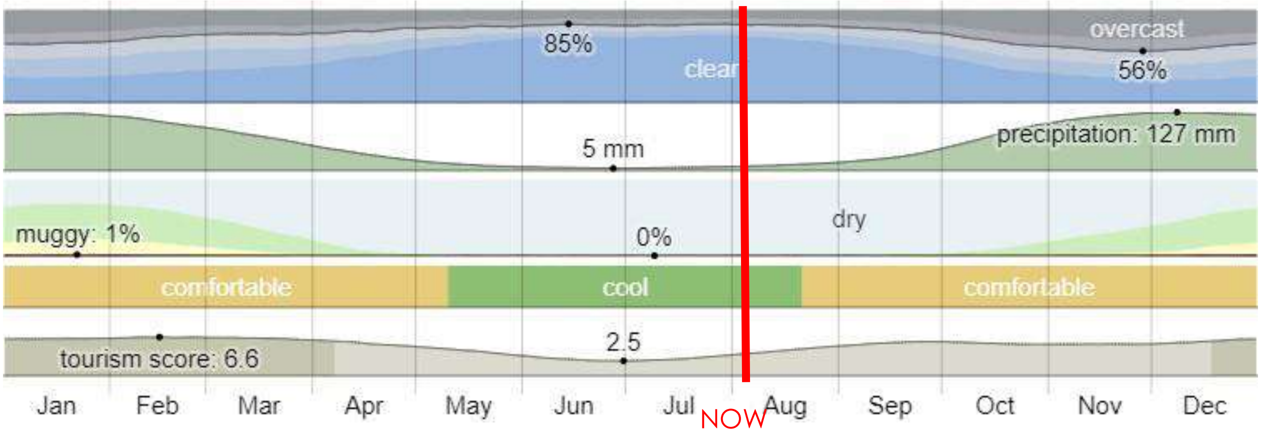

Figure 5:Climate in Ermelo. (https://weatherspark.com/, n.d.)

Temperature

The warm season lasts for 4.8 months, from October 29 to March 22, with an average daily high temperature above 21°C. The hottest month of the year in Ermelo is January, with an average high of 23°C and low of 12°C. The cold season lasts for 1.8 months, from June 2 to July 29, with an average daily high temperature below 16°C. The coldest month of the year in Ermelo is July, with an average low of -1°C and high of 16°C (https://weatherspark.com/, n.d.).The information retrieved from the weather spark websites co-relates with the information received from the in-house GIS specialist which is it more site specific and it shows on Figure 7 that the proposed mining permit area consist of an mean minimum annual temperature that is 0.1-2°C.

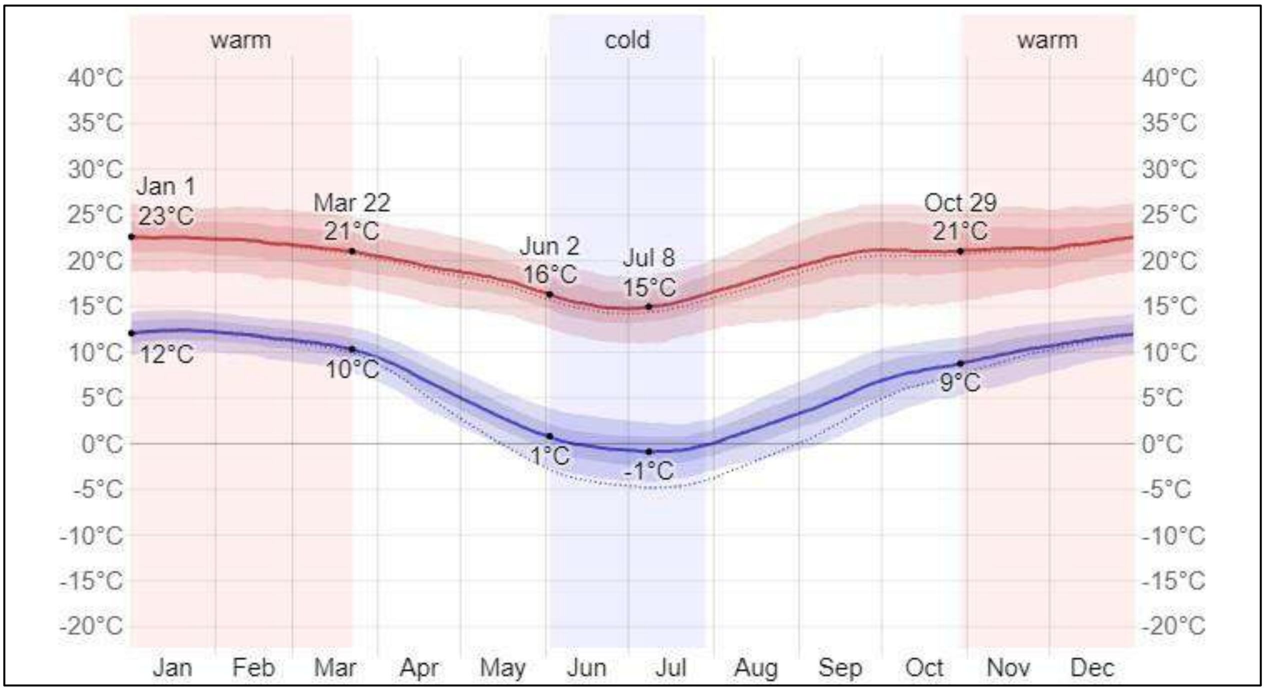

Figure 6: Average temperature of Ermelo. (https://weatherspark.com/, n.d.)

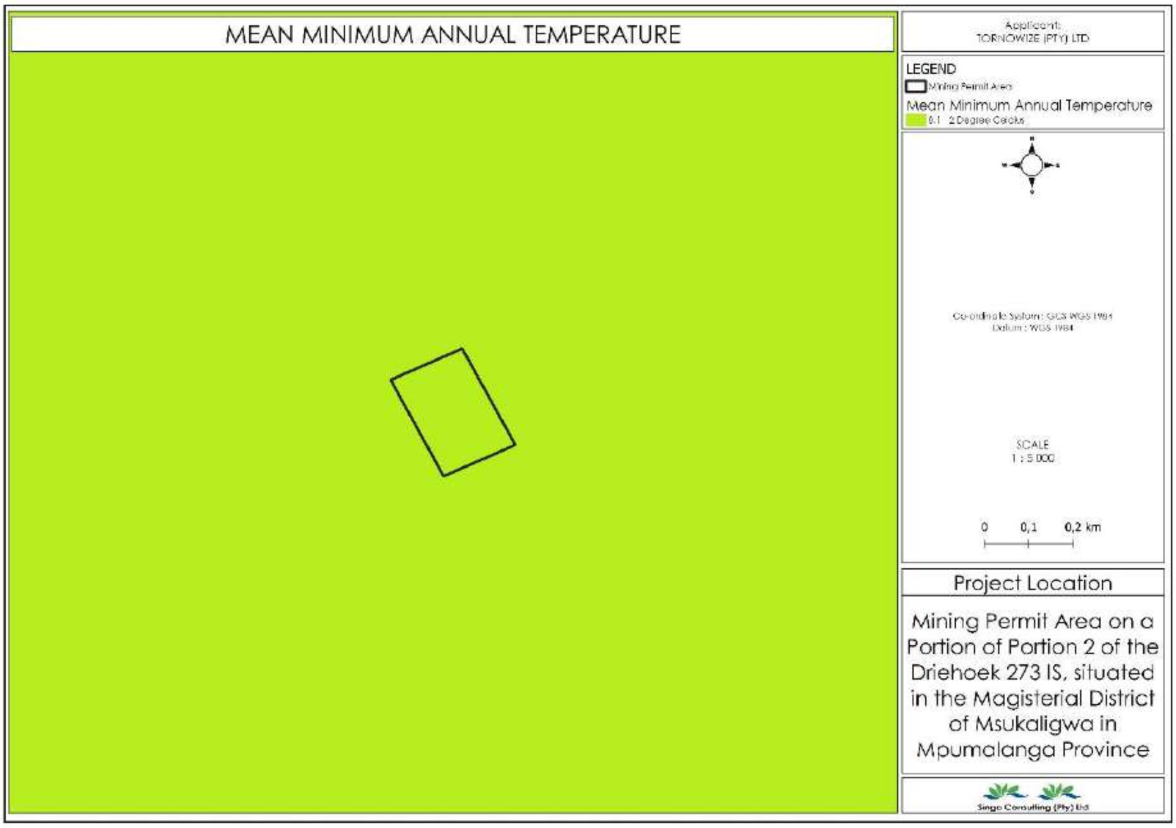

Figure 7: Mean Annual Temperature map. (Singo Consulting, 2023)

Rainfall

Ermelo experiences extreme seasonal variation in monthly rainfall. The rainy period of the year lasts for 8.9 months, from August 19 to May 16, with a sliding 31-day rainfall of at least 13 millimeters. The month with the most rain in Ermelo is December, with an average rainfall of 126 millimeters. The rainless period of the year lasts for 3.1 months, from May 16 to August 19. The month with the least rain in Ermelo is June, with an average rainfall of 6 millimeters. The mean annual rainfall according to the in-house GIS specialist is between 601-800 mm.

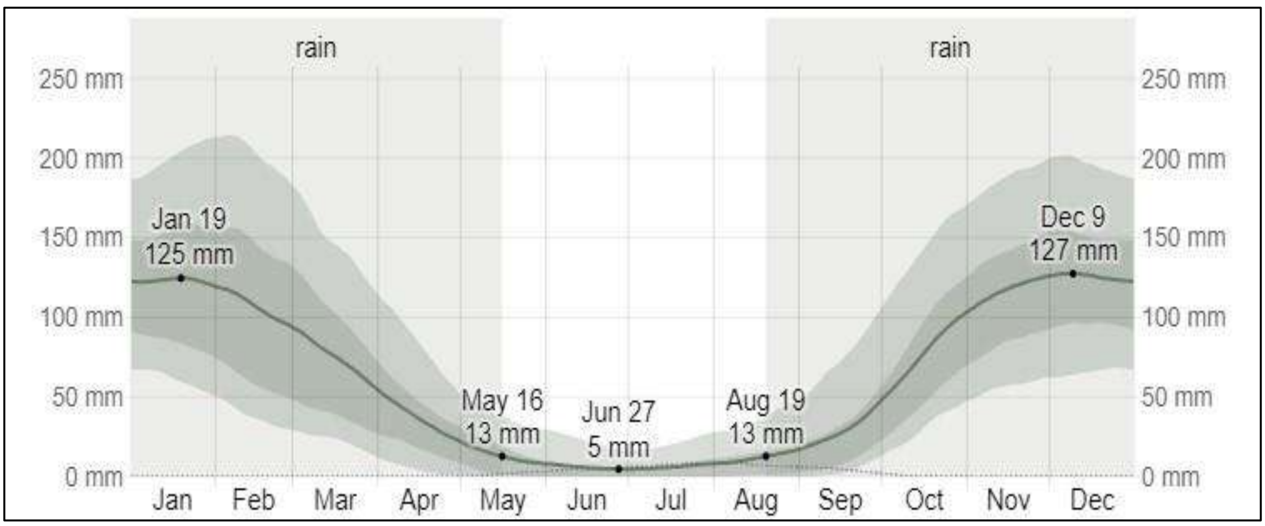

Figure 8:Daily chance of precipitation in Ermelo. (https://weatherspark.com/, n.d.)

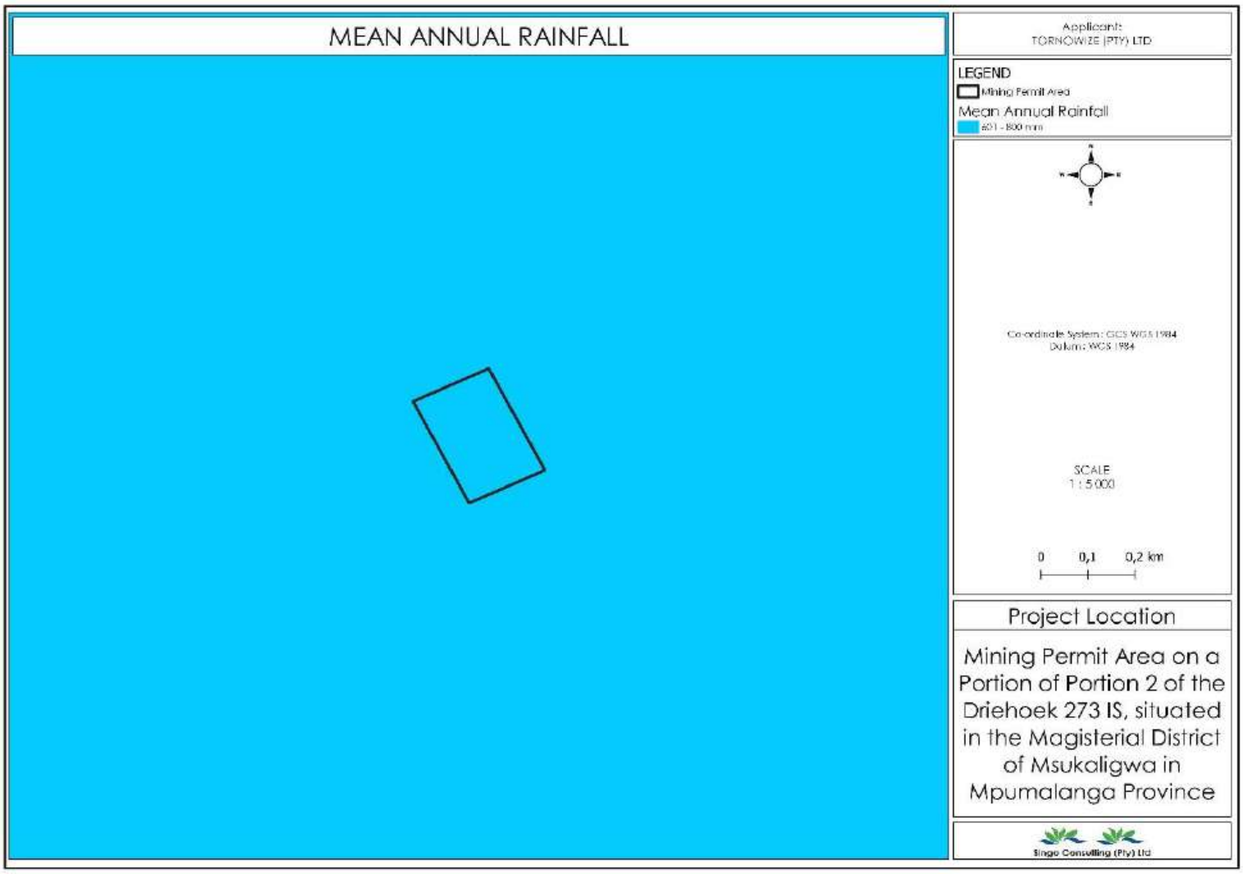

Figure 9: mean Annual rainfall map. (Singo Consulting, 2023)

4.3. Topography and Drainage

Topography

The topology of the area is illustrated below by Figure 10 below. A detailed description or representation on a map of the physical features of an area. SA's landscape has been shaped over a long time by movement below the surface of the Earth and by the movement of water across the surface of the Earth. Different layers of rocks have been laid down over millions of years and then shaped by erosion. Different strata and rock formations are eroded and the topography results from these processes.

In this environmental project, topography can be used to deduce the movement of surface water during rainy seasons. In the context of the study, topography will play a crucial role in the surface transport of contaminants and site-specific recommendations thereof. The topography of an area influences groundwater vulnerability, as topography also influences run-off and infiltration.

The topography of the study will be analysed based on its slope types and landforms observed onsite as well as seen on Figure 10. The highest point in the study area is at an elevation of 1535 mamsl in the southern direction and the lowest point is at an elevation of 1529 in the northern direction of the study area.

<u>Types of slopes.</u>

- **Gradual Slope:** A slope with contour lines widely spread. This even spacing is maintained in both up and down slope. The slope covers the entire study area, and it continues outside the project area in all the directions.

<u>Influence of Slope on Groundwater Contamination</u>

Slope of an area plays a major role in the transport of liquid or solid contaminants. In the context of the study area, two slope types were identified and observed during the site assessment. Gentle slope/Gradual Slope influences groundwater contamination as it consists of high groundwater level since less time is allowed for stormwater to infiltrate which means the will be an increase in residence time of contaminants such as Total Petroleum Hydrocarbon (TPH) (Gradual slope) and allowing faster movement of contaminants downhill (towards lower elevation).

<u>Landforms identified in the study area.</u>

- **Summit:** Point on a surface that is higher in elevation than all points immediately adjacent to it. The summit in the study area is not shown the topology map below, however the contour lines shows that the summit point might be on the north-eastern direction of the map after the 1690 mamsl elevation.
- **Valleys:** Valleys are depressed areas of land–scoured and washed out by the conspiring forces of water or gravity. Valleys are identified by contours that form a "V" pattern. The V pattern points upstream. Valleys are identified on the South and North parts of around the study area from east going to west at an elevation of 1725 mamsl. The identified valley influence groundwater contamination through channelling of contaminants, which will carry them to the nearby streams and or wetlands identified.
- **Saddle:** Flat area between hills/ Summit, ground rises to 2 sides and descends on 2 sides. A saddle is not identified on the topology map as the is not summit on around the area.

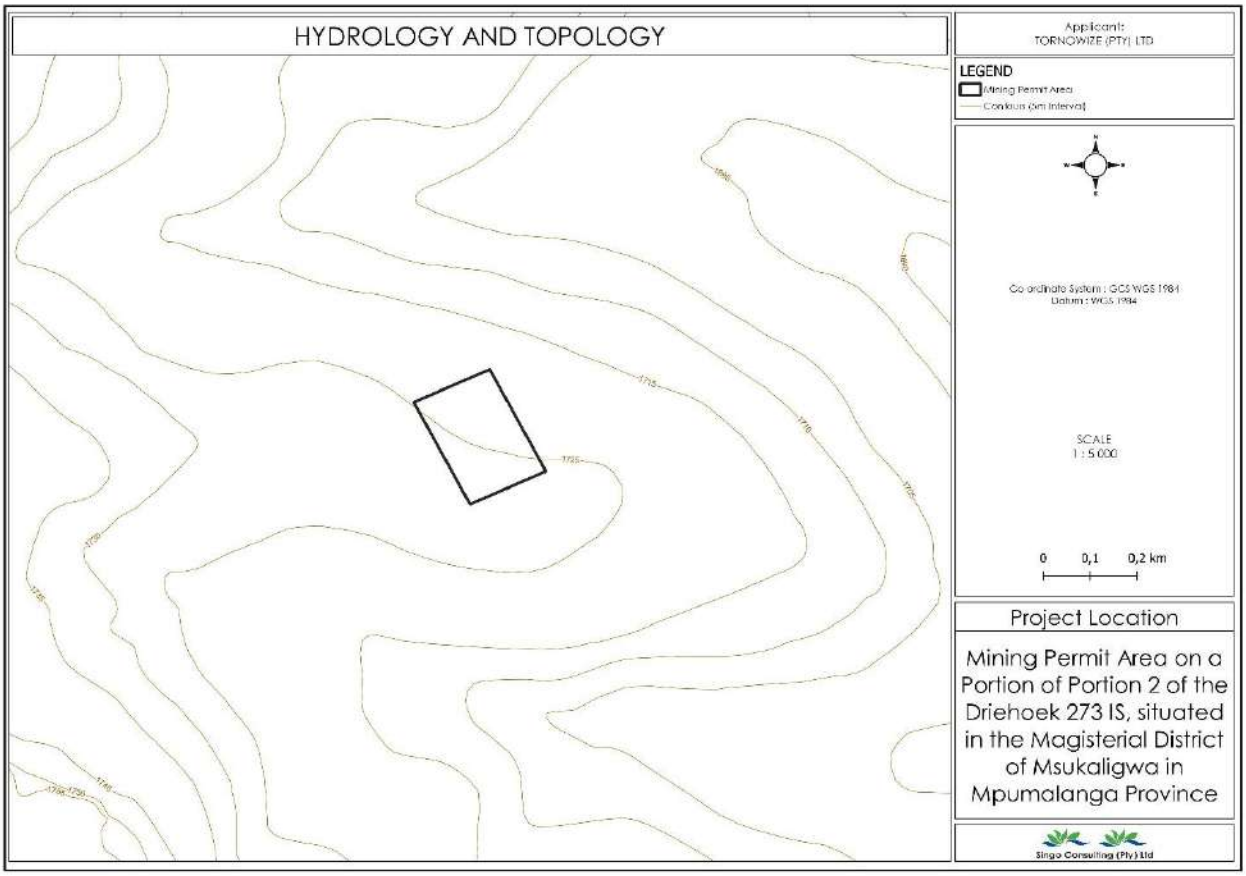

Figure 10: Topology map of the study area. (Singo Consulting, 2023)

<u>Drainage</u>

The hydrology surrounding the proposed area is of vital importance. In this context hydrology is all the surface waters appearing within and nearby the proposed project area, where a potential to be impacted upon by the project existence. The hydrology map as seen on Figure 12, illustrates that the following water bodies exists nearby the project area:

- **Channeled Valley Bottom wetlands:** Channelled valley bottom wetlands are linear fluvial, net depositional valley bottom surfaces which have a straight channel with flow on a permanent, seasonal, or ephemeral/episodic basis (Rountree, Todd, Kleynhans, et al, 2007: iv). A channelled valley bottom wetland was identified, the wetland is shown in the north-eastern direction of the study area covering the perennial river at an elevation of 1690 and 1695 mamsl.
- **Non-perennial:** non-Perennial rivers are rivers that flow seasonally, such as summer. The rivers flow from an area of higher elevation to an area of lower elevation. Non-perennial streams were identified at the north and southern parts of the project area, these non-perennial rivers are associated with valleys and they are found in all directions of the perennial river. They act as tributaries of the perennial river.
- **Perennial:** perennial rivers are rivers that flow all year round. The perennial river flowing from the northern direction towards the southern direction at an elevations of 1690 and 1695

mamsl, this perennial river connects with the non-perennial river which is flowing from the eastern direction towards southeastern direction.

- **Dam:** At the southern direction of the study area the is a dam. It is identified at an approximate elevation of 1600 mamsl.
- **Seep:** The seep wetlands are shown by red dotes within the hydrology map and are seen around the non-perennial rivers around the project area.

Drainage pattern in the study area

The drainage pattern observed within the study area is dendritic pattern.

- **Dendritic Pattern:** The dendritic pattern develops when the river channel follows the slope of the terrain often found in mountainous areas**.** It is the most common form of drainage pattern and looks like the branching pattern of a tree when joined by tributaries. The pattern is made by non-perennial rivers found within the proposed project area, it is most common along the boundary in the south-eastern direction, as seen on Figure 11.

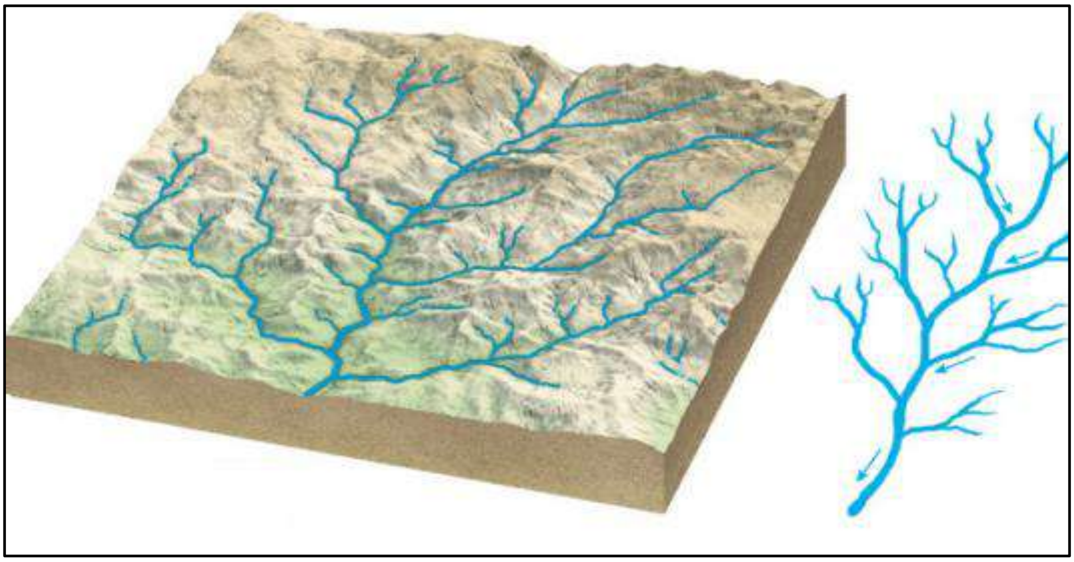

Figure 11: Drainage pattern.

The hydrology of the study area shows the presence of water bodies, once identified the project before it commences, the designing of the area will be influenced by the nearby waterbodies. These identified water bodies also recharge groundwater in that area.

There will be procedures and guidelines put in place for this project to avoid the risk of water contamination through nearby wetlands, and waterbodies, such as placing more mitigation measures to ensure that the waterbodies are not contaminated. However, given the fact that all the waterbodies and wetlands observed on the map are more than 500 m away from the proposed project, they will be no impacts occurring on the site. Operations should be carried out at the mining permit boundary only to prevent any contamination of the water bodies. As shown in Figure 13, the proposed mining permit project does not have any water bodies within and close to the boundary present within the project area.

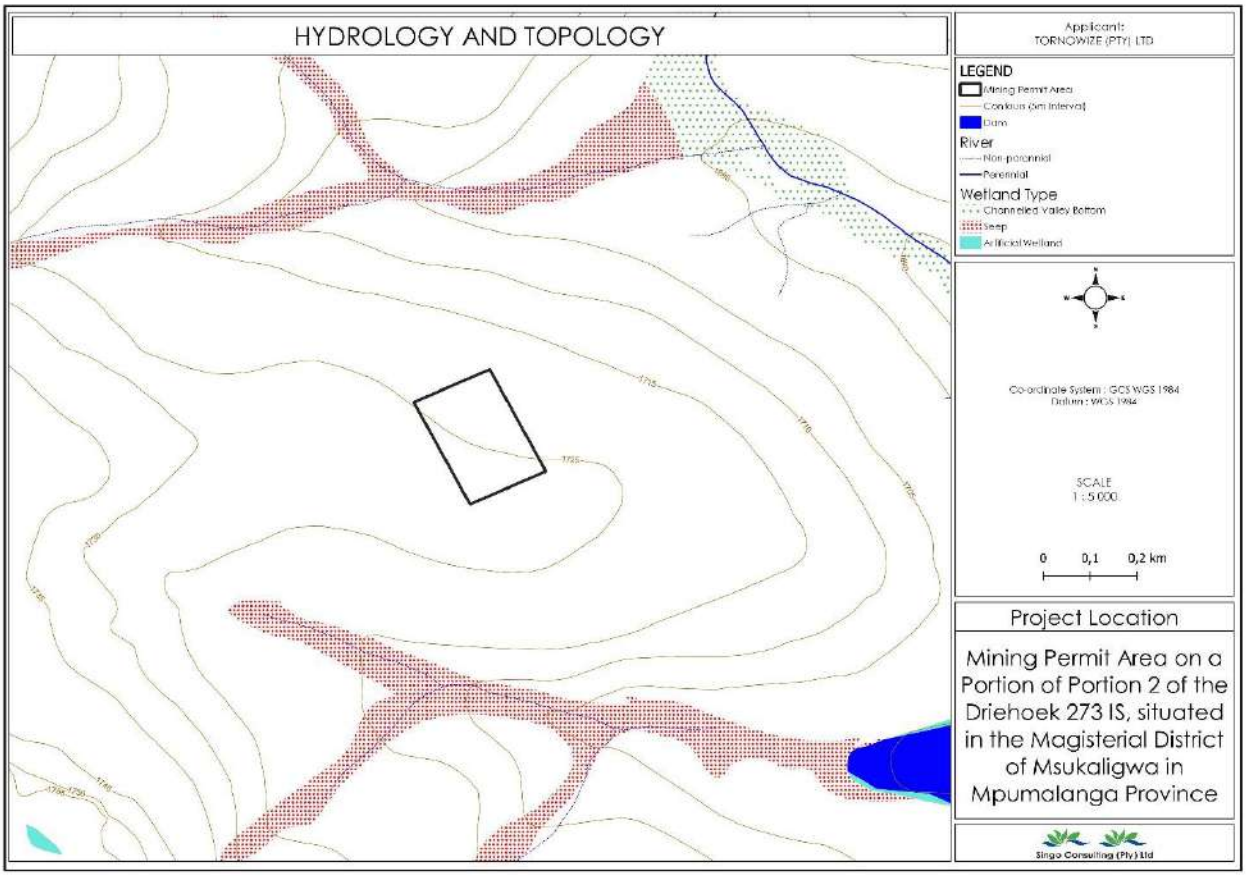

Figure 12: Drainage map of the study are. (Singo Consulting, 2023)

Figure 13:The overview of the proposed mining permit area. (Singo Consulting, 2023)

4.4. Catchment Information

The Olifants WMA is one of the most economically important WMAs in South Africa. Economic activity in the WMA is highly diverse and is characterised by mining, metallurgic activities, commercial agriculture, dry land and subsistence agriculture and eco-tourism. The economy of the WMA is largely driven by the mining sector, with large coal deposits found in the Emalahleni and Middelburg areas and large platinum group metal (PGM) deposits found in the Steelpoort and Phalaborwa areas (IUA, Delineation Report, 2011).

The proposed prospecting area falls within the Vaal Water Management Area (WMA) as shown on Figure 14 below, within quaternary catchments of C11F. The WRC 2012 study, presents hydrological parameters for each quaternary catchment including area, mean annual precipitation (MAP) and mean annual runoff (MAR), see table 2 for reference.

Table 2: WRC of 2012, Water management area, MAP and QC

Water management	Quaternary catchment	Catchment Area (km²)	MAP (mm)	MAR (mm)	Evaporation Zone
Vaal	C11F	929.1	704.7	60.5	2D

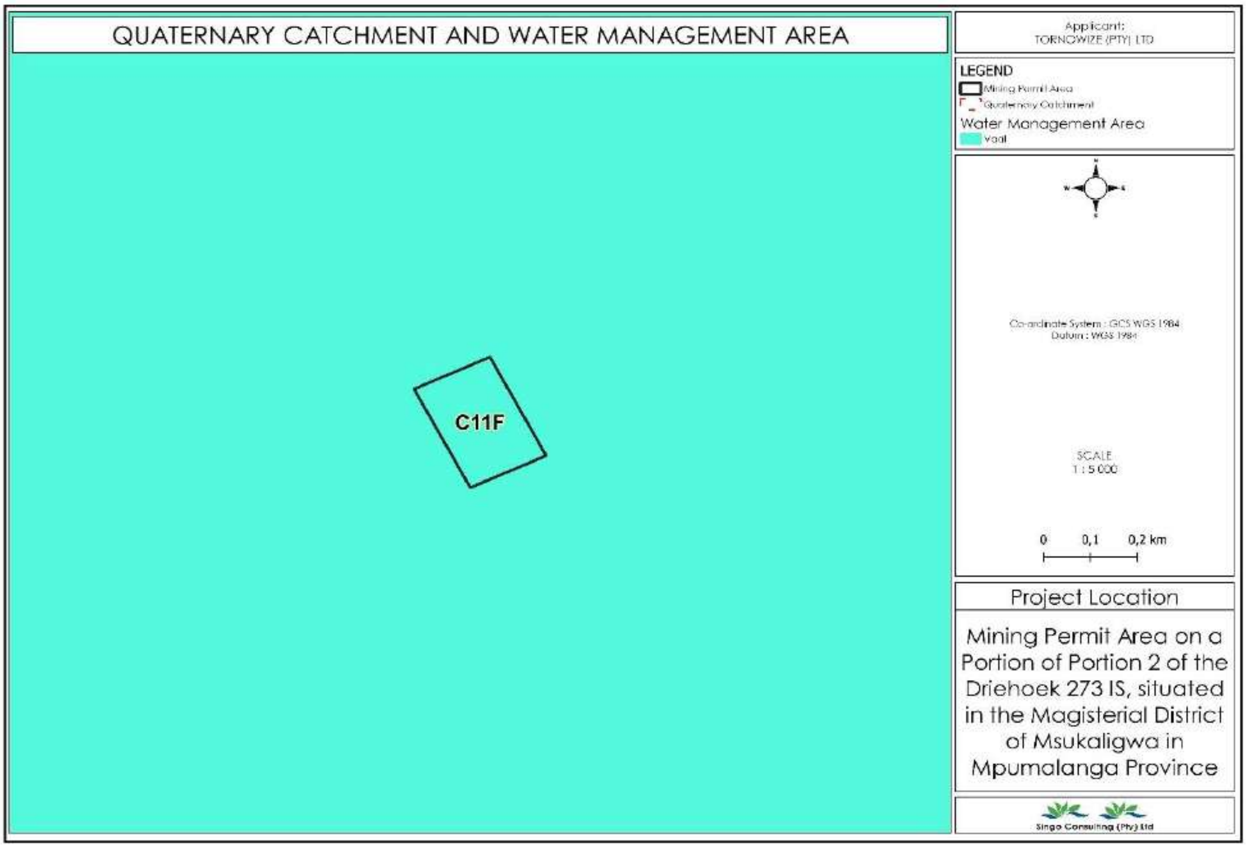

Figure 14: Quaternary catchment in the study area. (Singo Consulting, 2023)

4.5. Geology

The study of groundwater incorporates both the fluid (water) and the medium through which it is flowing (rock, soil, or any other geological material). As such, it is necessary to understand the geology of the permit area in order to gain a better understanding of the aquifer type and flow of ground water.

Regional Geology

The main Karoo Supergroup basin covers over 50% of South Africa's surface and consists of five age-based groups, which show a change of depositional environment in time. These groups are the Dwyka (glacial), Ecca (shallow marine and coastal plain), Beaufort (non-marine fluvial), Stormberg (aeolian) and the volcanic Lebombo or Drakensberg groups (Johnson et al., 2006). The proposed project area falls within the Ermelo Coalfield which hosts thinner seams that are more sedimentological and structurally complex. Sediments of Vryheid and Dwyka formations underlay the area which was deposited on a glaciated Pre-Karoo basement consisting of Rooiberg felsites. The deposit is preserved as an outlier underlying the small hill known as Vlooikop, surrounded by strata of the Dwyka Group (mainly tillites and varved mudstones/shales).

The Dwyka Group

The Dwyka Formation is the oldest subunit of the Ecca Group and is composed of glacial deposits that were formed during the Late Carboniferous and Early Permian periods (Catuneanu *et al.,* 2005). The formation is characterized by thick sequences of sandstone, shale, and tillite, which were deposited by glaciers as they advanced and retreated over the southern African continent. The Dwyka Formation is an important source of diamonds in southern Africa, as many of the diamonds found in the region are believed to have originated from the erosion of kimberlite pipes that were exposed by the advancing glaciers.

Figure 15: Tillite rock of the Dwyka Formation (Catuneanu et al., 2005).

Ecca Group

In the 1970s several studies (Cadle, 1974; Hobday, 1973, 1978; Mathew, 1974; Van Vuuren and Cole, 1979) showed that the Ecca Group could be subdivided into several informal units based on the cyclic nature of the sedimentary fills. In 1980 the South African Committee for Stratigraphy (SACS, 1980) introduced a formal lithostratigraphic nomenclature for the Ecca Group in the northern, distal sector of the MKB, which replaced the previously used informal Lower, Middle and Upper subdivisions with the Pietermaritzburg Shale Formation, the Vryheid Formation, and the Volksrust Shale Formation.

In South Africa, based on the literature; only 19 coalfields are generally accepted which cover an area of approximately 9.7 million hectares (ha). The distinction between coalfields is based on geographic considerations and variations in the mode of sedimentation, origin, formation, distribution, and quality of the coals. (Hancox & Annette, 2014).

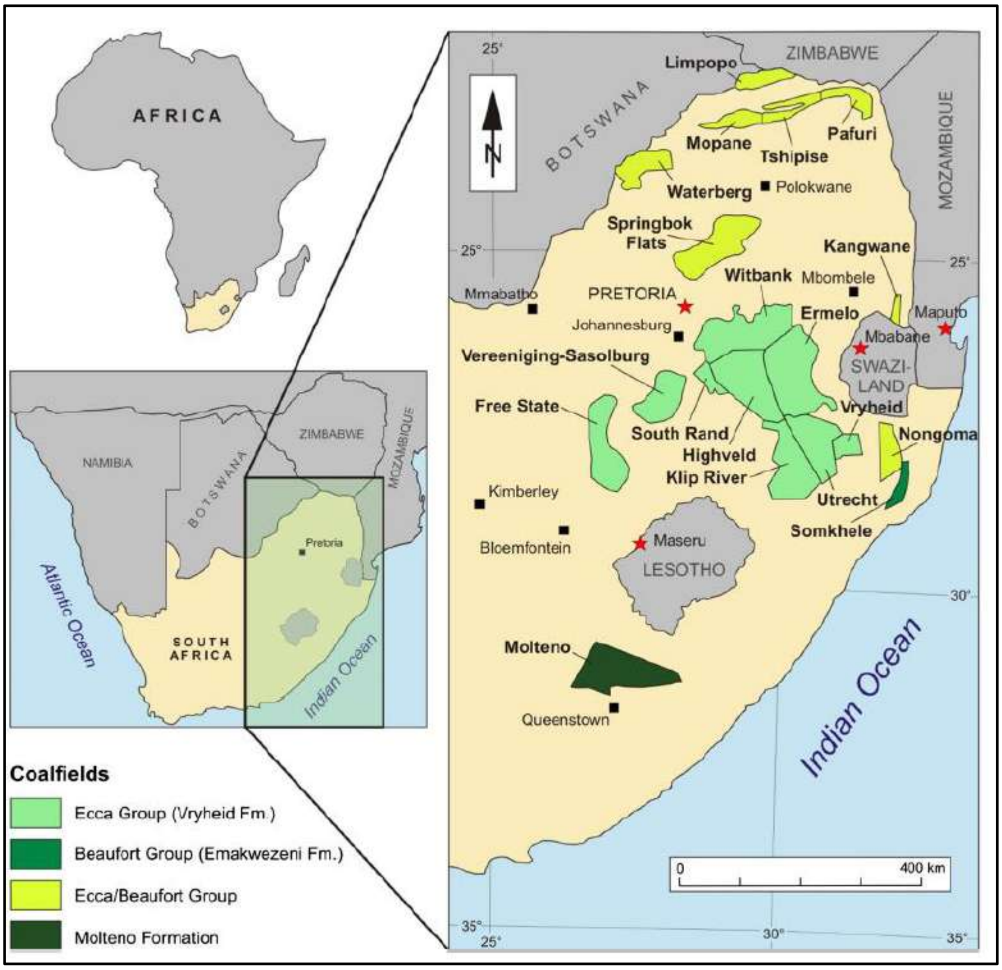

Figure 16: South Africa's Coalfields

Local Geology

The project area is overlain by the Vryheid formation of the Witbank Coalfields.

Witbank Coalfield

The Witbank Coalfield is elongated over 180 km in a west to east direction, it is not surprising that the basement to the Karoo Supergroup succession is varied. From west to east the basement rocks include metasedimentary, metavolcanic and dolomitic rocks of the Neoarchaean Transvaal Supergroup, metasedimentary and metavolcanic rocks of the Palaeoproterozoic Waterberg Group and BIC age intrusives (felsites and granites). The changing nature of the basement plays a major role in the nature of the palaeotopography created. For example, in the far east of the Witbank Coalfield, where dolomites of the Transvaal Supergroup form the basement, abnormally thick coals filling karst topography are known. A similar but more extreme case is documented at the Syferfontein Colliery in the West Rand outlier (Stuart-Williams,1986). In some areas close to the north-western basin margin, the stratigraphic column is reduced to only 80 m. It was also the focus of much of the academic research, including the works of Cairncross (1979) in the Van Dykes Drift area, Le Blanc Smith and Eriksson (1979) to the west of Witbank, and Holland et al. (1989) to the east of Witbank. Cadle and Cairncross (1993) described a sandy bedload dominated system with lateral accretion surfaces from the southern part of the central sector. More recently it has been covered in the regional geological model of Grodner (2002) and Grodner and Cairncross (2006) and various Competent Persons' Reports available on various companies' websites (Goldschmidt et al., 2010a).

Coal seams found in the Witbank Coalfield

- **No. 2 Seam**: The No. 2 Seam is one of the most economically significant coal seams in the Witbank Coalfield. It is known for its high-quality bituminous coal, which is suitable for various applications, including power generation and metallurgical processes.
- **No. 4 Seam**: The No. 4 Seam is another important coal seam in the Witbank Coalfield. It is characterized by its relatively high carbon content and good thermal properties. The coal from this seam is commonly used in power generation and industrial processes.
- **No. 5 Seam**: The No. 5 Seam is a notable coal seam that occurs in the Witbank Coalfield. It is generally thinner compared to other seams but still economically viable for mining. The coal from this seam is often used for power generation and industrial purposes.
- **No. 1 Seam**: The No. 1 Seam is a thinner coal seam found in the Witbank Coalfield. While it is not as extensively mined as some of the other seams, it still contributes to the overall coal production in the region.

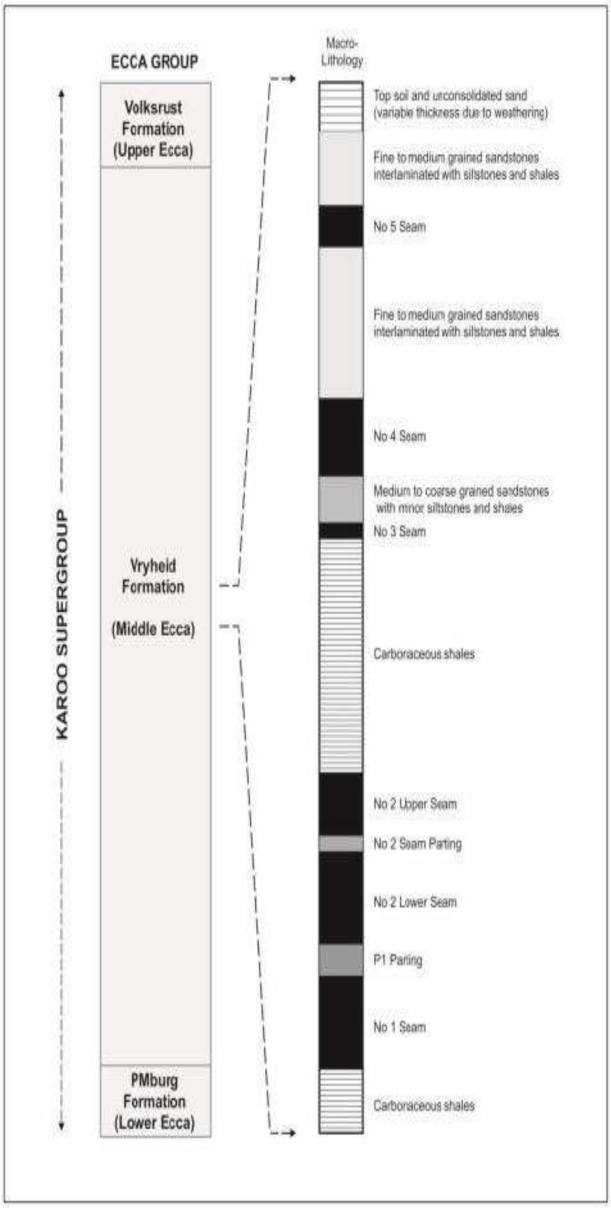

Figure 17: Typical stratigraphy of the Witbank coalfield.

Vryheid Formation

This formation has been subdivided into three different lithofacies arrangements. They are dominated by fine-grained mudstone, carbonaceous shale with alternating layers of bituminous coal seams, and coarse-grained, bioturbated immature sandstones respectively. The rock sediments are predominantly arranged in upward-coarsening cycles, although some fining-upward cycles are found in this formation's easternmost deposits. The alternating rock types observed in the Vryheid Formation indicate seasonal variations of storms and fairer weather in a pro-delta setting. The carbonaceous shales were formed below the water surface in anoxic conditions and the coal formed from compacted plant matter deposited at the bottom of peat swamps. These swamps formed on abandoned alluvial plains where stagnant water accumulated. The Vryheid Formation reaches a maximum of 1030m in Nongoma, KwaZulu-Natal, within the Nongoma Graben

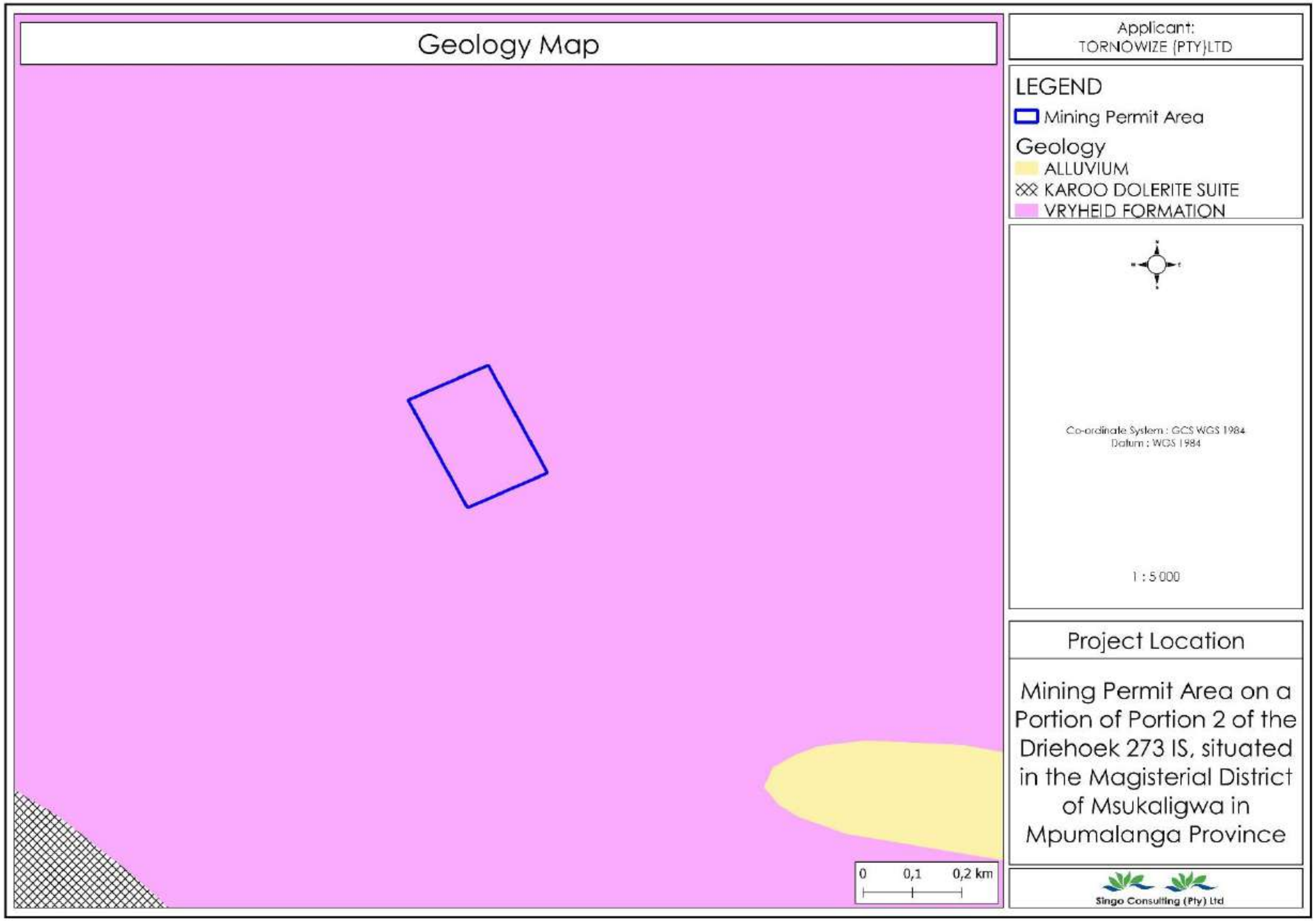

Figure 18: Geological formation map. (Singo Consulting, 2023)

5. AQUIFER CHARACTERIZATION

5.1. Groundwater vulnerability

Vulnerability of groundwater is a relative, non-measurable, dimensionless property (IAH, 1994). It is based on the concept that "some land areas are more vulnerable to groundwater contamination than others" (Vrba and Zaporozec 1994). The upper aquifer is associated with the weathered horizon. In boreholes, water may often be found at this horizon. The aquifer is recharged by rainfall. Rainfall that infiltrates into the weathered rock reaches impermeable layers of solid rock underneath the weathered zone. Water resources such as groundwater and surface water are in many cases threatened in terms of quality or quantity, this ranging from over abstraction to contamination. Water that recharges the aquifer must pass through many mediums, some of which pose a threat to that very same aquifer. Groundwater vulnerability depends on the following factors.

5.1.1. Depth to water table.

The data for the depth to groundwater map shown in the Figure 20 below was obtained from Department of Water Affairs and was derived from water level data for the National Groundwater Database (NGDB). The lower the depth to groundwater, the shorter the flow path for contaminants and this increases the potential for contamination of groundwater. In the study area, the depth to watertable is between 5 and 15 m as the project area falls on the yellow shaded area which is Mpumalanga Province.

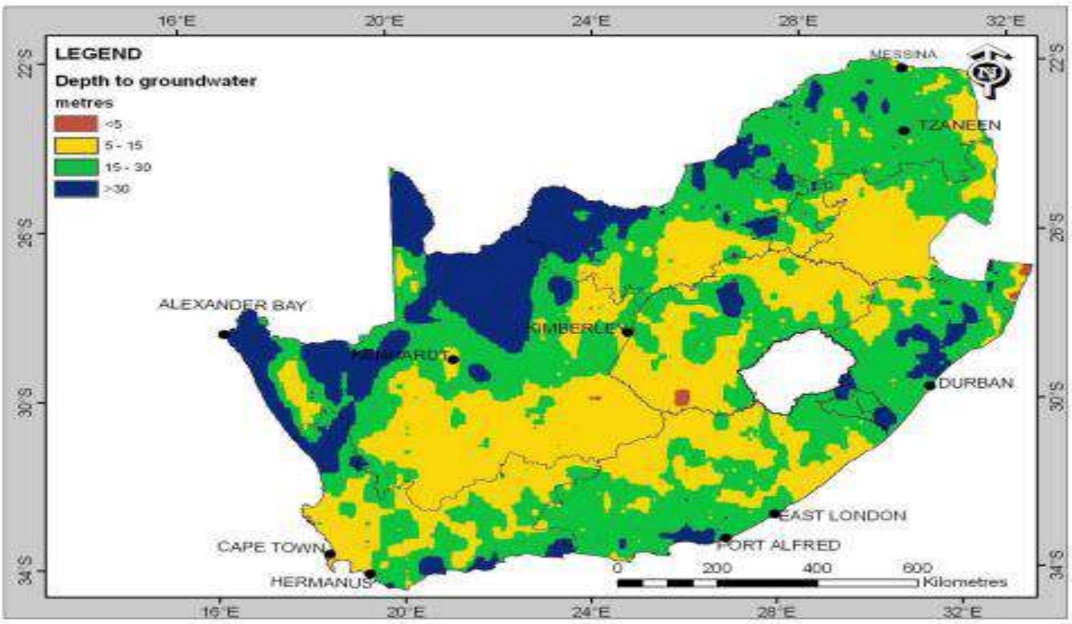

Figure 19: depth of groundwater across south African boreholes (CGS, 2011)

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5.1.2. Net recharge

Recharge is the principal vehicle for leaching and transporting solid or liquid contaminants to the water table (Aller et al., 1987).

5.1.3. Aquifer media

The type of aquifer affects groundwater vulnerability, the more fractured and the higher permeability of the rock, the higher the vulnerability. The 1:1 000 000 scale geological map of South Africa from the Council for Geoscience (Keyser, 1997) was grouped into different aquifer types (see Figure 21). The ratings and weights assigned to each aquifer. The study area falls under the intergranular and farctured aquifers, according to the council of geoscience map, its susceptibility is between 0.18 to 5.1 when compared with other aquifer types in south africa.

Table 3: showing the rating scale of aquifer vulnerability using Drastic Model (CGS, 2011).

Aquifer Media	Rate
Dolomite	5.1
Intergranular	2.24
Fractured	0.9
Fractured and weathered	0.18

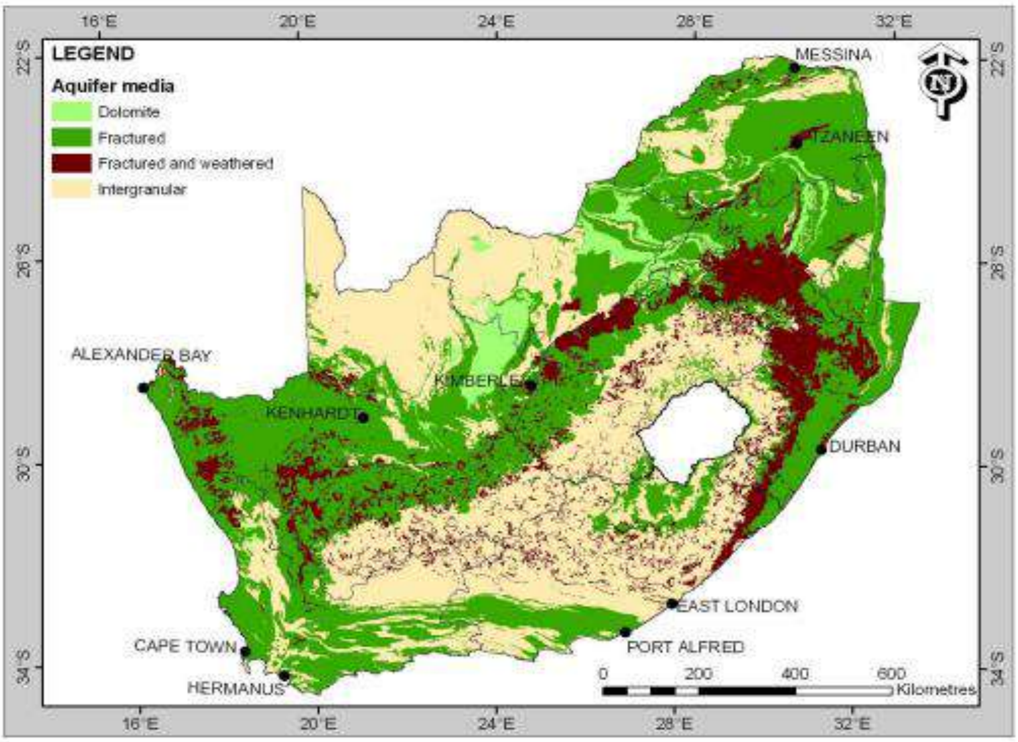

Figure 20: Showing the location of different aquifer types in south Africa (CGS, 2011)

5.1.4. Soil media

The soil media affects the vulnerability of groundwater to contamination. For example, soils with a high organic matter or high clay content lessen the potential for contamination when compared to soils with a low clay and organic matter content. Consequently, sandy soils are assigned a higher rating and weight than clay soils. The study area falls under Association of Classes 1 to 4: Undifferentiated structureless soils, which according to the rating on DRASTIC model is less susceptible to groundwater contamination.

5.1.5. Topography (slope)

In areas of shallow slope there is a greater chance of the pollution infiltrating the aquifer as opposed to areas of steep slope (where the pollutant is more likely to run off). The study area as seen on a topology map Figure 10 above, the slope is gentle, this increases the residence time of water or contaminants in an area, which promotes infiltration, increasing the likelihood of contamination. Knowledge in topography, the study area is surrounded by steep slopes, which influences run-off towards the mining permit area.

5.1.6. Impact of the vadose zone

The type of the vadose zone media affects the vulnerability of groundwater. This parameter involved the consideration of the properties of the aquifer including the soil porosity, the permeability, and the depth to water levels.

5.1.7. Land use

The land use has an effect of groundwater vulnerability. Irrigation water or agricultural chemical lead to the occurrence of non-point source pollution hence cultivated areas are assigned higher ratings than other land use classes. According to Merchant (1994) cited in Secunda *et al.,* 1998, extensive agriculture land use over prolonged periods of time at the same area can result in the altering of the soil colloidal nature and the degree of percolation through the soil matrix.

Areas with a high degree of human activity, i.e., built up urban areas have a high risk of soil and groundwater contamination (Meinardi et al., 1994). Mine and quarries, dongas and sheet erosion also significantly contribute to groundwater pollution. The area under study is to be used for mining, coal mining. Such activity makes the groundwater in the area more vulnerable to contamination with respect to the processes involved during mining activities.

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5.2. Groundwater Vulnerability Map

The figure below is showing different areas in South Africa with their respective groundwater vulnerability. The study area is situated in Mpumalanga, Emalahleni Magisterial district, and according to the figure below, it lies between Low (20-25) and Moderate (25-30). Mpumalanga is largely influenced by mining activities; it is because of that reason as to why certain area pose very high risk of contamination of groundwater contamination.

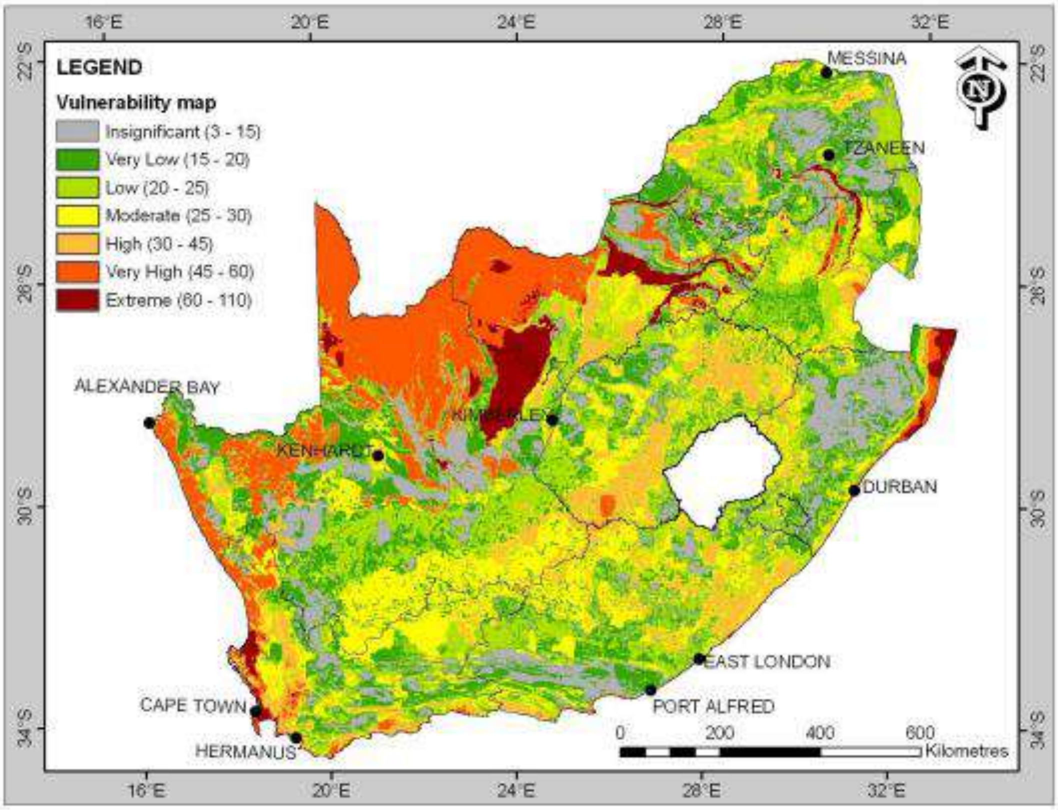

Figure 21: showing areas more vulnerable to groundwater contamination across South Africa, (CGS, 2011).

5.3. Aquifer classification

The figure below illustrates aquifer classification of different areas in South Africa. It can be deduced that the project area at magisterial district of Ermelo comprises of poor aquifers and the dominant water source is surface water. Table 6 interprets the meaning of the aquifer classification and when an area is said to have minor aquifer it means that the aquifer is low yielding or unacceptable quality aquifer.

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Table 4: Aquifer classification (Source:(Vegter & Seymour, , 2012))

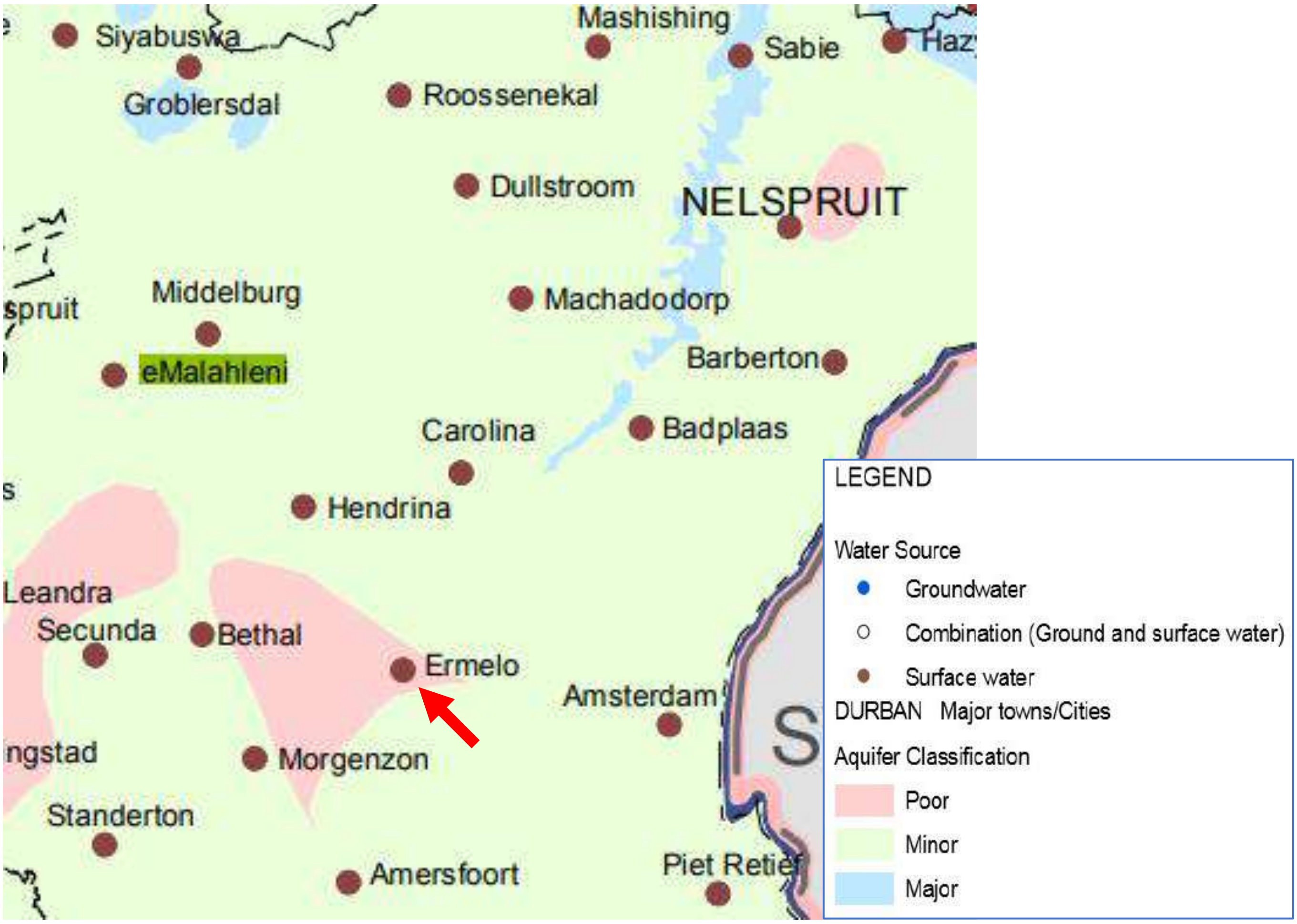

Table 5: Aquifer characterization

Sole source aquifer	An aquifer used to supply 50% or more of urban domestic water for a given area, for which there are no reasonably available alternative sources should this aquifer be impacted upon or depleted.
Major aquifer region	High-yielding aquifer of acceptable quality water.
Minor aquifer region	Moderately yielding aquifer of acceptable quality or high yielding aquifer of poor-quality water.
Poor aquifer region	Insignificantly yielding aquifer of good quality or moderately yielding aquifer of poor quality, or aquifer that will never be utilised for water supply and that will not contaminate other aquifers.

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5.4. Hydrogeology

Typically, five distinct aquifer types:

- Basement (fractured Achaean-Proterozoic igneous/ metamorphic)
- Hard rock (e.g., Table Mountain TMG, Waterberg, and Natal Groups sandstone; fractured)
- Karst/ dolomite (dissolution)
- Karoo (fractured and influenced by dykes)
- Porous (intergranular Quaternary alluvial, coastal, Aeolian and other surficial unconsolidated deposits)

The study area falls under the Karoo (fractured and influenced by dykes) and Bushveld Igneous Complex (BIC). For effective borehole yields, the boreholes must target the fracture zones in this area. Regional Groundwater Occurrence and Aquifers. Based on the geology within the study area, the structural geology, and the geomorphology, the following conditions can arise to enhance aquifer development within the study area:

- The fractured transition zone between weathered and fresh bedrock
- Fractures along contact zones between the host rocks due to heating and cooling of rocks involved with the intrusions
- Contact zones between sedimentary rocks of different types
- Interbed or bedding plane fracturing
- Openings on discontinuities formed by fracturing
- Faulting due to tectonic forces
- Stratigraphic unconformities
- Zones of deeper weathering
- Fractures related to tensional and decompressional stresses due to off-loading of overlying material
- Groundwater occurs within the joints, bedding planes and along dolerite contacts.

Groundwater potential is generally low in these rocks, with 87% of borehole yields < 3 l/s. The lithology sandstone makes up the fractured Ellisras aquifer. The pores of the geological units are generally strongly cemented, and fractured flow over secondary structures such as faults, bedding plane fractures, and so on is the primary flow mechanism. Due to the establishment of cooling joints, the intrusion of dolerite dykes and sills into the fractured aquifer has resulted in the formation of preferential flow routes along the contacts of these lithologies. The dykes may operate as permeable or semi-permeable barriers to prevent water from flowing across them.

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6. GROUNDWATER MODELLING

6.1. Software model choice

MODFLOW software is the chosen software to model groundwater flow and contaminant transport in this situation. The finite difference numerical model was created using the US Department of Defence Groundwater Modelling System (GMS9.2) as Graphical User Interface (GUI) for the well-established MODFLOW and MT3DMS numerical codes.

MODFLOW is a 3D, cell-centred, finite difference, saturated flow model developed by the United States Geological Survey. MODFLOW can perform both steady state and transient analyses and has a wide variety of boundary conditions and input options. It was developed by McDonald and Harbaugh of the US Geological Survey in 1984 and underwent eight overall updates since. The latest update (MODFLOW-NWT) incorporates several improvements extending its capabilities considerably, the most important being the introduction of the Newton formulation of MODFLOW. This dramatically improved the handling of dry cells that has been a problematic issue in MODFLOW in the past.

MT3DMS is a 3-D model for the simulation of advection, dispersion, and chemical reactions of dissolved constituents in groundwater systems. MT3DMS uses a modular structure like the structure utilized by MODFLOW and is used in conjunction with MODFLOW in a two-step flow and transport simulation. Heads are computed by MODFLOW during the flow simulation and utilized by MT3DMS as the flow field for the transport portion of the simulation.

Elevation data is crucial for developing a credible numerical model, as the groundwater table in its natural state tends to follow topography. The best currently available elevation data is derived from the SRTM (Shuttle Radar Tomography Mission) DEM (Digital Elevation Model) data. The SRTM consisted of a specially modified radar system that flew on board the Space Shuttle Endeavour during an 11-day mission in February of 2000, during which elevation data was obtained on a near-global scale to generate the most complete high-resolution digital topographic database of Earth. Data is available on a grid of 30 meters in the USA and 90 meters in all other areas.

6.2. Model set-up and boundaries

During model setup, the conceptual model is translated into a numerical model. This stage entails selecting the model domain, defining the model boundary conditions, discretizing the data spatially and over time, defining the initial conditions, selecting the aquifer type, and

preparing the model input data. The above conditions together with the input data are used to simulate the groundwater flow in the model domain for pre steady state conditions.

6.3. Overview of the Problem

An aquifer system with one stratigraphic unit is bounded by no-flow boundaries on the West and East sides, which are in full hydraulic contact with the aquifer. The hydraulic heads on the west and east boundaries are 10m and 5m above reference level, respectively.

The aquifer system is unconfined and anisotropic. The horizontal hydraulic conductivities of the first stratigraphic units are 0.0001 m/s. Vertical hydraulic conductivity is assumed to be 10 percent of the horizontal hydraulic conductivity. The effective porosity is 25 percent. The elevation of the ground surface is 30m. A constant recharge rate is applied to the aquifer.

A numerical model must be developed for this site to calculate groundwater flow field; we will use MT3D to simulate the contaminant transport. To demonstrate the use of the transport models, we assume that the pollutant is dissolved into groundwater at a rate of 1×10^{-4} μg/s/m2. The initial concentration, molecular diffusion coefficient, and decay rate are assumed to be zero. We will calculate the concentration distribution after a simulation time of 10,50,100 and 500 years.

6.4. Groundwater sources and sinks

The conceptual model was transformed into a numerical model following the characterization of the aquifers, contaminant sources and groundwater receptors, so that the groundwater flow conditions, and mass transport can be solved numerically. A conceptual model is a simplified, but representative description of the groundwater system that illustrates the interaction of the sources, pathways, and receptors at the site.

The SPR conceptual model was first used in the field of environmental engineering in the late 1970"s to describe the flow of environmental pollutants from a source, through different pathways to potential receptors (Holdgate, 1979). Since then, the model has been used in several environmental risk assessments (e.g., Environment Agency, 2004, Scottish Government, 2010, Sneddon et al., 2009).

Source - The origin of a hazard (for example, Construction phase, operational phase, Decommissioning phase, and post closure phase).

Pathway - Route that a hazard takes to reach Receptors. A pathway must exist for a Hazard to be realized.

Receptor - Receptor refers to the entity that may be harmed (a person, property, habitat etc.). For example, in the event of construction *(the source)* TPH may propagate through the soil *(the* pathway*)* and reach groundwater *(*the receptor*)* that may suffer degrade its quality.

The figure below outlines the sources, pathways, and receptors of the proposed development throughout its phases, ranging from construction to operational phase.

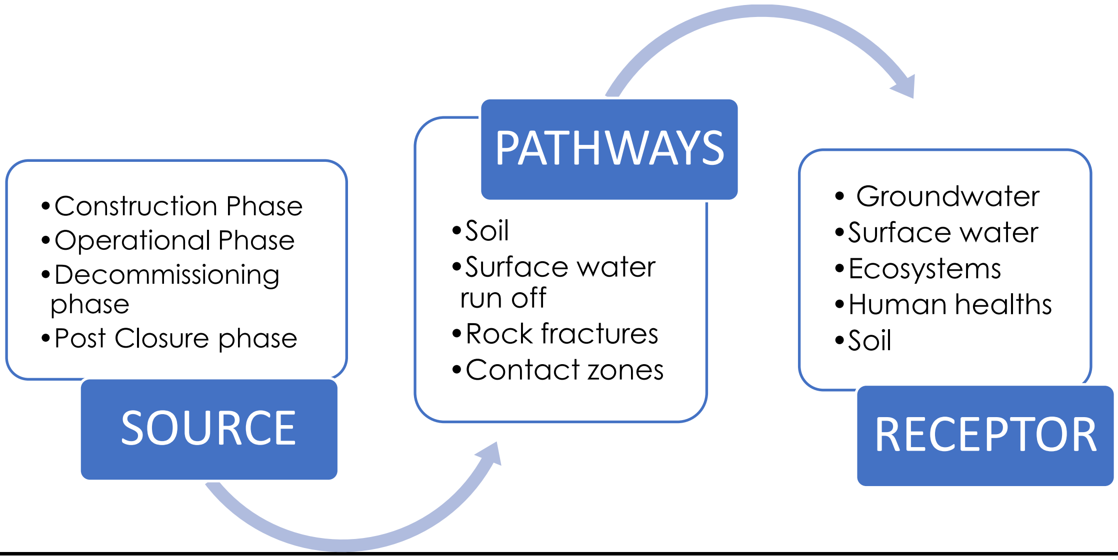

Figure 22: SPR Model for the proposed mining activity.

Risk to groundwater is high if the source of pollution is in contact with the aquifer with no mitigation plans in place.

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7. IMPACT ASSESSMENT

The impacts to groundwater quantity and quality for the development of the mining permit can be discussed according to the different phases. These phases include construction, operational and decommissioning phases.

7.1. Construction phase

7.1.1. Impacts on groundwater quantity.

- The establishment of hard paved areas during infrastructure construction and haul road construction reduces the recharge of aquifers due to increased runoff.
- The establishment of the opencast areas is expected to have a negative effect on the surrounding aquifers within the immediate area which can cause lowering of water levels on neighbouring boreholes.
- Dewatering of groundwater in certain areas during the construction phase also leads to reduction in groundwater quantity in the area.
- Substantial amount of groundwater will be used during construction phase of tailings dam, and other infrastructures such as buildings.
- Streams may need to be diverted, to create way or to prevent pollution. Surface water recharges groundwater, their absence in an area also decreases the quantity of groundwater.

7.1.2. Impacts on groundwater quality.

- During Construction phase, trucks and other vehicles on site will have to be fuelled, leaks during such process has the potential for causing contamination of surface water and groundwater.
- The operation of offices, ablutions and maintenance workshops has the potential for the contamination of groundwater due to incorrect disposal of domestic and hazardous wastes, incorrect handling of workshop effluent spills and leaks.
- The use of nitrate-based explosives during blasting for the establishment of the opencast areas has the potential to cause surface water pollution due to the addition of nitrates to water.
- Blasting has the potential to contaminate water as well in the sense that the vibrations caused could fracture the neighbouring aquifers, and cause migration of wastewater to mix with freshwater.

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- During the construction phase, a lot of metals is used which often results, metal scraps when exposed to water and oxygen could lead to iron oxide, which could infiltrate into soils and ultimately contaminate groundwater and surface water. And disposal of other wastes is high, which could end up in river streams, and contaminate groundwater.

7.1.3. Groundwater management

- Frequent monitoring of spills, which include petrol, diesel, and oils, to quickly clean up.
- Proper management of stormwater drainage infrastructure should be ensured.
- Vehicle repairs on site should be minimized, and when done, it should be on a hard standing surface.
- Regular monitoring of groundwater, for quantity and quality with the use of boreholes as per the WUL and approved monitoring programme.
- Spill kits will be made available in areas of likely spillage.
- All hydrocarbon storage containers will be stored within a bunded areas which are watertight and able to contain 110% of the stored volume.
- All around the site, there should be availability of metal industrial bins, which should be frequently emptied, to avoid overflow of waste.

7.2. Operational phase

7.2.1. Impacts on Groundwater quantity.

Once the mine begins operations, below impacts on groundwater quantity can be envisioned.

- The constant movement of trucks, this hardens the surface, which in turn decreases the amount of infiltration and increase run-off in that area.
- There will be regular inflow into the pit through the rock fractures and other geologic features, this water will be pumped out of the pit and discharged somewhere it wasn't.
- The exploitation of the resource still requires the use of blasting, this could still impact the groundwater quantity by creating fissures and migration of groundwater from one area to the other.
- The processing method of coal uses a lot of water as well, such as cooling at the plant and dust suppression at the site uses an extensive amount of groundwater, this is seen by decrease in hydraulic head at the surrounding boreholes.
- Coal washing also will be a huge factor with groundwater reduction in quantity.
- Dust suppression requires a significant amount of water.

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7.2.2. Impacts on groundwater quality

- The spillage of ammonium nitrate-based explosives during charging of holes, misfires and incomplete combustion of explosives may lead to an increase in nitrate levels in groundwater.
- The operation of the fuel and lubricants storage facility has the potential for causing contamination of groundwater due to either an infrastructure failure (emergency) or spillages during normal operation.
- Included in normal operation is the potential for the incorrect disposal of spill absorbing material.
- AMD formation from spoil piles, exposed shale and backfilled spoils and discard in rehabilitated areas will affect groundwater quality through the acidification of groundwater and the leaching of salts and heavy metals from rock.
- Depending on the buffering capacity of the host rock, AMD will either result in the formation of low pH, high dissolved salt, and heavy metal content water (insufficient buffering capacity) or the formation of neutral pH, high salt (including sodium) water, if high buffering capacity exists.
- During the operation stage, mining of coal is associated with sulphur, the reaction of sulphur with water and oxygen lead to acid rock drainage, also called yellow boy.

7.2.3. Impacts on surface water

- Impact on water quality and erosion because of the pipeline breaking and spillage to the nearby wetland and perennial river.
- Pump failure will result in dirty water accumulation in the pit, leading to uncontrolled dirty water management and associated pollution.
- Impact on water quality and availability as a result in ineffective dirty water separation, and dirty water entering the wetland.
- High rate of ground water ingress causing flooding of the pit.
- The rainfall water within the designated dirty water area of the pit area that forms part of the MAR to the local water courses will be removed from the catchment. This will result in a lower intensity potential on the local surface water resource.
- Increase in volume of contaminated water that needs to be managed within the footprint.
- Erosion of stream banks because of crossings and diversions leading to siltation of the streams.

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- Impacts on surface water resources quality because of incorrect waste management practices and pollution.
- During the operation of the mine, waste within the mining permit area is likely to increase, contributing to land pollution, which will end up in the streams contaminating the water.

7.2.4. Groundwater management

- All spillages will need to be cleaned up as soon as practically possible.
- Proper management of stormwater drainage infrastructure should be ensured.
- Maintain construction vehicles and encourage contractors to report, react and manage all spills and leaks so that action can be taken to immediately minimise contamination to the groundwater.
- Groundwater monitoring of boreholes should continue as per the WUL and approved monitoring programme.
- Spill kits will be made available in areas of likely spillage.
- All hydrocarbon storage containers will be stored within bunded areas which are watertight and able to contain 11% of the stored volume.
- All equipment utilising hydrocarbons will be stored on a hard standing surface.
- Grouting and capping of boreholes located within the footprint of construction camps be required prior to construction activities.
- Treat the water emanating for the opencasts to increase the decant water quality.
- Dust suppression should be done using already used water, but not polluted water that could lead to groundwater contamination.

7.3. Decommissioning phase

The mining permit area is 5 ha and the potential contaminants are relatively low but can have a long-term adverse effect on the environment. The quality of groundwater will be impacted upon the ceasing of the mining operations, the following impacts are envisioned with respect to coal mining:

- Erosion of the exposed material, such material could end up in the nearing river, this could degrade the water quality of groundwater through infiltration and surface water.
- The mining area might produce a seepage zone or decant as the recharge to opencast workings have increased by the disturbance of the strata.
- Infrastructures no longer maintained, this could lead to rusting of the metals, which could hinder the quality of water resources.

- Acid Rock Drainage, coal mining is associated with the exposing of sulphur, the reaction of water, sulphur and oxygen leads to ARD which contaminates the water resources.

Mitigation Measures.

- As soon as mining ceases, the mined-out areas should be rehabilitated to avoid the risk of ARD.
- Legislations pertaining to mining, Water, and environment should be abided by.
- Frequent monitoring should be applied.

7.4. Post-mining phase

7.4.1.Groundwater quality

Once the operation of mining stop, the area now in most cases and as instructed by the relevant legislations, will be rehabilitated to an acceptable state. The following impacts are envisioned:

- AMD, upon mining, the area will no longer be maintained, rainfall will fill the open areas if there are any, and exposed or harmful minerals will be dissolved, which will contaminate surface and groundwater and the resulting wastewater is called Acid Mine Drainage.
- ARD, this is usually associated with coal mining since coal contains sulphur. Exposed sulphur reacts with water and oxygen. In most mines, overburden is not returned to where it was, this could expose sulphur to oxygen and water.
- Metal structures no longer in good condition, the metals are likely to rust, which will contaminate the soil and the water resources (Groundwater and surface water).
- The ablution facilities will no longer be maintained, rainfall is likely to wash the waste to the nearby streams or rusting of the sewage pipes.

7.4.2. Cumulative impacts

The cumulative impacts due to the proposed mining could be of a quantitative and qualitative nature. The aquifers within the region are classified as minor aquifer systems and their main function is a domestic water supply source as well as supplying base flow to the surface water environment. This will result in a positive impact locally and could see the importance of groundwater increasing as a potential source within the catchment.

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However, the water quality within the workings could be good or deteriorate depending on the geochemical characteristics of the material. This could in turn result in surface water users being put under pressure should the decant water quality lead to the deterioration of surface water resources in the catchment. The cumulative impact on the catchment will have to be considered for mining, agriculture and the remainder of the current surface and groundwater uses in the Emalahleni municipal area.

The regional hydrological setting of the project site is indicated in Figure 21. The project area is in the Olifants Management Area (OWMA). The quaternary catchment is C11F. The WR2012 study, presents hydrological parameters for each quaternary catchment including area, mean annual precipitation (MAP) and mean annual runoff (MAR).

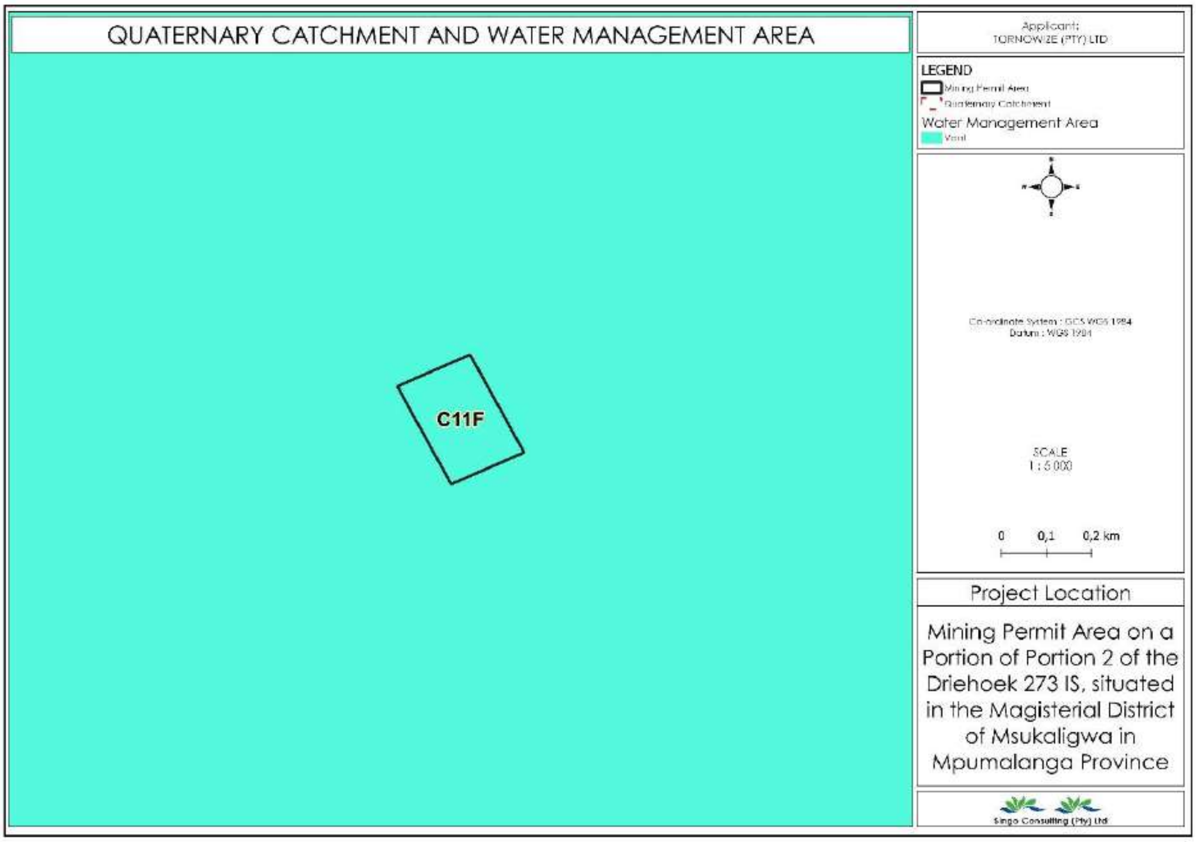

Figure 23: Quaternary Catchments and Water Management Area Map. (Singo Consulting, 2023)

7.5. Impact assessment and mitigation measures table

Severity of impact	RATING	Spatial scope of impact	RATING	Duration of Impact	RATING	Frequency of Activity	RATING	Frequency of Impact	RATING
Insignificant/ non-harmful	1	Activity specific	1	1 day to 1 month	1	Annually or less/ low 6	1	Almost never/ almost impossible	1
Small / potential harmful	2	Mine specific (within the mine boundary)	2	1 month to 1 year	2	Monthly/temporary	2	Very seldom/ highly unlikely	2
Significant/ Slightly harmful	3	Local area (within 5km of the mine boundary)	3	1 year to 10 years	3	Monthly/ Infrequent	3	Infrequent/ unlikely/ seldom	3
harmful	4	Regional	4	Operational life	4	Weekly/life operation/regularly/likely	4	Often/ regularly/ likely/ possible	4
extremely harmful	5	National	5	Post-closure/ Permanent	5	Daily/ permanent/high	5	Daily/ highly likely/ definitely	5

<u>The Environmental Significance is derived from the below mentioned variables:</u>

Severity (Magnitude) Of Impact **(M)**

Spatial Scope **(S)**

Duration of Impact **(D)**

Frequency of Activity **(Fa)**

Frequency of Impact **(Fi)**

Environmental Significance = (Severity of Impact +Spatial Scope + Duration of Scope) X (Frequency of Activity +Frequency Of impact)

SP= (M+S+D) x (FA+ FI)

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7.6. Significance Rating Matrix

(Severity(M) + Spatial scope(S) + Duration(D))

Frequency Of Activity (Fa) + Frequency Of Impact (Fi)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

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Table 6: Impact assessment and mitigation measures table

	Potential environmental impact	Environmental significance before mitigation							Recommended measures/remarks for mitigation	Environmental significance after mitigation						
OPERATIONAL PHASE IMPACTS		M	S	D	Fa	Fi	total	SP		M	S	D	Fa	Fi	total	SP
	Increased groundwater contamination potential due to overburdened stockpiles.								1. Use lining system before stockpiling the overburden, as recommended by the waste classification study of the project area (for e.g geomembrane lining)	1	2	3	4	2	36	
		4	2	3	4	4	72		2. Lined Dirty Water Trenches will be erected around the stockpiling area, directing to the pollution control dam	1	2	2	1	2	15	
									3. Monthly Environmental audits will be conducted (to monitor the compaction, life of the soil, alien invasion and erosion)	1	2	2	4	2	30	

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	Fuel & hydrocarbon spills from cars can lead to contamination of ground water	4	2	4	4	4	80		Have spill trays and absorbent spill kits. Workshops and diesel bays should be lined with clay/ concrete slab. An emergency response contingency plan should be put in place to address clean-up measures should a spill/ leak occur.	2	2	3	4	2	42	
	Borehole / aquifer reduc tion outcomes from pit d ewatering	3	3	4	4	4	80		Avoid pumping/ dewatering amounts of water higher than the regulated accepted amount to prevent cone of depression. Increase groundwater recharge by having vegetation, avoiding steep slopes and excess runoff. Authorising all production boreholes within the mine in terms of section 21, of the NWA 36, 1998.	2	2	4	3	2	40	

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	Surface and groundwater quality may be impacted by acid mine drainage potential	5	3	5	4	4	104		Dams to regulate pollution must be lined and intended to meet the requirements of NEMA and NWA (Act 36 of 1998). Manage any leaks and spills to avoid contamination of groundwater. Monitor groundwater to detect contamination of groundwater. Neutralize water stored in the PCD with lime before using for dust suppression. Conduct AMD treatment either using passive or active methods.	3	2	3	4	3	56	
	Open cast mining will result in pit inflows which can results in flooding within the mine workings	4	2	2	4	4	64		Conduct pitwater dewatering frequently to the pollution control dam. Use this water to conduct dust suppression within the mine.	2	2	2	4	2	36	
	Ablution facilities leakages	4	3	4	4	4	88		Mobile ablution facilities will be utilized, and will be serviced twice weekly by a service provider	2	2	1	4	2	30	

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	Diversion of water resources during processing. (e.g stream diversion/impeding)	4	4	5	5	4	117		Apply for a water use licence, as section 21 c and I of the NWA, 36 1998, is triggered.	3	2	5	5	4	90	
POST CLOSURE IMPACTS	Contribution of salt load towards the closest river	4	3	5	5	3	96		1.NaCl concentration monitoring in both surface and groundwater to detect increase of this concentration in time. Ensure proper rehabilitation of materials after mining	2	3	5	1	3	40	
	Mine Decanting, potential decant points will be identified within the mine boundries.	5	3	5	5	5	130		Ensure proper rehabilitation of the mine especially the identified decant point. Monitor decant points regulary. Aensure the Artesion wells, if any are well cased and capped.	2	2	5	3	2	45	
	Aquifer contamination due to backfill	4	3	5	3	2	60		Monitor the rehabilitated area post-closure. Ensure the mine pits are lined and backfilled with materials that are declared not acidic.	2	2	5	2	2	36	

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8. GROUNDWATER MONITORING PLAN

Groundwater management strategies for most mining activities are limited, and emphasis is mostly on pollution prevention rather than on treatment. Early detection of contamination is the key to react and effectively manage any possible sources of pollution. This will assist in identifying potential future impacts from mining operations on the groundwater environment.

8.1. Groundwater monitoring system

8.1.1.System response monitoring network

Groundwater contamination

Groundwater levels and quality may be recorded on monthly basis. Water levels can be measured using an electrical contact tape or pressure transducer to detect any changes or trends in groundwater flow direction. Contamination from the coal stockpile and other surface infrastructure (pollution control dams, water balancing dams, etc) can contaminate the underlying aquifers.

To prevent contaminants from seeping into the underlying aquifers, surface infrastructures such as pollution control dams must be fully sized and lined according to the engineering designs and normal practices. The proposed monitoring boreholes should be constructed to monitor groundwater levels and quality changes close to the pollution control dams, opencast pit, discard dump, and plant area, and around the mining area where the contamination plume is flowing to.

8.2. Sampling Methods and Preservation

Required apparatus:

- Plastic bottles (1L)
- Glass bottles
- Dip meter
- Steel bailer
- Cooler box
- EC and Ph meter
- Marking pens

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Methods and preservation

One litre plastic bottle with unlined plastic caps is required for most sampling exercises; however, in cases where organic constituents are to be tested for, glass bottles are required. Sample bottles must be marked clearly with the borehole name, date of sampling, water level depth and the sampler's name. Water levels (mbgl) should be measured prior to taking the sample, using a dip meter. Purging must be done on each borehole that needs to be sampled, this is to ensure sampling of the aquifer and not stagnant water in the casing. Purging is done using a submersible pump or a clean disposable polyethylene bailer in the event of a small diameter borehole. During purging and continuous water quality monitoring, at least three borehole volumes of water should be removed until the electrical conductivity value stabilizes. Metal samples must be filtered in the field to remove clay suspensions. The pH and EC meter used for field measurements should be calibrated daily using standard solutions obtained from the instrument supplier. Samples should be kept cool in a cooler box in the field and kept cool prior to being submitted to the laboratory to maintain proper preservation thereof.

Sampling Locations

The main objectives in positioning the monitoring boreholes are to:

- Monitoring of groundwater migrating away from the pit area and
- Monitoring the lowering of the water table and the radius of influence

8.3. Data Management

Good hydrogeological decisions require sound information developed from raw data. The production of good, relevant, and timely information is the key to achieving qualified long-term and short-term plans. It is necessary to utilize all relevant groundwater data to minimize groundwater contamination. Monitoring results will be captured in an electronic database as soon as results become available, which allows for:

Data presentation in tabular format,

- Time-series graphs with comparison abilities,
- Graphical presentation of statistics,
- Presentation of data, statistics and performance on diagrams and maps,
- Comparison and compliance to legal and best practice water quality standards.

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8.4. Monitoring frequency

Drastic changes in groundwater composition are not normally detected within days, as groundwater is a slow-moving medium; therefore, groundwater monitoring should be conducted monthly. Samples should be collected by an independent groundwater consultant, using the stipulated best practice guidelines, and should be analysed by a SANAS accredited laboratory. Groundwater levels must be recorded within an accuracy of 0.1m on a quarterly basis, using an electrical contact tape, float mechanism or pressure transducer to detect any changes or trends in the groundwater levels.

9.5 Monitoring parameters

Table 7: Groundwater monitoring

Class	Parameter	Frequency	Motivation
Physical	Static groundwater levels	Monthly	Time dependent data is required for transient calibration of numerical flow models. Changes in static water levels may give early warnings of dewatering in the area.
	Rainfall	Daily	Recharge to the saturated zone is an important parameter for assessing groundwater vulnerability. Time dependent data is required for transient calibration of numerical flow models.
	Groundwater abstraction rates (if present)	Monthly	Response of groundwater levels to abstraction rates can be used to calculate aquifer storativity, which is important for groundwater management.

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Chemical	Major chemical parameters: Ca, Mg, Na, K, NO3, SO4, Cl, Fe, Alkalinity, pH, EC TPH (Total Petroleum Hydrocarbons)	Monthly	Background information is crucial to assess impacts during and after operations. Changes in chemical composition may indicate areas of groundwater contamination and can be used as an early warning system to implement management/remedial actions. Legal requirement. Groundwater chemistry forms an integral part of the development of conceptual models.
	Minor chemical constituents Full scan of trace metals	Monthly	Changes in chemical composition may indicate areas of groundwater contamination and can be used as an early warning system to implement management/remedial actions. Legal requirement
	Other Stable isotopes	Ad-hoc basis	The monitoring program should allow for research and refinement of the conceptual geohydrological model. This may, from time to time, require special analyses like stable isotopes (O^{18}/O^{16}, H)

8.5. Reporting

Based on the recorded water quality data, the data management functions will be carried out and reported to the mine management monthly. The contents of the report should include the monthly water monitoring results and trends at surface points, as well as comments on the effectiveness of the mitigation measures and monitoring program. Reporting to the authorities should be as specified in the permitting/licensing conditions, and any accidental release of pollutants or possible polluting substances should be reported to the relevant authorities as specified in the mining permit conditions.

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9. CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion and Summary

Mining is extremely important to the South African economy. However, it is mining activities that have the greatest impact on the environment, ranging from land pollution to air pollution to water resource contamination, to name a few, and measures must be put in place to protect the environment during all these mining activities that are meant to protect citizens' livelihoods and the country's economy. The paper details all the expected environmental implications of mining operations, as well as how these impacts will be managed to preserve the quality of water supplies.

There are wetlands such as channelled valley bottom around the research area in the northern and southern directions, however they are more than 500m away from the project area and the measures that will be put in place include, monitoring the steam and making sure that the proposed project does not affect the water bosies. These bodies of water are important for the environment as well as the neighbouring communities, which rely on surface water. Throughout the project's lifespan, a monitoring program will be created to detect any changes in the quality or quantity of nearby water resources. The MODFLOW simulation models will be used to model how a contaminated plume will affect the river, considering the data and the affected area. There are poor aquifers in the mining permit region, and the major water source is groundwater.

10.2. Recommendations.

- In the northeast direction, there are water bodies, the construction should take into consideration of surface drainage systems to ensure surface water is not polluted.
- The study area falls on a fractured aquifer system, the mine planning should take into consideration the fracture zones in the Vryheid formation, drilling activities should not contact the fractures as that is where most groundwater in the area is found and to prevent possible groundwater pollution from residual explosive material used.
- The numerical model should be recalibrated as soon as more hydrogeological data such as monitoring holes are made available. This would enhance model predictions and certainty.
- It is recommended that there should be regular testing or monitoring of surrounding soil, water resources to detect any change in chemistry so that remedial measures are implemented in time.
- There should be soil, water resources and land pollution mitigation measures on site.

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- Wastewater source should be identified, and mitigation measures put in place to prevent groundwater contamination.
- The stockpile, there should be regular monitoring of any heavy metal which could be exposed, could result in leaching during rainfall.
- Proper and competent structure of the tailings dam should be built, to contain liquid, or solid waste and to prevent such waste from entering the outside environment.
- According to section 21(S21) of the National Water Act 36 of 1998, if a proposed project triggers any of the listed S21 activities, a water use license must be applied for. For this project, there will be activities which includes abstraction of water from groundwater, mining activities within 100 m from the water courses dust suppression, dewatering and ROM stockpiles. It is therefore recommended that a water use license be applied for.
- Should the perennial river in the north direction of the mining permit be diverted for path of any development, it should be directed in a way that it is still sustainable as that river will be used for monitoring purposes.
- It is recommended that throughout the mining project, compliance of NEMA Act 107 of 1998, NWA Act 36 of 1998, NEM: Waste Management Act 58 of 1998.

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2023

HYDROLOGICAL STUDY

DMRE REF: MP 30/5/1/1/3/13557 MP

- Mining Permit Application for Coal onportion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province

PREPARED BY:

Singo Consulting (Pty) Ltd

PREPAIRED FOR:

Tornowize PTY (LTD)

Report Credentials.

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Project details

Report type	**Hydrological Study for a Mining Permit**	
Project title	Hydrological Report on behalf of Tornowize (Pty) Ltd for the proposed Mining Permit Application on portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province	
Mineral (s)	Coal	
Client	Tornowize (Pty) Ltd	
Site location	Portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province	
Version	01	
Date	July 2023	
		Electronic signatures
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1 INTRODUCTION

According to the recent World Health Organization (WHO) report, the countries which still have limited access to water for drinking purposes are mainly those in the Sub-Saharan region (Verlicchi and Grillini, 2020). It is with this knowledge that the protection of surface water sources is ensured. According to WHO (2004), Surface water is any body of water that is above ground which includes but not limited to streams, lakes, dams and wetlands.

1.1 Project Background Information

Singo Consulting (Pty) Ltd was appointed by Tornowize (Pty) Ltd to carry out a specialist surface water study and compilation of a specialist surface water report, providing the surface water information required for the mine to fully comply with environmental authorization stipulated conditions.

Chapter 3 of the National Water Act (Act 36 of 1998) requires that a person who owns, control, occupies, uses the land is responsible for preventing pollution of water resources and is also responsible to remedy (correct) the effects of the pollution. It is with this Act that the hydrological report was deemed necessary for the site to gather all relevant information related to surface water and its related potential impacts.

The proposed mining activity is situated on portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province. Facilities on site within the mining permit area include but not limited to:

- Dirty water trench
- Access roads
- Mobile sanitation area
- Mobile office area
- Boxcut
- Strip (1 & 2)
- Mobile crushing and screening plant
- ROM stockpile
- Product stockpile
- Overburden stockpile
- Pollution control dam
- Topsoil Stockpile

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The surface water study includes a baseline hydrological assessment and conceptual stormwater management plan for the proposed infrastructure to ensure compliance with best practice and relevant legislation.

The goal of this study:

- To assess the quality condition of surface water within and around the mining permit area, and to draft a water monitoring programme for the project site and provide recommendations.
- Prediction of the environmental impact of the proposed mining activity on the hydrological regime of the area.
- Forecasting the effects of the activity on the receiving environment

1.2 Proposed Activities

This project will entail an open cast method of excavation and all the activities will be guided by the project's EMPr such that the project does not impact the environment negatively.

- The topsoil will be stockpiled elsewhere on site preferably next to the farm boundary and will be used during rehabilitation period
- Once a box cut has been made, the overburden and mineral resources where necessary will be loosened by blasting.
- The loosened material will then be loaded onto trucks by excavators
- A haul road will be situated at the side of the open cast, forming a ramp up which trucks can drive, carrying ore and waste rock.
- Waste rock will be piled up at the surface, near the edge of the open cast (waste dump)
- The waste dump will be tiered and stepped, to minimize degradation

1.3 Scope of Work

The Hydrology Evaluation Scope of Work (SoW) is summarized as follows:

Phase 1:

- Information sourcing / literature review (Desktop Study)
- Collection and revision of relevant information

Phase 2:

- Site visit
  - Site assessment (better understanding of site) and sampling

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- Update catchment hydrology with newly available data
  - Catchment characteristics and delineation
  - Meteorological analysis (including MAP)
  - Average runoff analyses
  - Peak flow analyses for 1:50
  - Analyses of water quality samples
- Reporting:
  - Using the above components, a final hydrogeological report is compiled

1.4 Project Location

The proposed coal mining permit covers an area of approximately 5 hectares and is situated within portion of portion 2 of the Farm Driehoek 273 IS, within ward 9 under the Magisterial District of Ermelo as shown by a red ribbon on Figure 4 below. The permit area is located approximately 9.30 km North-East of Spitskop farm.

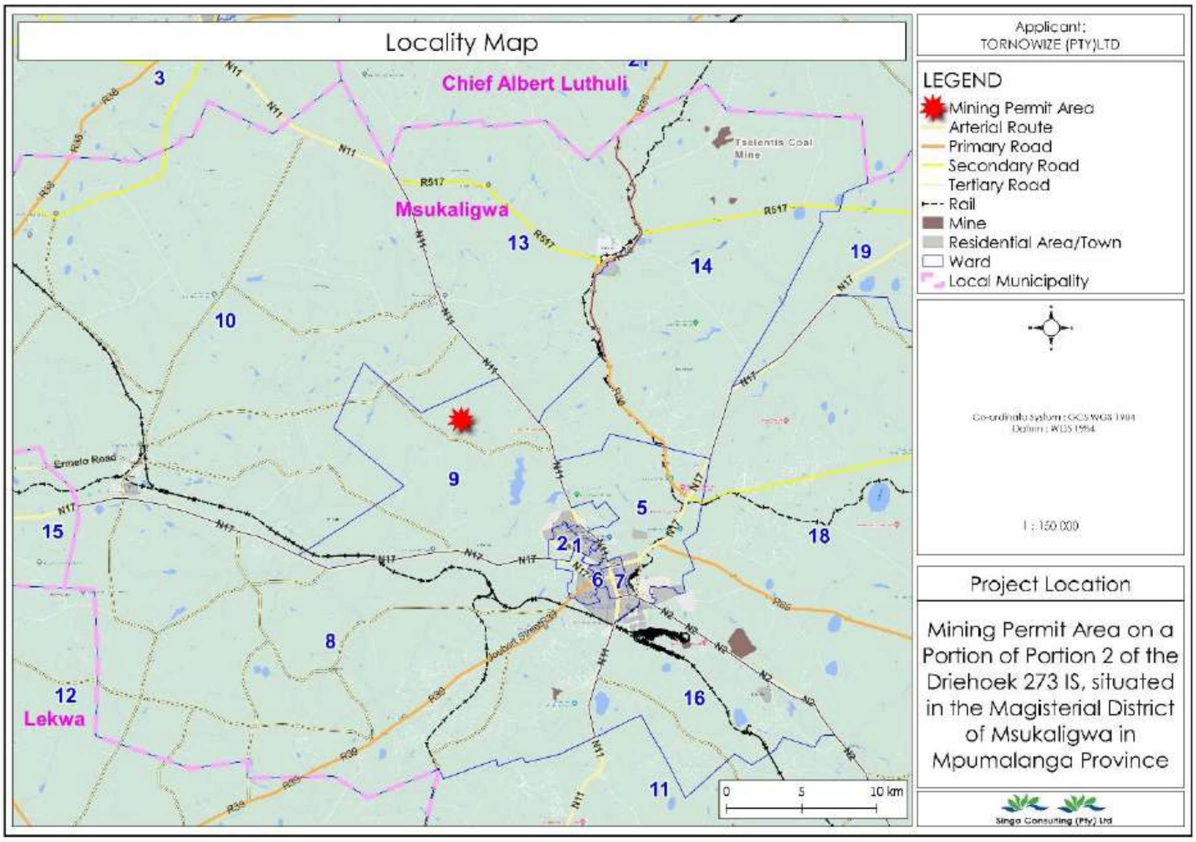

Figure 1: Locality map of the project area. *(Singo Consulting, 2023)*

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2 LEGAL FRAMEWORK

Government Notice 704 (Government Gazette 20118 of June 1999) (hereafter referred to as GN 704), was established to provide regulations on the use of water for mining and related activities aimed at the protection of water resources.

- **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.
- **Regulation 6** - 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 of the flows of a 1:50- year recurrence event. Clean and dirty water systems should not spill into each other more frequently than once in 50 years. Any dirty water dams should have a minimum freeboard of 0.8m 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.
- **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

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➢ **The National Water Act (Act 36 of 1998)**:

The NWA governs water resource management in South Africa. As guardians of water, the Department of Human Settlements, Water and Sanitation (DHSWS) must guarantee that resources are used, preserved, safeguarded, developed, managed, and controlled in a sustainable manner for the benefits of all people of south Africa and the environment. Key provisions applying to the current study include:

- **Catchment Areas** - Any disturbance to a watercourse, such as the construction and operation of surface mining infrastructure, may require authorisation from DWS.

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3 HYDROLOGICAL SETTING AND BASELINE HYDROLOGY

3.1 Climate

Climate is the state of the atmosphere over a long period of time, such as over years, decades, centuries or greater and weather is defined as atmospheric conditions of an area over a short period of time (Naomi, 2004). Climate for the purpose of the study is chosen based on the fact that it does not change over a long period of time whereas weather conditions fluctuate more rapidly, and its data cannot be relied upon.

In Ermelo, the wet season is comfortable and partly cloudy and the dry season is cool and mostly clear. Over the course of the year, the temperature typically varies from -1°C to 23°C and is rarely below -4°C or above 26°C (https://weatherspark.com/, n.d.).

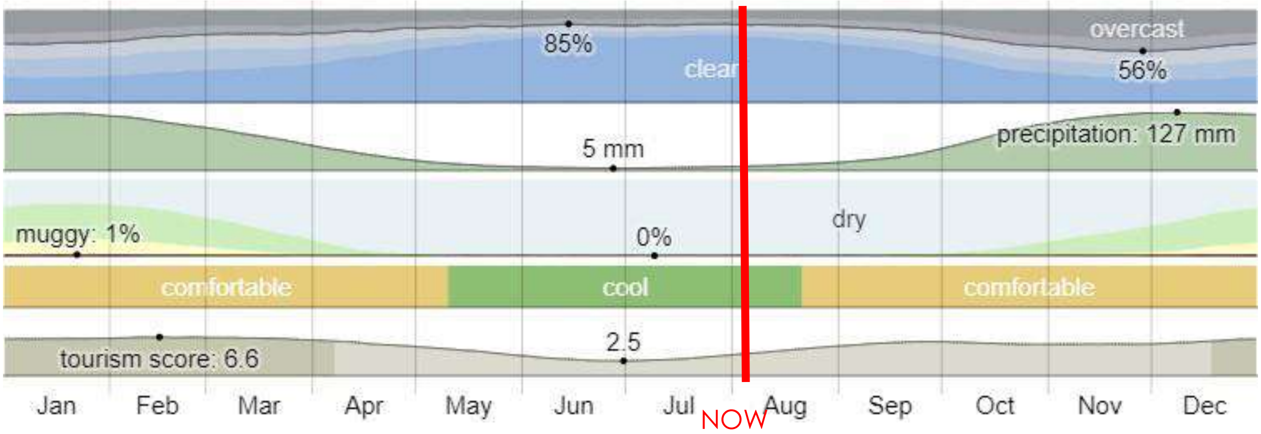

Figure 2:Climate in Ermelo. (https://weatherspark.com/, n.d.)

<u>Temperature</u>

The warm season lasts for 4.8 months, from October 29 to March 22, with an average daily high temperature above 21°C. The hottest month of the year in Ermelo is January, with an average high of 23°C and low of 12°C. The cold season lasts for 1.8 months, from June 2 to July 29, with an average daily high temperature below 16°C. The coldest month of the year in Ermelo is July, with an average low of -1°C and high of 16°C (https://weatherspark.com/, n.d.).The information retrieved from the weather spark websites co-relates with the information received from the in-house GIS specialist which is it more site specific and it shows on Figure 7 that the proposed mining permit area consist of an mean minimum annual temperature that is 0.1-2°C.

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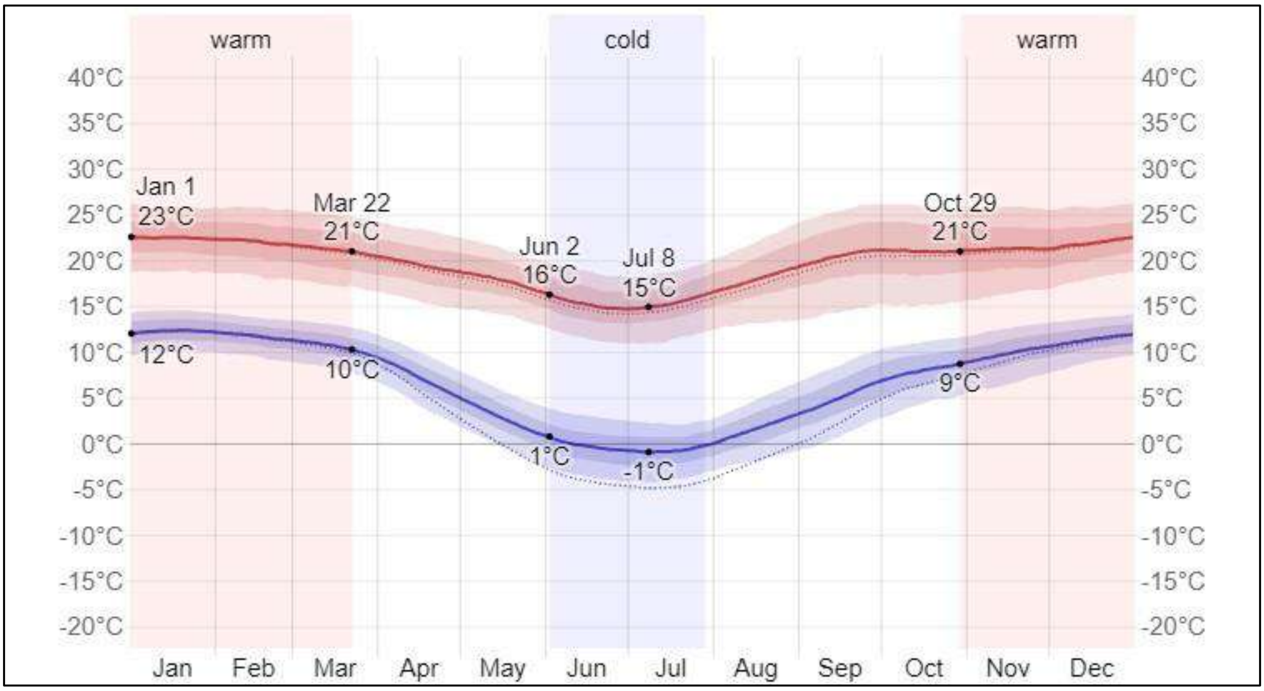

Figure 3: Average temperature of Ermelo. (https://weatherspark.com/, n.d.)

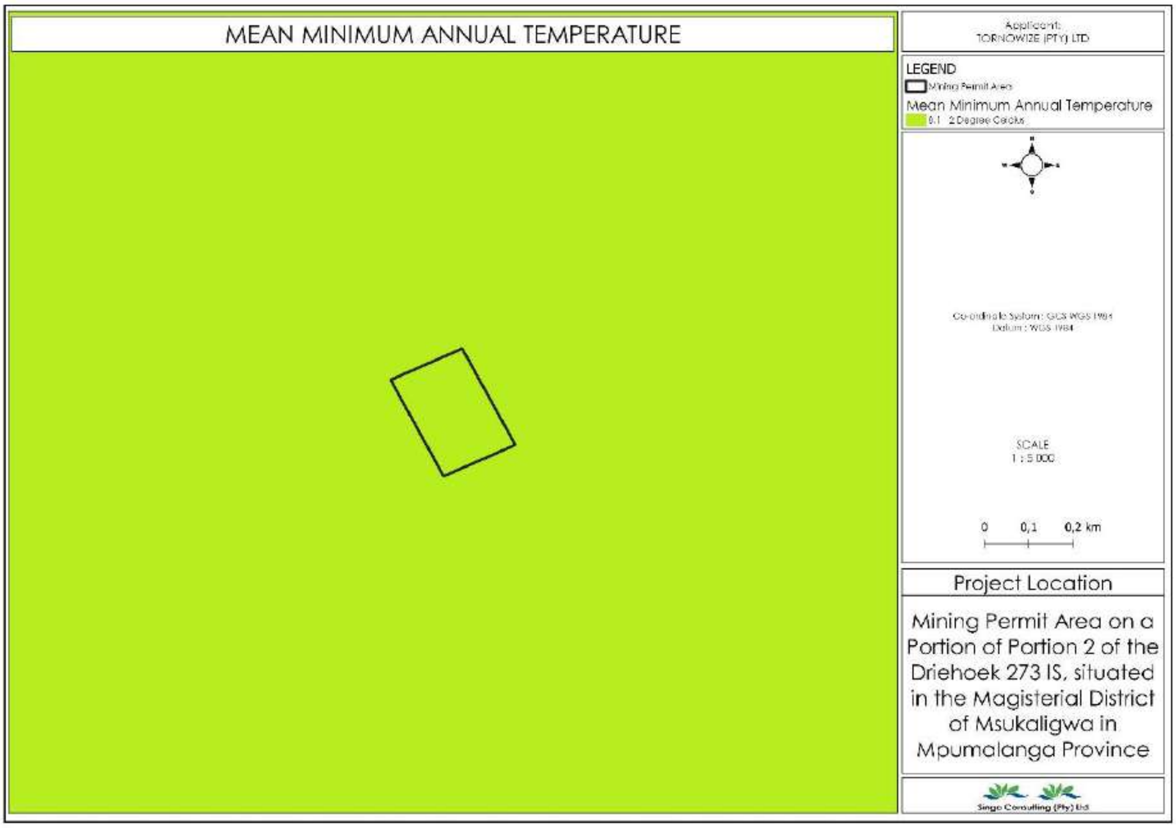

Figure 4: Mean Annual Temperature map. (Singo Consulting, 2023)

Rainfall

Ermelo experiences extreme seasonal variation in monthly rainfall. The rainy period of the year lasts for 8.9 months, from August 19 to May 16, with a sliding 31-day rainfall of at least 13 millimeters. The month with the most rain in Ermelo is December, with an average rainfall of 126 millimeters. The rainless period of the year lasts for 3.1 months, from May 16 to August 19. The month with the least rain in Ermelo is June, with an average rainfall of 6 millimeters. The mean annual rainfall according to the in-house GIS specialist is between 601-800 mm.

Figure 5:Daily chance of precipitation in Ermelo. (https://weatherspark.com/, n.d.)

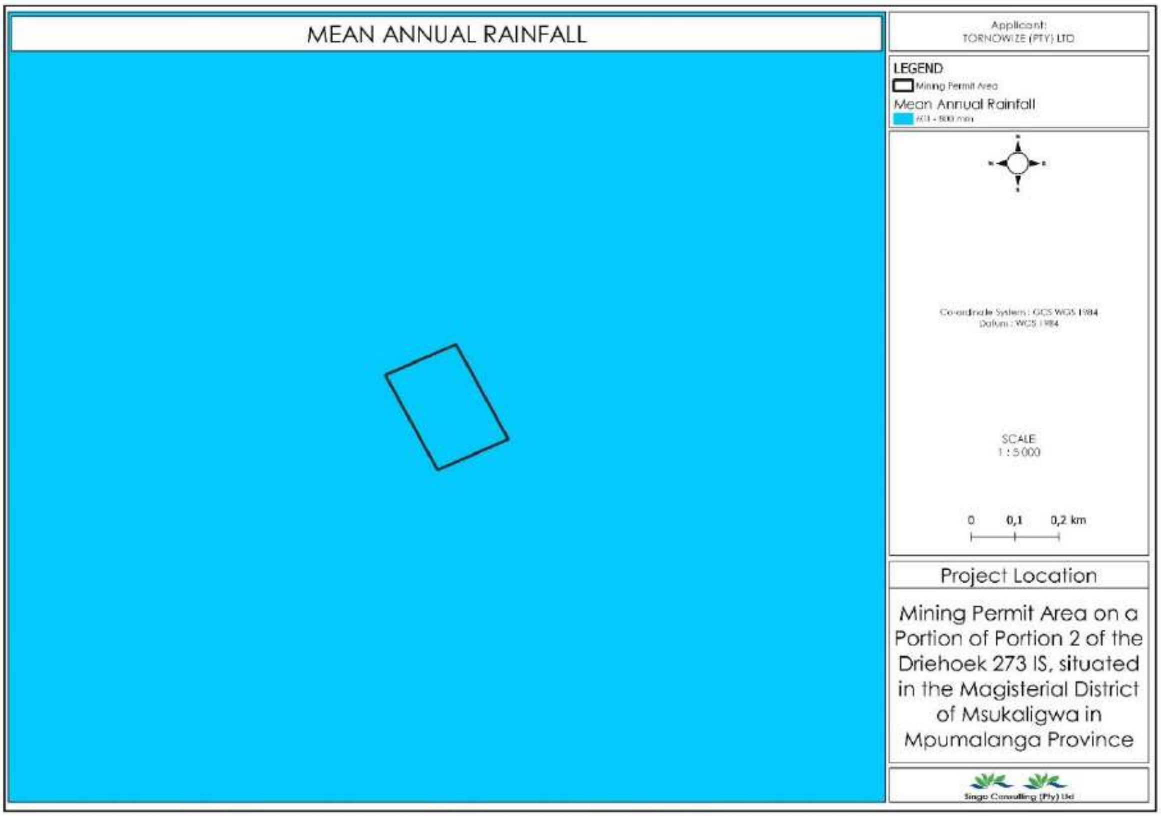

Figure 6: mean Annual rainfall map. (Singo Consulting, 2023)

3.2 Drainage and Topography

3.2.1 Drainage

The hydrology surrounding the proposed area is of vital importance. In this context hydrology is all the surface waters appearing within and nearby the proposed project area, where a potential to be impacted upon by the project existence. The hydrology map, illustrates that the following water bodies exists nearby the project area:

- **Channeled Valley Bottom wetlands:** Channelled valley bottom wetlands are linear fluvial, net depositional valley bottom surfaces which have a straight channel with flow on a permanent, seasonal, or ephemeral/episodic basis (Rountree, Todd, Kleynhans, et al, 2007: iv). A channelled valley bottom wetland was identified, the wetland is shown in the north-eastern direction of the study area covering the perennial river at an elevation of 1690 and 1695 mamsl.
- **Non-perennial:** non-Perennial rivers are rivers that flow seasonally, such as summer. The rivers flow from an area of higher elevation to an area of lower elevation. Non-perennial streams were identified at the north and southern parts of the project area, these non-perennial rivers are associated with valleys and they are found in all directions of the perennial river. They act as tributaries of the perennial river.
- **Perennial:** perennial rivers are rivers that flow all year round. The perennial river flowing from the northern direction towards the southern direction at an elevations of 1690 and 1695 mamsl, this perennial river connects with the non-perennial river which is flowing from the eastern direction towards southeastern direction.
- **Dam:** At the southern direction of the study area the is a dam. It is identified at an approximate elevation of 1600 mamsl.
- **Seep:** The seep wetlands are shown by red dotes within the hydrology map and are seen around the non-perennial rivers around the project area.

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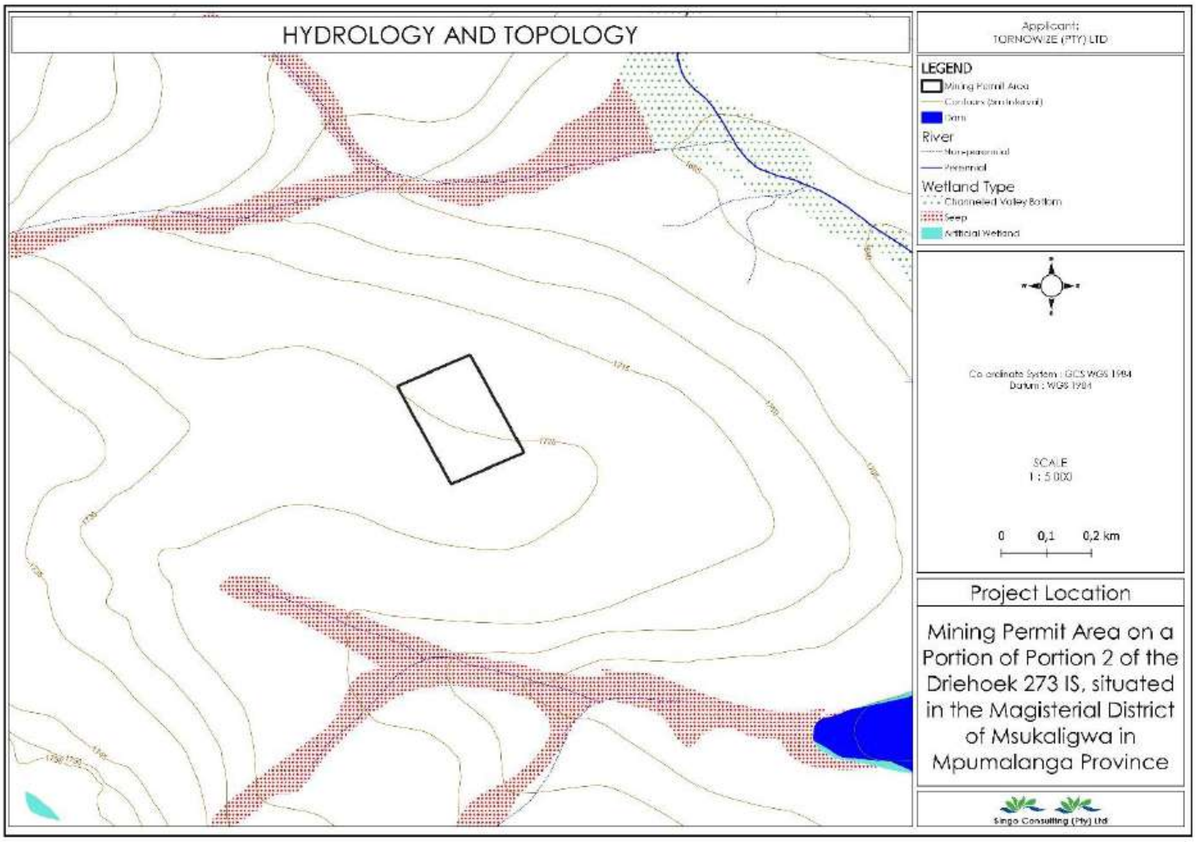

Figure 7: Hydrology map of the study area. *(Singo Consulting, 2023)*

3.2.2 Topography

The topology of the area is illustrated below by Figure 7 below. A Topographic map is a map which indicates, to scale, the natural features of the Earth's surface, as well as human features, with features at the correct relationship to each other (Oxford Dictionary; 2020). The topography map other than showing landform features, rivers, and associated water resources, it also shows the height above sea level with the use of contour lines. Contour lines are an Imaginary line on the ground surface joining the points of equal elevation.

In this environmental project, topography is used to determine how surface water flows during rainy seasons or how it would flow during the existence of the project. The topography also influences groundwater vulnerability, as topography also influences run-off and infiltration rate by means of residence time.

The slope of the study area is gentle, this is seen by the contours being widely spread, the study area lies between 1715 and 1730 mamsl. It can be concluded that in the area water flow is likely to be slow, this will increase the residence time of the water and or contaminants in the

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area, this gives the management time to deal or manage the contaminants in the area, but it poses a risk of groundwater contamination since it will encourage infiltration and increase the likelihood of groundwater vulnerability. This knowledge helps the site development team to be able to know how to manage water in the area, since the measures to manage water on a gentle and steep slope are different.

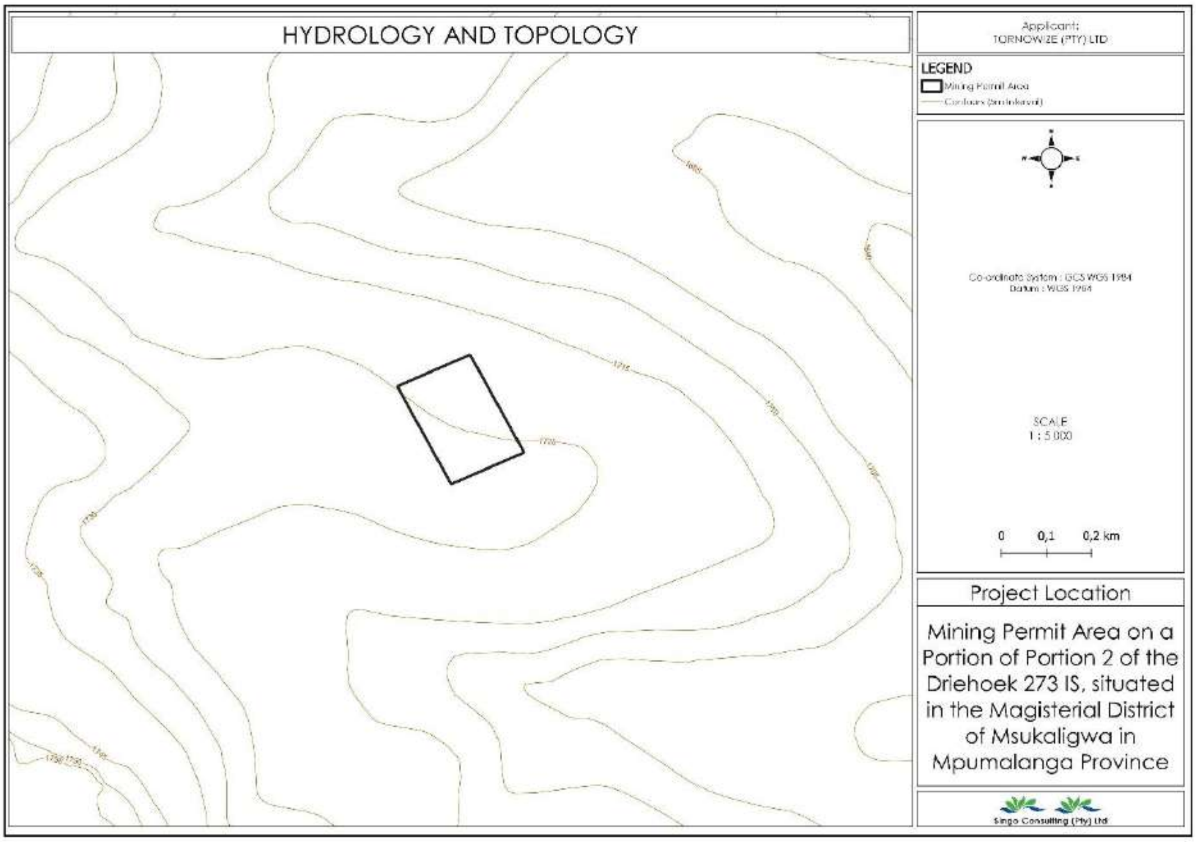

Figure 8: Topology map of the study area. *(Singo Consulting, 2023)*

3.3 Catchment Description

South Africa's water resources are divided into quaternary catchments, which are the country's primary water management units (DWAF 2011). In a hierarchical classification system, a quaternary catchment is a fourth order catchment below the primary catchments. The primary drainages are further classified as Water Management Areas (WMA) and Catchment Management Agencies (CMA) (CMA). In accordance with Section 5 subsection 5(1) of the National Water Act, 1998, the Department of Water and Sanitation (DWS) has established nine WMAs and nine CMAs as outlined in the National Water Resource Strategy 2 (2013). (Act No. 36 of 1998). The purpose of establishing these WMAs and CMAs is to improve water

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governance in various regions of the country, ensuring a fair and equal distribution of the Nation's water resources while ensuring resource quality is maintained.

The proposed prospecting area falls within the Vaal Water Management Area (WMA) as shown on Figure 14 below, within quaternary catchments of C11F. The WRC 2012 study, presents hydrological parameters for each quaternary catchment including area, mean annual precipitation (MAP) and mean annual runoff (MAR), see table 2 for reference.

Table 1: WRC of 2012, Water management area, MAP and QC

Water management	Quaternary catchment	Catchment Area (km^2)	MAP (mm)	MAR (mm)	Evaporation Zone
Vaal	C11F	929.1	704.7	60.5	2D

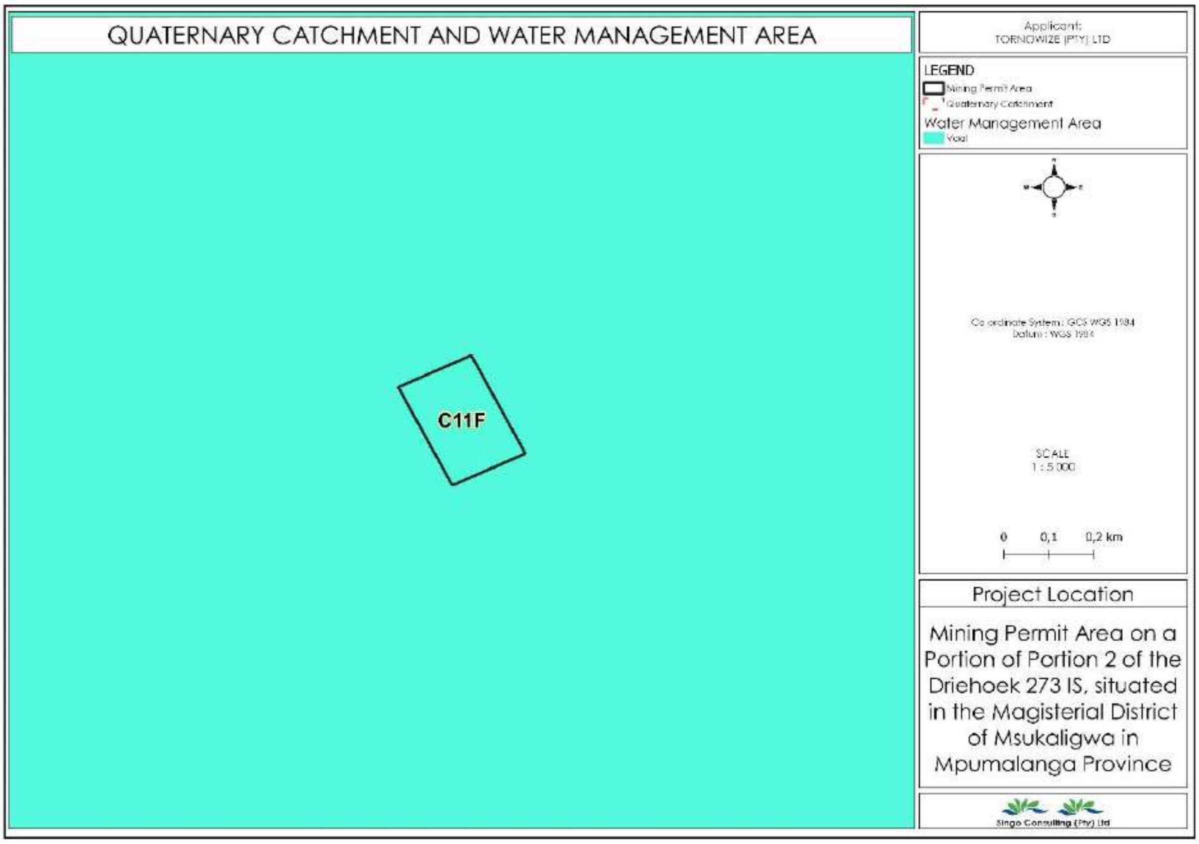

Figure 9: Water management area of the site. *(Singo Consulting, 2023)*

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3.4 Wetlands Delineation

According to National water Act 36 of 1998, a wetland is defined as 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.

Wetland delineation is the process of identifying outer edge of the temporary zone of the wetland. Whilst the identification of a wetland is useful, normally the requirement (specifically for EIA and WULA applications) is for the wetland to be delineated – for its boundaries to be precisely determined so that it can be mapped out and indicated as a sensitive area. This edge marks the boundary between the wetland (water resource) and the adjacent terrestrial areas. This process is aided by using the various indicators which are used to identify a wetland, the indicators are as follows:

- The position in the landscape, which will help identify those parts of the landscape where wetlands are more likely to occur
- The type of soil form (i.e., the type of soil according to a standard soil classification system), since wetlands are associated with certain soil types
    - The presence of wetland vegetation species, and
    - The presence of redoxymorphic soil features, which are morphological signatures that appear in soils with prolonged periods of saturation (due to the anaerobic conditions which result).

The drainage channels on site are recharged by surface water run-off from elevated residential and mountain areas during rainy periods. On a regional scale, rainfall within the Quaternary Catchment boundaries will recharge groundwater in the project area. Although geological structures such as weathered and fractured zones will create preferred pathways for groundwater flow, the general flow direction, particularly in the weathered unsaturated zone, is expected to follow surface gradients. Figure 9 below is a hydrological map illustrating channelled valley bottom wetlands, seep wetlands, a dam, perennial and non-perennial rivers waterbodies.

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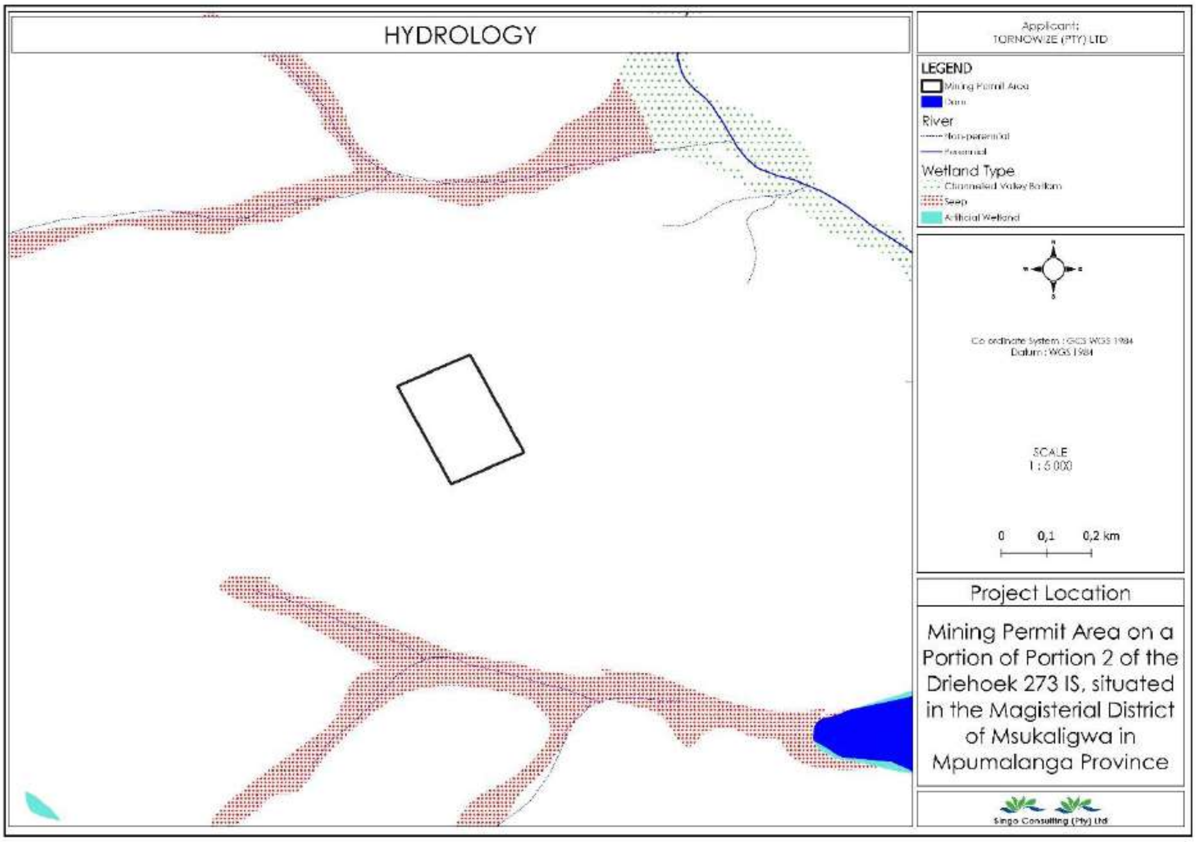

Figure 10: Hydrology map showing different wetlands in the area. (Singo Consulting, 2023)

3.5 Buffer Zones

The natural environment is still being destroyed at an alarming rate, all over the globe (Ebregt and Greve, 2000)

According to the National Environmental Management: Protected area Act of 2003 no 57, Buffers are areas peripheral to a specific protected area, where restrictions on resource use and special development measures are undertaken to enhance the conservation value of the protected area.

A buffer zone is a strip of plants adjacent to land-disturbing sites or bordering streams, lakes, and wetlands which provides streambank stability, reduces soil erosion, reduces storm runoff velocities and filters sediment in stormwater. (Sliva, Lucie, and D. Dudley Williams. "Buffer zone versus whole catchment approaches to studying land use impact on river water quality." (Water research 35.14 (2001): 3462-3472).

Within the vicinity of the proposed site, there are no water bodies present. To ensure that such area remain protected throughout the existence of the project, buffers are put in place to mitigate the impacts which such project will have on the protected area. For the proposed

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site, there are wetlands such as channelled valley bottom around the research area in the northern and southern directions, however they are more than 500m away from the project area and the measures that will be put in place include, monitoring the stream and making sure that the proposed project does not affect the water bosies.

Figure 11: Overview of the project Area. *(Singo Consulting, 2023)*

3.6 Vegetation and Soil

3.6.1 Vegetation

The proposed area comprises of only one type of vegetation, the moist sandy highveld grassland vegetation type. This type of vegetation can be found everywhere on Earth, there are two main types of grasslands: temperate and tropical. Temperate grasslands appear in areas where the variations in temperature occur when the seasons change. This means that in temperate grasslands, the vegetation changes accordingly because some species prefer to grow during summertime, while others come to life when it is cold. On the other hand, tropical grasslands, also known as savannas, prefer when it is warm and (mostly) dry throughout the year. (Robel, R. J., et al. "Relationships between visual obstruction

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measurements and weight of grassland vegetation." Rangeland Ecology & Management/Journal of Range Management Archives 23.4 (1970): 295-297.)

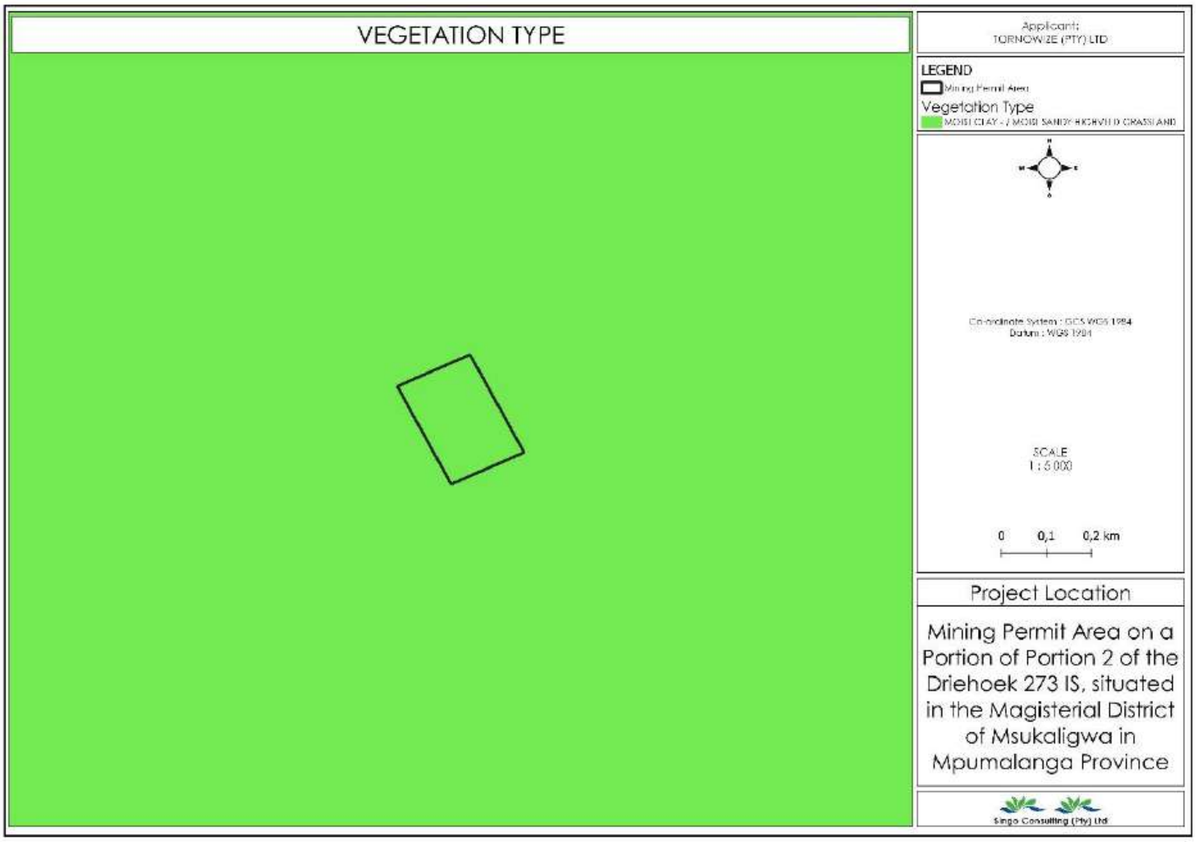

Figure 12: Vegetation Type in the project site. *(Singo Consulting, 2023)*

3.6.2 Soils

The area is dominated by the association of classes 1 to 4: undifferentiated structureless soils. Structureless soils have no observable aggregation and no definite arrangement of the soil particles. Sands and sandy-loam soils are often structureless with a single grain arrangement of the soil particles. Clay soils may also be described as structureless when the particles form a massive structure with no small aggregates within. (Belokas, George, and Michael Kavvadas. "An anisotropic model for structured soils: Part i: Theory." Computers and Geotechnics 37.6 (2010): 737-747.)

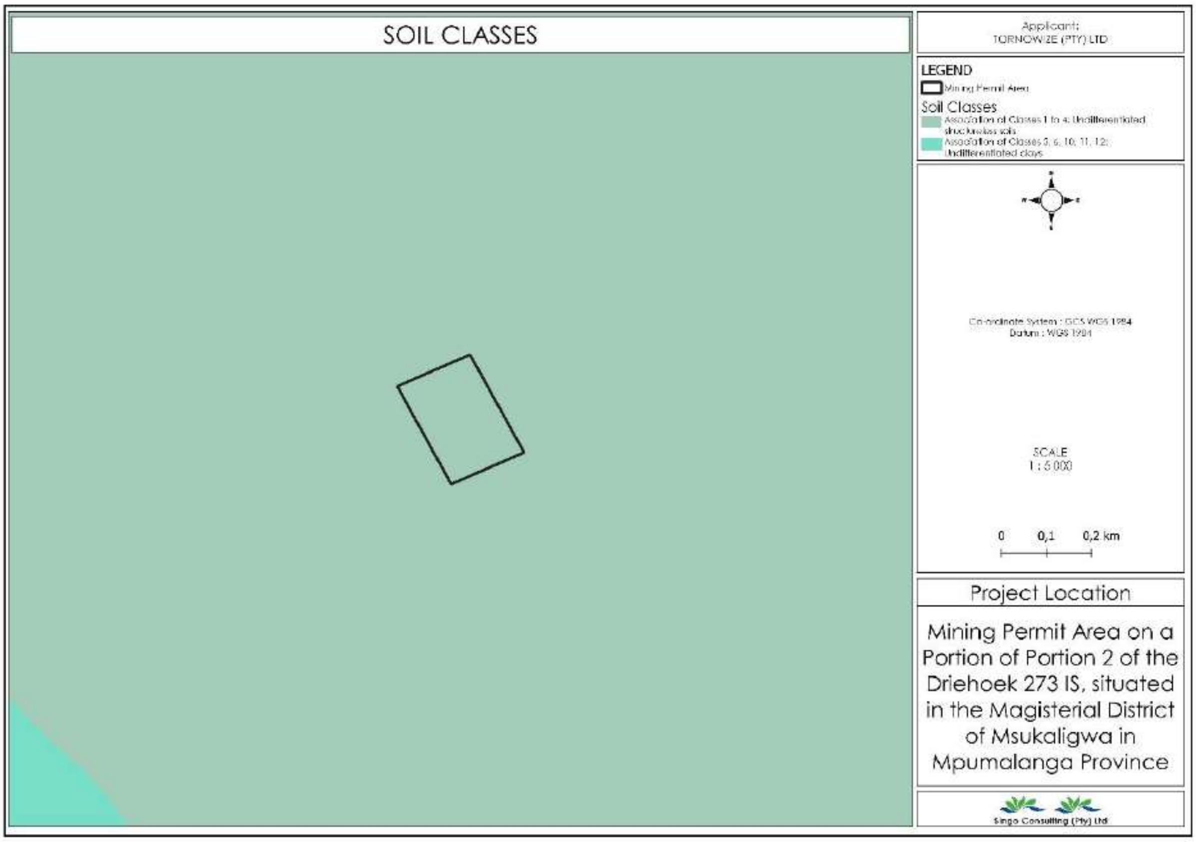

Figure 13: Map showing soil class for the proposed area. (Singo Consulting, 2023)

3.7 Geological setting

The study of groundwater incorporates both the fluid (water) and the medium through which it is flowing (rock, soil, or any other geological material). As such, it is necessary to understand the geology of the permit area in order to gain a better understanding of the aquifer type and flow of ground water.

Regional Geology

The main Karoo Supergroup basin covers over 50% of South Africa's surface and consists of five age-based groups, which show a change of depositional environment in time. These groups are the Dwyka (glacial), Ecca (shallow marine and coastal plain), Beaufort (non-marine fluvial), Stormberg (aeolian) and the volcanic Lebombo or Drakensberg groups (Johnson et al., 2006). The proposed project area falls within the Ermelo Coalfield which hosts thinner seams that are more sedimentological and structurally complex. Sediments of Vryheid and Dwyka formations underlay the area which was deposited on a glaciated Pre-Karoo basement consisting of Rooiberg felsites. The deposit is preserved as an outlier underlying the small hill

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known as Vlooikop, surrounded by strata of the Dwyka Group (mainly tillites and varved mudstones/shales).

The Dwyka Group

The Dwyka Formation is the oldest subunit of the Ecca Group and is composed of glacial deposits that were formed during the Late Carboniferous and Early Permian periods (Catuneanu *et al.,* 2005). The formation is characterized by thick sequences of sandstone, shale, and tillite, which were deposited by glaciers as they advanced and retreated over the southern African continent. The Dwyka Formation is an important source of diamonds in southern Africa, as many of the diamonds found in the region are believed to have originated from the erosion of kimberlite pipes that were exposed by the advancing glaciers.

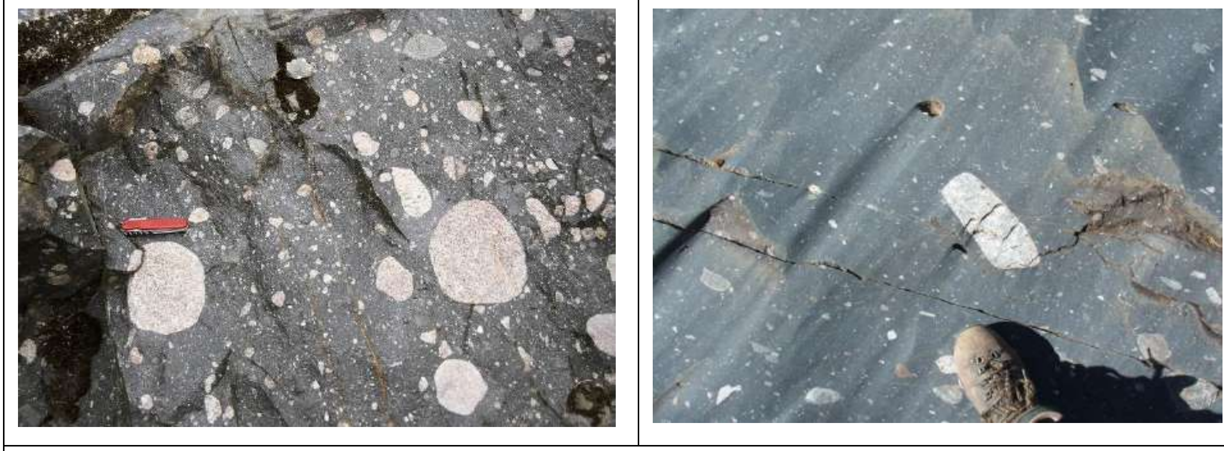

Figure 14: Tillite rock of the Dwyka Formation (Catuneanu et al., 2005).

Ecca Group

In the 1970s several studies (Cadle, 1974; Hobday, 1973, 1978; Mathew, 1974; Van Vuuren and Cole, 1979) showed that the Ecca Group could be subdivided into several informal units based on the cyclic nature of the sedimentary fills. In 1980 the South African Committee for Stratigraphy (SACS, 1980) introduced a formal lithostratigraphic nomenclature for the Ecca Group in the northern, distal sector of the MKB, which replaced the previously used informal Lower, Middle and Upper subdivisions with the Pietermaritzburg Shale Formation, the Vryheid Formation, and the Volksrust Shale Formation.

In South Africa, based on the literature; only 19 coalfields are generally accepted which cover an area of approximately 9.7 million hectares (ha). The distinction between coalfields is based

on geographic considerations and variations in the mode of sedimentation, origin, formation, distribution, and quality of the coals. (Hancox & Annette, 2014).

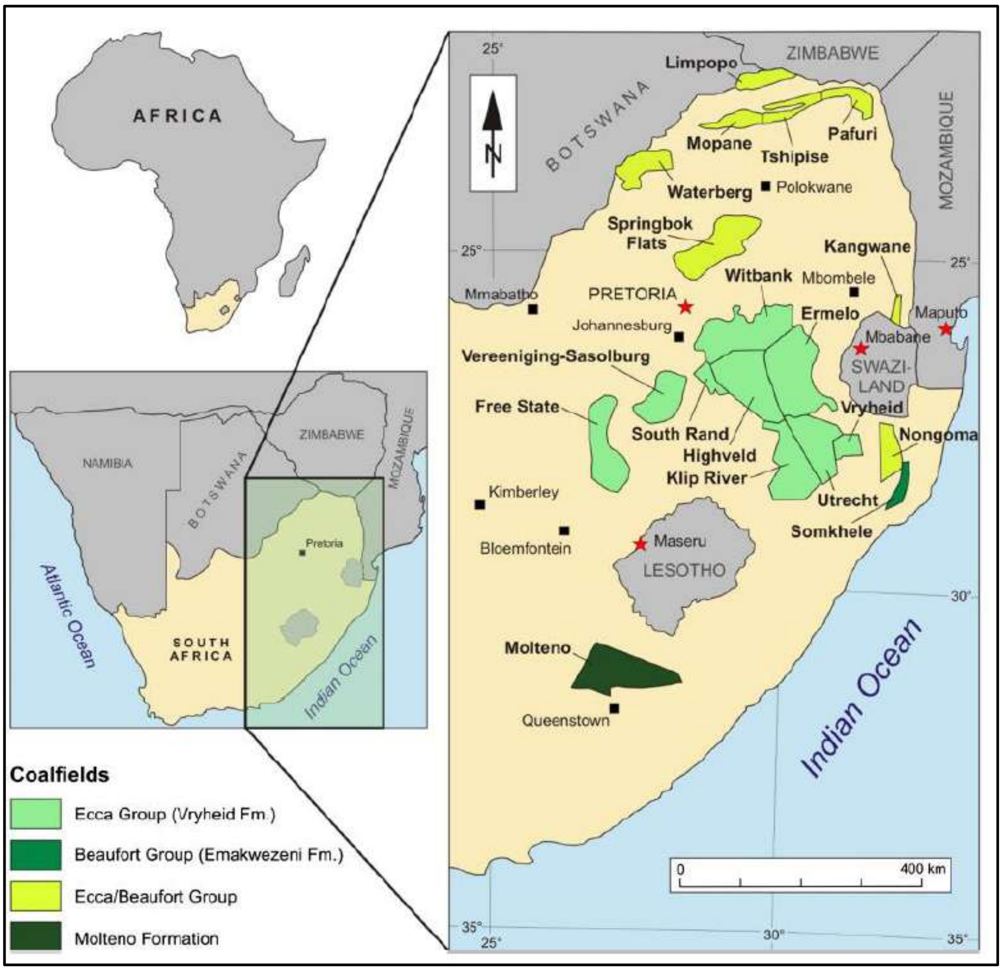

Figure 15: South Africa's Coalfields

Local Geology

The project area is overlain by the Vryheid formation of the Witbank Coalfields.

Witbank Coalfield

The Witbank Coalfield is elongated over 180 km in a west to east direction, it is not surprising that the basement to the Karoo Supergroup succession is varied. From west to east the basement rocks include metasedimentary, metavolcanic and dolomitic rocks of the

Neoarchaean Transvaal Supergroup, metasedimentary and metavolcanic rocks of the Palaeoproterozoic Waterberg Group and BIC age intrusives (felsites and granites). The changing nature of the basement plays a major role in the nature of the palaeotopography created. For example, in the far east of the Witbank Coalfield, where dolomites of the Transvaal Supergroup form the basement, abnormally thick coals filling karst topography are known. A similar but more extreme case is documented at the Syferfontein Colliery in the West Rand outlier (Stuart-Williams,1986). In some areas close to the north-western basin margin, the stratigraphic column is reduced to only 80 m. It was also the focus of much of the academic research, including the works of Cairncross (1979) in the Van Dykes Drift area, Le Blanc Smith and Eriksson (1979) to the west of Witbank, and Holland et al. (1989) to the east of Witbank. Cadle and Cairncross (1993) described a sandy bedload dominated system with lateral accretion surfaces from the southern part of the central sector. More recently it has been covered in the regional geological model of Grodner (2002) and Grodner and Cairncross (2006) and various Competent Persons' Reports available on various companies' websites (Goldschmidt et al., 2010a).

Coal seams found in the Witbank Coalfield

- **No. 2 Seam**: The No. 2 Seam is one of the most economically significant coal seams in the Witbank Coalfield. It is known for its high-quality bituminous coal, which is suitable for various applications, including power generation and metallurgical processes.
- **No. 4 Seam**: The No. 4 Seam is another important coal seam in the Witbank Coalfield. It is characterized by its relatively high carbon content and good thermal properties. The coal from this seam is commonly used in power generation and industrial processes.
- **No. 5 Seam**: The No. 5 Seam is a notable coal seam that occurs in the Witbank Coalfield. It is generally thinner compared to other seams but still economically viable for mining. The coal from this seam is often used for power generation and industrial purposes.
- **No. 1 Seam**: The No. 1 Seam is a thinner coal seam found in the Witbank Coalfield. While it is not as extensively mined as some of the other seams, it still contributes to the overall coal production in the region.

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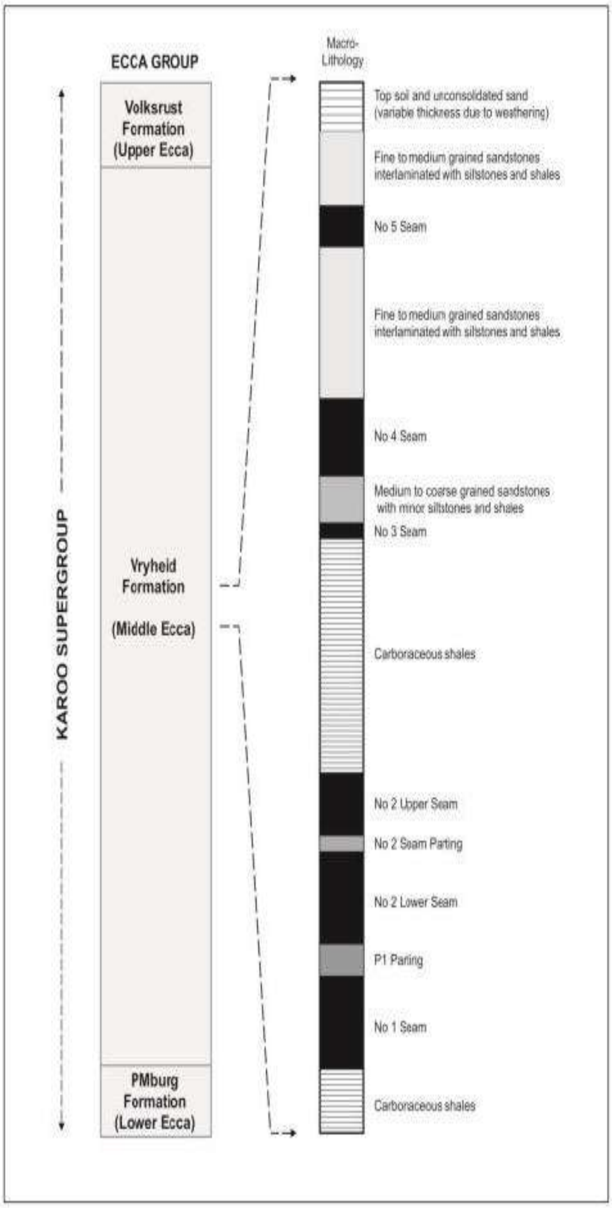

Figure 16: Typical stratigraphy of the Witbank coalfield.

Vryheid Formation

This formation has been subdivided into three different lithofacies arrangements. They are dominated by fine-grained mudstone, carbonaceous shale with alternating layers of bituminous coal seams, and coarse-grained, bioturbated immature sandstones respectively. The rock sediments are predominantly arranged in upward-coarsening cycles, although some fining-upward cycles are found in this formation's easternmost deposits. The alternating rock types observed in the Vryheid Formation indicate seasonal variations of storms and fairer

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weather in a pro-delta setting. The carbonaceous shales were formed below the water surface in anoxic conditions and the coal formed from compacted plant matter deposited at the bottom of peat swamps. These swamps formed on abandoned alluvial plains where stagnant water accumulated. The Vryheid Formation reaches a maximum of 1030m in Nongoma, KwaZulu-Natal, within the Nongoma Graben

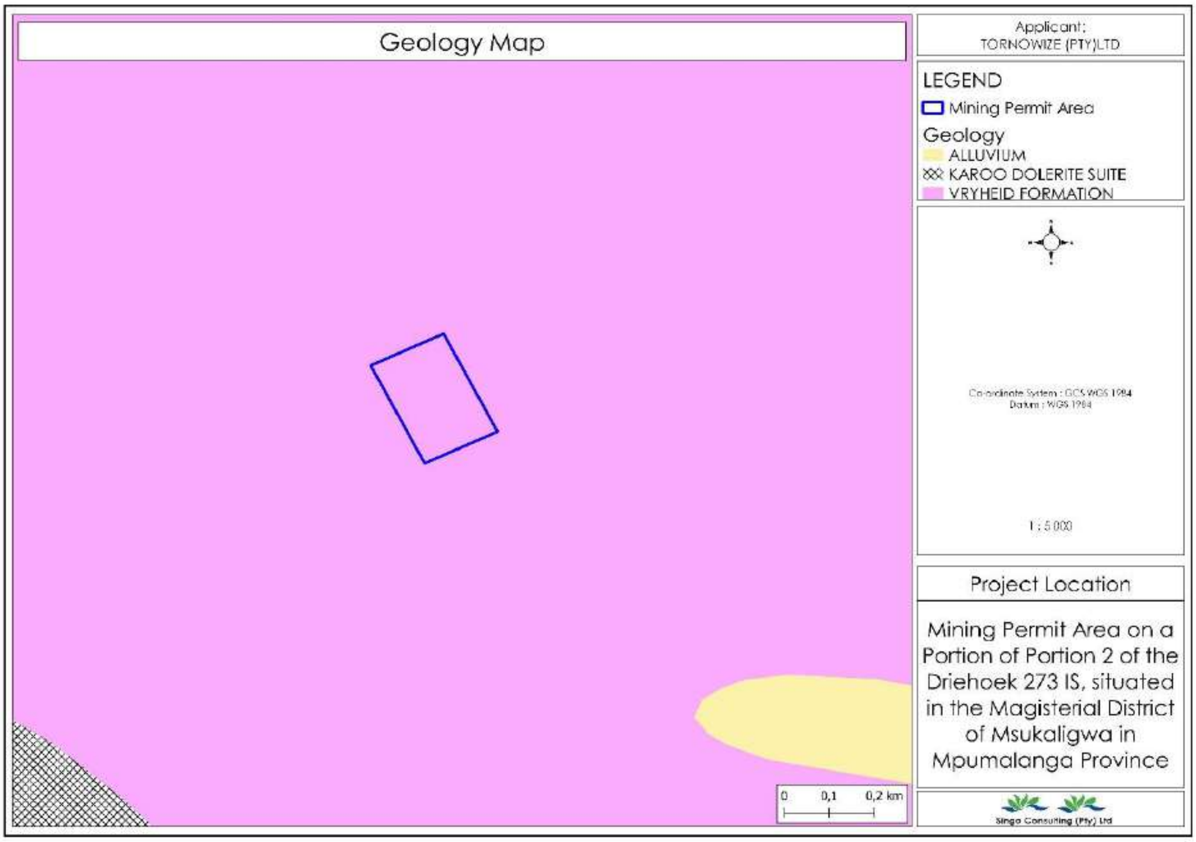

Figure 17: Geological map of the proposed area. (Singo Consulting, 2023)

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4 SITE ASSESSMENT

Site assessment is most probably the most important aspect in any form of study, this is because through site assessment visual observations are made, and proper mitigation measures are ensured.

4.1 Locality setting

The proposed coal mining permit application is situated within Portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province.

4.2 Water Sampling

During the site inspection no water samples were taken. Water quality must be tested on a regular basis as part of maintaining a safe and reliable source. This helps ensure that the water source is being properly managed from potential contamination due to the development of the storage, and appropriate treatment is selected. The water sampling bottles must be rinsed at least 3 times before actual collection of water sample. The pH, temperature, Dissolved oxygen, TDS and electrical conductivity must be measured from the water sample. The samples are then stored in a cooler box at a temperature of 4°c and below, and then taken to the laboratory for further analysis.

Table 2: Classification of water according to its hardness

Water classification	Total hardness concentration as mg/L as CaCO3
Soft water	<50 mg/L as CACO3
Moderately hard	50-150 mg/L as CaCO3
Hard water	150-300 mg/L as CaCO3
Ver hard water	>300 mg/L as CaCO3

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4.3 Current Activities.

Currently there some parts of the area is used for cultivation activities and grazing activities. The proposed activities were observed during site inspection.

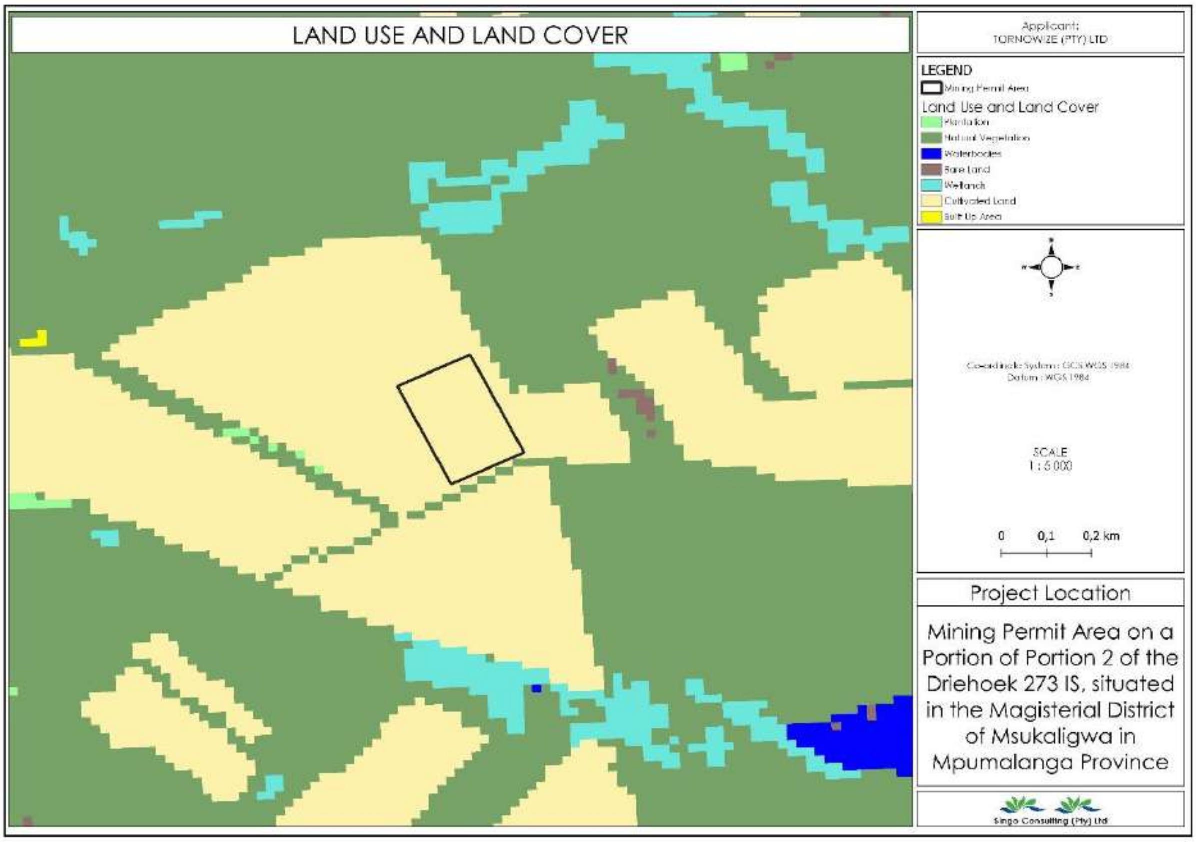

Figure 18: Land use and cover map. (Singo Consulting, 2023)

Figure 19: Land-Use activities observed onsite. *(Singo Consulting, 2023)*

5 FLOODLINE DETERMINATION

Flood risk and flood line determination are an important part of development planning for a wide range of potential developments. For commercial, housing and mining developments, no development may occur within areas that are potentially prone to becoming inundated with water as a result of floods. The need for determination is frequently legislated or included in regulations. Typical examples would be regulations contained in: General notice 704 of the south African national Water Act (Act 36 of 1998), which stipulates that no mining activities may take place within or below a defined 1: 100- year flood line.

5.1. Methodology and Data Sources

National legislation applicable to surface water management includes:

- Constitution of the Republic of South Africa, 1996 (No. 108 of 1996) – The Bill of Rights states that everyone has the right to an environment that is not harmful to their health or well-being.
- National Water Act, 1998 (Act 36 of 1998) – Provides for the protection of the quality of water and water resources in South Africa and provides for the establishment of Water Management.

5.1.1 Elevation Data

Elevation data in the form of 5 m contour intervals covering the project area was sourced from the client. The contour lines were used to generate a 5 m spatial resolution. The contour lines were used to determine change in elevation. The distance between contour lines indicates the slope of the area. The area consists of a gentle slope, when contour lines are further apart from each other, then slope is gentle slope. Refer to figure 7 of the topographic map above.

5.1.2 Manning's Roughness Coefficients

The Manning's roughness coefficients are values that represent the channel and adjacent floodplains resistance to flow. The vegetation and terrain were assessed during the site investigation, to estimate suitable Manning's roughness coefficients. A Manning's roughness coefficient of 0.08 was used for the non-perennial drainage lines, as dense vegetation occurs within and along these watercourses.

5.1.3 Peak Flows

For the non-perennial drainage lines in the vicinity of the project, the Rational method is the preferred method to calculate the peaks.

The Rational method is based on the following equation:

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$$QT = \frac{C\ I\ A}{3.6}$$

where: QT = Peak flow for a recurrence interval e.g., a 1:100-year flood (m^3/s)

C = Runoff coefficient (dimensionless)

I = Average rainfall intensity over the catchment (mm/hour)

A = Catchment area contributing to the peak flow (km^2)

3.6 = Conversion factor

5.1.4 Software

The following software's were used:

- ArcMap 10.2 is a GIS software programme used to view, edit, create and analyse geospatial data.
- ArcMap was used to view spatial data and to create maps. Its extension 3D Analyst was used for terrain modelling purposes, for converting the contour data into a DTM grid format.
- HEC-GeoRAS utilises the ArcMap environment and is used for the preparation of geometric data (cross-sections, river profile, banks and flow paths) for input into the HEC-RAS hydraulic model. It is further used in post processing to import HEC-RAS results back into ArcMap, to perform flood inundation mapping; and
- HEC-RAS 4.1 (Brunner, 2010) was used to perform hydraulic modelling. HEC-RAS is a hydraulic programme used to perform one-dimensional hydraulic calculations for a range of applications, from a single watercourse to a full network of natural or constructed channels.

5.1.5 Hydraulic Model Setup

Development of the hydraulic model included the following steps:

- Preparation of geometric data (cross-sections, stream centre line, bank lines and flow paths) in HEC-GeoRAS.
- Importing of geometric data into HEC-RAS.
- Entering HEC-RAS model parameters such as the Manning's roughness coefficients, boundary conditions and peak flows.

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- Performing steady, mixed flow (combination of subcritical, supercritical, hydraulic jumps and drawdowns) modelling within HEC-RAS to calculate the flood water elevations at cross-sections; and
- Importing flood level elevations at cross-sections into HEC-GeoRAS to perform floodplain delineations

5.2 Catchments

The quaternary catchment is shown in the diagram below:

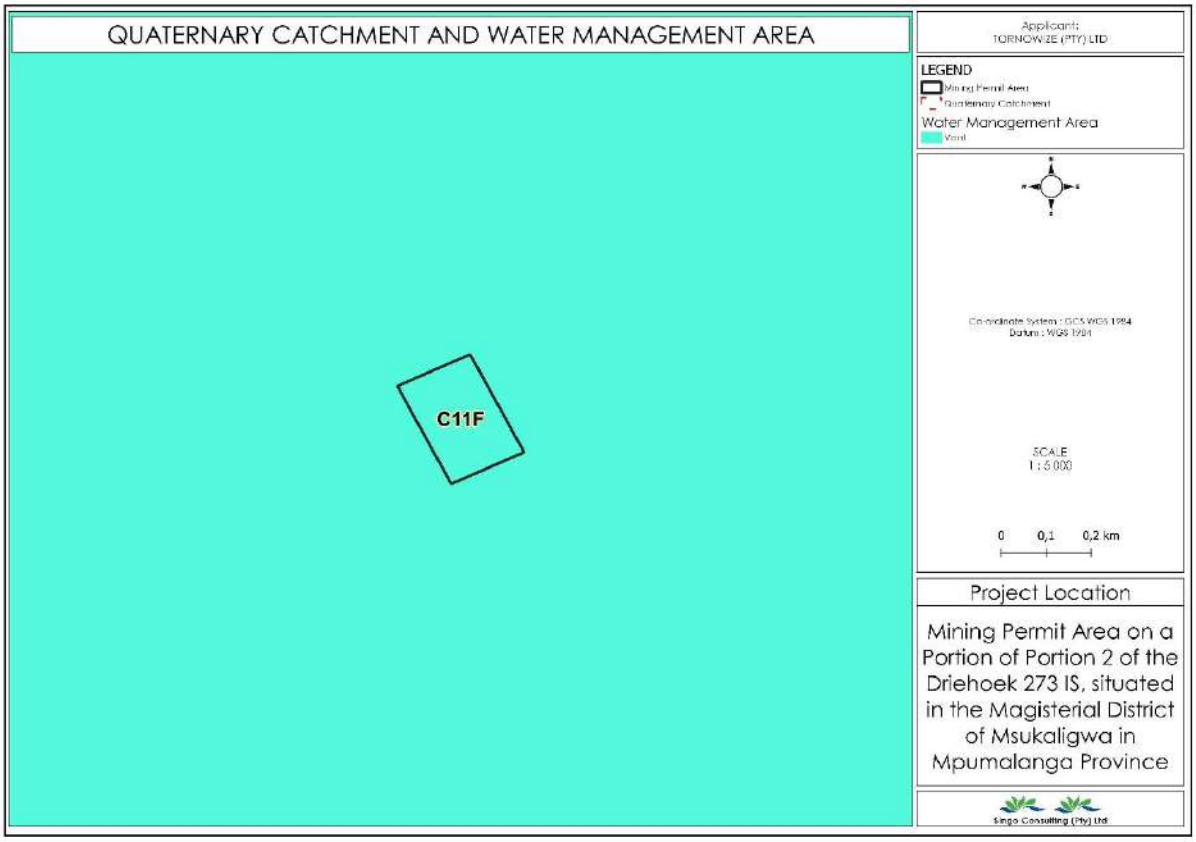

Figure 20: Water catchment delineated. *(Singo Consulting, 2023)*

6 SURFACE WATER IMPACT ASSESSMENT

6.1 Methodology

This section evaluates the potential impact of the proposed development on watercourses present within and around the mining site. Watercourse is a term used in the National Water Act (Act No. 36 of 1998) (NWA) that includes various water resources, such as different types of wetlands (both natural and artificial), rivers, riparian habitat, dams and drainage lines (e.g., natural channels in which water flows regularly or intermittently). Results and discussions of delineated watercourses are used as part of the impact assessment that considers both corridor alternatives separately.

Expected watercourse impacts associated with the proposed development is assessed in detail for the construction and operational phases of the project using the approach provided in the Impact Assessment methodology Section below, which includes the provision of recommended mitigation measures. An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need.

6.1.1 Impact status

- Negative effect (i.e., at a `cost' to the environment)
- Positive effect (i.e., a `benefit' to the environment)
- Neutral effect on the environment

6.1.2 Impact extent

- Site (site only)
- Local (site boundary and immediate surrounds)
- Regional
- National
- International

6.1.3 Impact duration

- Immediate (< 1 year)
- Short term (1-5 years)
- Medium term (5-15 years)
- Long term (ceases after the operational life span of the project),
- Permanent

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6.1.4 Impact Probability

- None (the impact will not occur)
- Improbable (probability very low due to design or experience)
- Low probability (unlikely to occur)
- Medium probability (distinct probability that the impact will occur)
- High probability (most likely to occur)
- Definite

6.1.5 Impact intensity

- None
- Minor
- (4) Low
- (6) Moderate (environmental functions altered but continue)
- (8) High (environmental functions temporarily cease)
- (10) Very high / unsure (environmental functions permanently cease)

6.1.6 Impact Significance

Based on the information contained in the points above, the potential impacts are assigned a significance rating (S). This rating is formulated by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact.

S= (E+D+M) P

The significance ratings are given below:

(<30) Low	(i.e., where this impact would not have a direct influence on the decision to develop in the area),
(30-60) Medium	(i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
(>60) High	(i.e., where the impact must have an influence on the decision process to develop in the area)

6.2 Impact Assessment Ratings and Mitigation Measures

The evaluation of impacts is conducted in terms of the criteria detailed in Table 3 to Table 7. The various impacts of the project are discussed in terms of impact status, extent, duration, probability and intensity. Impact significance is the sum of the impact extent, duration, probability and intensity, and a numerical rating system is applied to evaluate impact significance. Therefore, an impact magnitude and significance rating are applied to rate.

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6.2.1 Impact Assessment Rating

Table 3: Impact status

Rating	Description	Quantitative Rating
Positive	Benefit to the receiving environment	P
Neutral	No cost or benefit to the receiving environment	-
Negative	A cost to the receiving environment	N

Table 4: Impact extent

Rating	Description	Quantitative Rating
Low	**Site-specific**; occurs within the site boundary	1
Medium	**Local;** extends beyond the site boundary; affects the immediate surrounding environment (i.e., up to 5 km from the project site boundary)	2
High	**Regional**; extends far beyond the site boundary; widespread effect (i.e., 5 km and more from the project site boundary)	3
Very high	**National and/or international**; extends far beyond the site boundary; widespread effect.	4

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Table 5: Duration of the impact

Rating	Description	Quantitative Rating
Low	**Short-term**; quickly reversible; less than the project lifespan; 0 – 5 years.	1
Medium	**Medium-term**; reversible over time; approximate lifespan of the project; 5 – 17 years	2
High	**Long-term;** permanent; extends beyond the decommissioning phase; >17 years.	3

Table 6: Probability of the impact

Rating	Description	Quantitative Rating
Improbable	Possibility of the impact materialising is negligible; chance of occurrence <10%	1
Probable	Possibility that the impact will materialise is likely; chance of occurrence 10 – 49.9%.	2
Highly probable	It is expected that the impact will occur; chance of occurrence 50 – 90%	3
Definite	Impact will occur regardless of any prevention measures; chance of occurrence >90%.	4
Definite and Cumulative	Impact will occur regardless of any prevention measures;	5

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	chance of occurrence >90% and is likely to result in in cumulative impacts.	

Table 7: Impact magnitude and Significance rating

Impact	Rating	Description	Quantitative Rating
Positive	High	Of the highest positive order possible within the bounds of impacts that could occur. +	+12 to -16
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Other means of achieving this benefit are approximately equal in time, cost and effort	+6 to -11
	Low	Impacts is of a low order and therefore likely to have a limited effect. Alternative means of achieving this benefit are likely to be easier, cheaper,	+1 to -5

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		more effective and less time-consuming	
No impact	No impact	Zero impact	
Negative	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged	-1 to -5
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and possible. Social cultural and economic activities of communities are changed but can be continued (albeit in a different form).	-6 to -11

		Modification of the project design or alternative action may be required	
	High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt.	-12 to -17

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7 STORMWATER MANAGEMENT PLAN

7.1 Terminology

Stormwater management involves the control of that surface runoff. The volume and rate of runoff both substantially increase as land development occurs. Construction of impervious surfaces, such as roofs, parking lots, and roadways, and the installation of storm sewer pipes which efficiently collect and discharge runoff, prevent the infiltration of rainfall into the soil. Management of stormwater runoff is necessary to compensate for possible impacts of impervious surfaces such as decreased groundwater recharge, increased frequency of flooding, stream channel instability, concentration of flow on adjacent properties, and damage to transportation and utility infrastructure.

- Activity: Any mining related process on the mine including the operation of washing plants, mineral processing facilities, mineral refineries and extraction plants; the operation and the use of mineral loading and off-loading zones, transport facilities and mineral storage yards, whether situated at the mine or not; in which any substance is stockpiled, stored, accumulated, dumped, disposed of or transported.
- Clean area: This refers to any area at or near a mine or activity, which is not impacted by mining activities, but has the potential to become contaminated if not managed appropriately.
- Clean water system: This includes any dam, other form of impoundment, canal, works, pipeline and any other structure or facility constructed for the retention or conveyance of clean unpolluted water.
- Dam: This includes any return water dam, settling dam, tailings dam, evaporation dam, catchment or barrier dam and any other form of impoundment used for the storage of unpolluted water or water containing waste.
- Dirty area**:** This refers to any area at a mine or activity which causes, has caused or is likely to cause pollution of a water resource (i.e. generate contaminated water as a result of mining activities).
- Partially dirty area: These are areas that are unlikely to produce contaminated runoff other than elevated suspended solids.
- Dirty water system: This includes any dam, other form of impoundment, canal, works, pipeline, residue deposit and any other structure or facility constructed for the retention or conveyance of water containing waste; and
- Watercourse: This is defined in the NWA as:
    - A river or spring
    - A natural channel in which water flows regularly or intermittently
    - A wetland, lake or dam into which, or from which, water flows; and

7.2 Stormwater Management Principles

Stormwater pose a risk of flooding to project infrastructure. The aim of stormwater management measures is to mitigate these impacts by fulfilling the requirements of the National Water Act (Act 36 of 1998) and more particularly GN 704

The following principles from GN 704 are appropriate for the design of stormwater management measures site area.

- Capacity: dirty water systems are to be designed, constructed, maintained and operated in a manner that they will not spill into a clean water system or the environment more frequently than once in 50 years.
- Conveyance: All the water systems will be designed, constructed, maintained and operated so that they convey a 1:50 year flood event.
- Freeboard: as a minimum, any dirty water dams are to be designed, constructed, maintained and operated to have 0.8m freeboard above full supply level.
- Collect and re-use: ensure that dirty water is collected and re-used (dust suppression).
- Diversion: minimise flow of any surface water of floodline into mine workings.

7.3 Current Stormwater Management

- Currently there is no stormwater management designed specifically for the site.

7.4 Proposed Stormwater Measures

- Clean stormwater will be prevented from entering dirty catchments by creating perimeter beams around dirty water areas and dirty water collection infrastructure (channels and dams).
- Dirty stormwater from the operation areas (crushers, ore stockpiles, load out stations, workshops, contractors' area etc) must be collected by lined drainage channels and conveyed into dirty water containment facilities, either the dirty water dam or pollution control dam.
- During storm events, the dirty water dam will spill through new channels into a stormwater dam, and this stormwater will be pumped back to the dirty water dam after the storm event for re-use purposes.
- Dirty stormwater and any groundwater collecting within the pit must be collected and pumped to the dirty water dam.







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- Runoff from the waste rock dumps will be prevented from entering any surface water receptors by creating perimeter stormwater retention berms to collect runoff and allow it to infiltrate into the ground and/or evaporate
- The topsoil will be revegetated and any runoff from this will be classified as clean
- Dirty water uses will be dust suppression, wash down or other non-potable uses where water quality permits.

7.4.1 ROM Stockpile Consolidation

Coal stockpiles destroys natural habitats, not only through deforestation and mountain removal, but also by contaminating the surrounding land and water bodies around. This causes a disruption on the entire ecosystem, as it harms or even kills plants and animals.

- There are several mitigation measures to avoid stockpile run of mine such as lining of stockpiles, on a mining permit the height of the stockpile should not exceed 2 meters in height
- Trenches around the stockpile, which will collect dirty water which was in contact with the stockpile.
- Permeable pavement will be constructed around the stockpile.

7.4.2 Open Cast Area

There are two major sub-method within open cast mining, which are area mining and the contour mining. If the topography is relatively flat as illustrated in the left column on table 8, then the area mining is appropriate. If the terrain is hilly or mountainous as indicated by the figure on the right column, then contour mining is appropriate (Ghose, Mrinal K. "Effect of opencast mining on soil fertility." (2004).

- Pump on standby to quickly dewater the mining area, this will reduce the residence time of the water and decrease the infiltration in the mining area.

- The haul roads should be compacted, this will reduce infiltration

- Around the mining area, the area should never be flat, so that the stormwater could be directed to a channel and quickly collected

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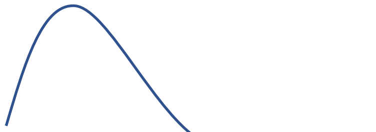
Table 8: Open cast mining methods

	
Area mining	Contour mining

7.4.3 Water Management Infrastructure

To ensure minimum soil erosion the mining permit area must have trenches to direct dirty water runoff from the mining activity and stormwater to the pollution control dam. The dirty water (mine affected water) runoff from the mine operation can then be captured and properly contained in the pollution control dam and will be managed in a closed system. Detension basin and infiltration tanks can be used to manage water on site.

- Detention basins

Detention basins are the optimal control solution to regulate stormwater flow into the pump stations. These large concrete tanks store stormwater temporarily and drain slowly when the system is ready to pump water to a treatment plant.

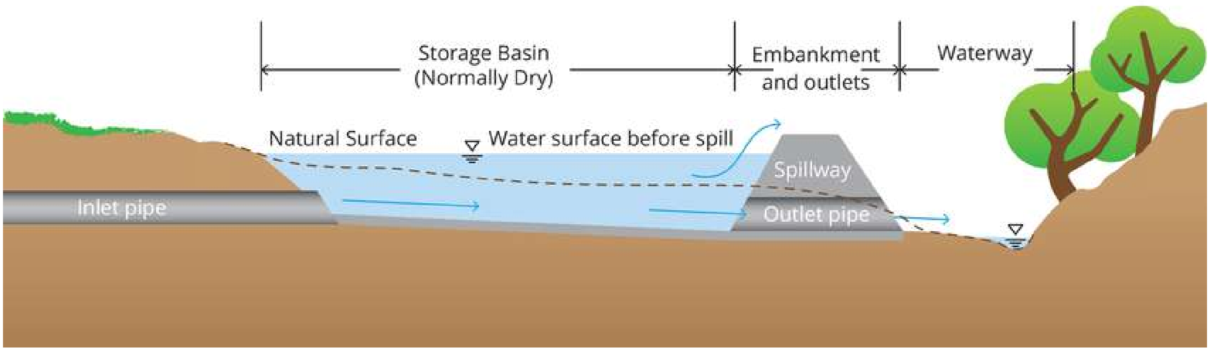


Figure 21: Detention basin.

- Infiltration tanks

These underground storage tanks are commonly made of plastic modules that infiltrate collected rainwater. Their modular system makes infiltration tanks cheaper and faster to construct than concrete detention basins, but they do not have the same capacity for storing and handling large volumes of runoff in short periods of time.

8. MONITORING PLANS

8.1. Surface Water Quality

Overburden, topsoil, and waste stockpiles are all expected at the mine site. Stockpiles will be distinguished by bare soil, steep side slopes, and significant surface run-off. Run-off from these stockpiles is likely to be sediment-rich, whereas acid rock drainage from carbonaceous stockpiles may occur as pyrites in the overburden are exposed to oxygen.

During the Construction and Operational Phases of the mine project,water body adjacent to the mining permit area should be sampled on a monthly basis.

Monitoring during the Decommissioning Phase will be based on the Operational Phase monitoring, adapted to suit the final works to be implemented during this phase. However, in terms of surface water this will be primarily downstream of the area as for the Operational Phase.

Monitoring during the Post Closure Phase will be undertaken only where required to prove the sustainability of the site. In terms of surface water, this relates primarily to managing the surface topography (monitoring for settlements), and water quality and levels within the mined-out area.

Any infrastructure (PCDs) that will remain on site, post closure, will continue to be included in the surface water monitoring programme and should be monitored in terms of water quality and water levels on a monthly basis.

8.2. Stormwater Infrastructure

Dirty water inside the mine from the mining activities, stormwater drainage or rainfall must be channelled to the pollution control dam through water trenches. The farm must have water trenches, to minimize and prevent possibility of gully erosion inside the mining permit area. Stormwater runs rapidly into storm drains, sewer systems and drainage ditches and can cause flooding, erosion, turbidity (or muddiness), storm and infrastructure damage, however stormwater infrastructure capture and re-use stormwater to maintain or restore natural hydrologies.

Stormwater infrastructure should be monitored together with water quality. It is necessary to monitor these infrastructures because overtime they lose their integrity and or ability to perform their ultimate purpose. It should be based on monthly monitoring which will involve taking notes of the structure and providing recommendations on a monthly basis.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusion and Summary

The application for the mining permit is proposed to be developed on a gentle topography with the project area situated within 1715 and 1730 m above mean sea level, in this project contour lines indicates a gentle slope and a low chance of soil erosion. The project mining permit area falls on portion of portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province. The identified water bodies in the proximity of the project include the perennial river, non-perennial river, seep wetlands and channelled valley-bottom wetland. There wetlands are more than 500 m away from the project area and the measures that will be put in place include, monitoring the steam and making sure that the proposed project does not affect the water bodies.

South Africa is a water scarce country, as such ways to ensure that the quality and quantity is conserved to meet basic needs are of paramount importance. More ways and site-specific measures are needed to ensure that such is possible. Through desktop and site assessment observations, the following conclusions were made:

- During construction, presence of heavy machinery which will result in Hydrocarbon spillage. Clearing of vegetation which will result in decrease in infiltration. Use of VOCs on site, dewatering and leakage of ablution chemicals.
- Operational phase, the adjacent water body will likely be affected by dust settling in the water and possibly leaching of heavy minerals.
- Post mining phase, AMD as a result of non-maintenance of the mined-out area.
- The study area is underlain by the Vryheid formation which is the coal bearing formation in the Witbank coalfield, which is under the Ecca group, part of the karoo supergroup.
- The area is overlain by undifferentiated structureless soil and moist Highveld grassland.

9.2 Recommendations

- Proper stormwater management is recommended to prevent the risk of water resources contamination.

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- The study area falls on a fractured aquifer system, the mine planning should take into consideration the fracture zones in the Vryheid formation, drilling activities should not contact the fractures as that is where most groundwater in the area is found and to prevent possible groundwater pollution from residual explosive material used.
- The numerical model should be recalibrated as soon as more hydrogeological data such as monitoring holes are made available. This would enhance model predictions and certainty.
- It is recommended that there should be regular testing or monitoring of surrounding soil, water resources to detect any change in chemistry so that remedial measures are implemented in time.
- The monitoring process throughout the existence of the project, the chemical and physical parameters of the water samples should be tested and compared with the SANS241: 2015
- There should be soil, water resources and land pollution mitigation measures on site.
- Wastewater source should be identified, and mitigation measures put in place to prevent groundwater contamination.
- The stockpile, there should be regular monitoring of any heavy metal which could be exposed, as such could result in leaching during rainfall.
- Proper and competent structure of the tailings dam should be built, to contain liquid, or solid waste and to prevent such waste from entering the outside environment.
- According to section 21(S21) of the National Water Act 36 of 1998, if a proposed project triggers any of the listed S21 activities, a water use license must be applied for. For this project, there will be activities which includes abstraction of water from groundwater, mining activities within 100 m from the water courses dust suppression, dewatering, and ROM stockpiles. It is therefore recommended that a water use license be applied for.

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MINING PERMIT APPLICATION

REHABILITATION AND CLOSURE PLAN

REPORT PREPARED BY:

Singo Consulting (Pty) Ltd

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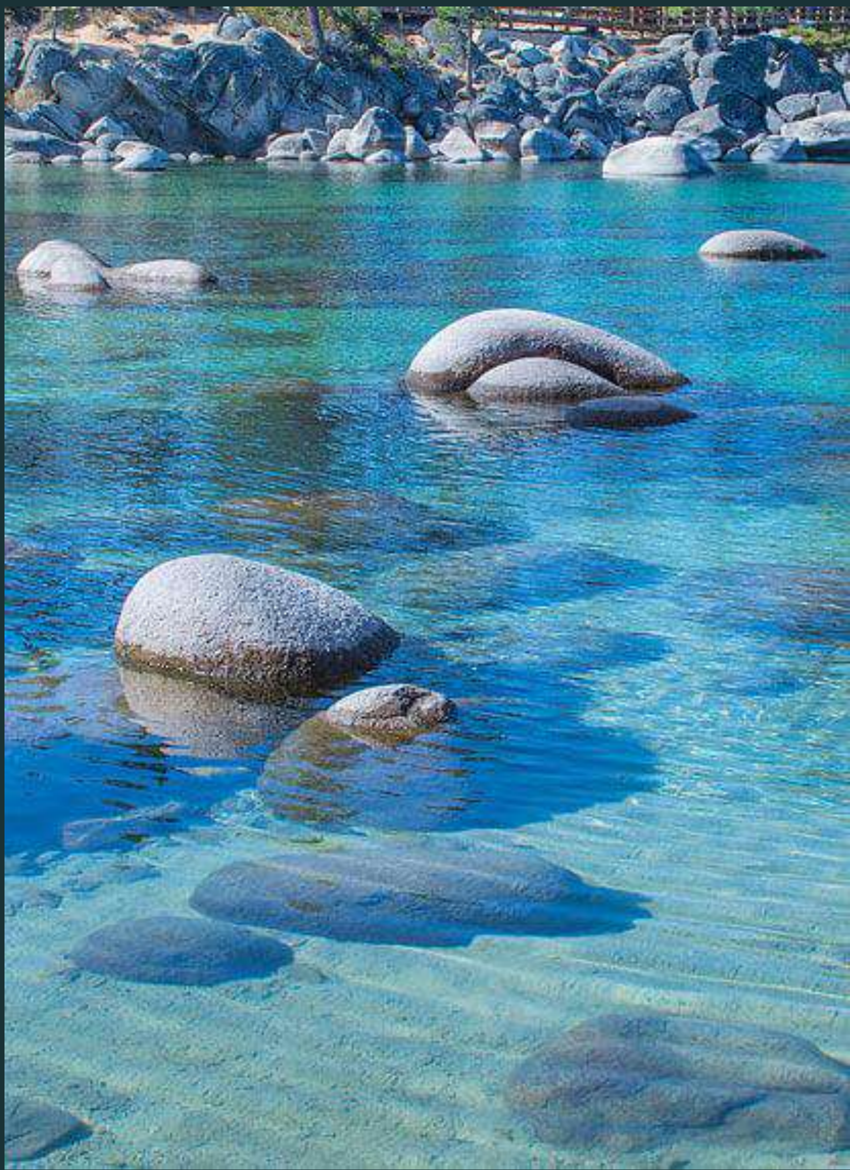
Rehabilitation and Closure Plan for the proposed Mining Permit application for Tornowize (Pty) Ltd on a Portion of Portion 2 of the Farm Driehoek 273 IS, situated in the Magisterial District of Ermelo, Mpumalanga Province.



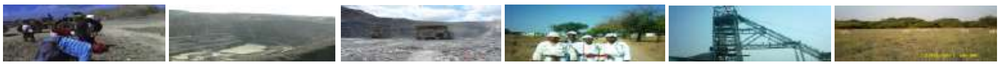
Tornowize PTY (LTD)

DMRE REF: MP 30/5/1/1/3/13557 MP

Report Credentials.

Disclaimer

The opinion expressed in this and associated reports are based on the information provided by Tornowize (Pty) Ltd to Singo Consulting (Pty) Ltd ("Singo Consulting") and is specific to the scope of work agreed with Tornowize (Pty) Ltd. Singo Consulting acts as an advisor to the Tornowize (Pty) Ltd and exercises all reasonable skill and care in the provision of its professional services in a manner consistent with the level of care and expertise exercised by members of the environmental profession. Except where expressly stated, Singo Consulting has not verified the validity, accuracy or comprehensiveness of any information supplied for its reports. Singo Consulting shall not be held liable for any errors or omissions in the information given or any consequential loss resulting from commercial decisions or acts arising from them. Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by Tornowize (Pty) Ltd or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Singo Consulting is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise. These views do not generally refer to circumstances and features that may occur after the date of this study, which were not previously known to Singo Consulting (Pty) Ltd or had the opportunity to assess.



Project details		
Report type	**Rehabilitation Plan for a Mining Permit application**	
Project title	Rehabilitation Plan for Mining Permit application for Tornowize (Pty) Ltd on Portion of Portion 2 of the Farm Driehoek 273 IS, under the Magisterial District of Ermelo, Mpumalanga Province.	
Mineral (s)	Coal Resources	
Client	Tornowize (Pty) Ltd	
Site location	Portion of Portion 2 of the Farm Driehoek 273 IS, under the Magisterial District of Ermelo, Mpumalanga Province.	
Version	01	
Date	August 2023	
		Electronic signatures
Compiled by	Khulekani Zwane (Hydrogeologist) Singo Consulting (Pty) Ltd	
Reviewed by	Mutshidzi Munyai (Hydrogeologist) Singo Consulting (Pty) Ltd (Water Resources Science (Professional Natural Scientist), Environment Science (South African Council for Natural Scientific Professions) (SACNASP Registration Number 122464)	
Final review and approval	Dr. Kenneth Singo (Principal Consultant of Singo Consulting (Pty) Ltd)	

EXECUTIVE SUMMARY

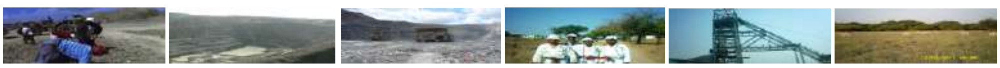
Singo Consulting Pty Ltd has been requested by **Tornowize (Pty) Ltd** to compile a Rehabilitation and Closure Plan, as well as financial provision for mining operation which will involve opencast mining on Portion of Portion 2 of the Farm Driehoek 273 IS, under the Magisterial District of Ermelo, Mpumalanga Province, in South Africa to support the Environmental Authorisation Process.

The document supplies the Department of Mineral Resources & Energy (DMRE) with information pertaining to closure planning for the mining activities as required in terms of the National Environmental Management Act 107 of 1998 (NEMA) and the Mineral and Petroleum Resources Development Act 28 of 2002. The contents of this Rehabilitation and Closure Plan have been prepared as per the requirements of Appendix 5 of the NEMA EIA Regulations of 2014 (GNR 517) and as stipulated under Appendix 4 of GNR 1147.

The Mining activities would be conducted in phases:	
Site Preparation	Topsoil, subsoil, overburden, discard and ROM stockpiles
Opencast mining	Hauling and transportation
Invasive Drilling	Integrated discard
Blasting	Final decommissioning and Rehabilitation and closure

DESCRIPTION OF THE SCOPE OF THE OVERALL ACTIVITY

The method of mining preferred for this proposed mining permit is the opencast method, which involves removal of ore from seam relatively near the surface by means of open cast. Open cast method is a surface mining technique of extracting rock or minerals from the earth by their removal of rock from an Open cast or borrow. Open-cast mines are typically enlarged until either the mineral resource is exhausted, or an increasing ratio of overburden to ore makes further mining uneconomic. The pit at the site will be worked by cutting a bench which will be progressed further north-easterly direction. The mining method will make use of blasting and will make use of ripper since it is close to the surface by means of explosives to loosen the hard rock (overburden) when necessary; the material (i.e. overburden) will then be loaded by excavators and hauled to the area designated for overburden stockpile on site Coal will be loaded and hauled to a mobile crushing and screening plant that will be established within the boundaries of the mining area or elsewhere out of the mining area. Once crushed and screened the Coal will be then stockpiled and transported to clients via trucks and trailers. All activities will be contained within the boundaries of the mining site of the mining permit.



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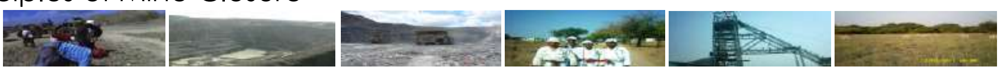

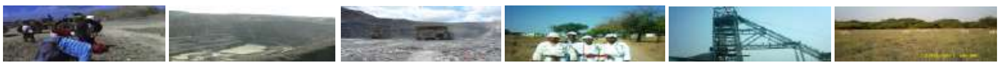

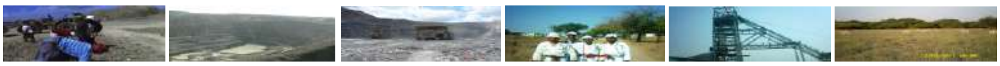

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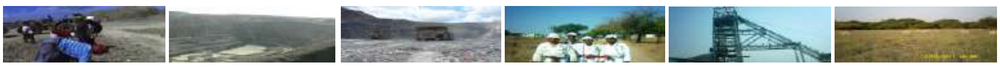
1 INTRODUCTION

South Africa's legislation unambiguously places the responsibility of mitigating environmental damage as a result of mining operations on mining companies. The liability exists throughout the life of the mine, and beyond in terms of residual impacts. It includes commitments for remediation and/or rehabilitation. There now have been full police from the department of mineral which encourage to pay rehabilitation before mining activities commence, where the South African mining industry and mining companies now fully accept the concept and responsibility of mine site rehabilitation and decommissioning.

According to the Chamber of Mines Guidelines for the rehabilitation of mined land 'effective rehabilitation', is defined as "rehabilitation that will be sustainable, in the long term, under normal land management practices" (Chamber of Mines, 2007; Department of Minerals and Energy, 2008). Mine rehabilitation therefore must be considered as an on-going process aimed at restoring the physical, chemical and biological quality or potential of air, land and water



regimes disturbed by mining to a state acceptable to the regulators and to post mining land users (Whitehorse Mining Initiative, 1994).

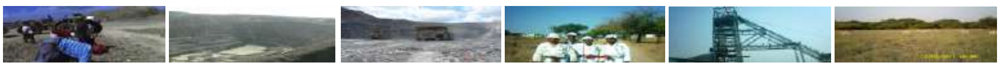
Singo Consulting Pty Ltd has been tasked by **Tornowize (Pty) Ltd** to compile a Rehabilitation and Closure Plan, as well as financial provision for its mining activities in support of the Environmental Authorisation Process. Contained herein is the conceptual rehabilitation plan, which is one of the specialist studies that have been compiled for the project. The objective of the rehabilitation plan is to ensure activities associated with mine construction, operation and closure will be designed to prevent, minimise, or mitigate adverse long-term environmental and social impacts and create a self-sustaining ecosystem.

The conceptual rehabilitation plan should be used to guide construction, operation and decommissioning phases of the project and guide the final rehabilitation of the project area. The report must be updated with the mine plan as often as needed to ensure that it is fully applicable to the activities associated with the operations. Rehabilitation report aims to provide standardized guidance for setting corporate standards and policies, and site-specific land rehabilitation plans. It will also provide technically sound, simple, and practical approaches for implementation by all levels of land rehabilitation practitioners, mine planning teams, and administrating regulators; all of whom are responsible for mining-related land.

2. ASSUMPTIONS AND LIMITATIONS

For the compilation of the rehabilitation plan, it is assumed that:

- All relevant information will be made available, including designs for the waste rock facilities and tailings facility.
- All maps for the area will be made available, including the most up to date mine.
- All engineering inputs appointed contractor's responsibility and are thus not included in this report.
- The rehabilitation guidelines and plan are dependent on the specialist studies done for the area and the full mine plan for the project.



3 STUDY AREA AND DESCRIPTION

3.1 Project Area

Farm name	Portion of Portion 2 of the Farm Driehoek 273 IS, under the Magisterial District of Ermelo, Mpumalanga Province.
Application area (ha)	5 hectares
Magisterial district	Ermelo
Distance and direction from nearest town	Situated approximately 14.31 north-west of Ermelo and approximately 32.02 km South-east of Hendrina

Figure 1 below shows the locality of the Coal mining permit application on Portion of Portion 2 of the Farm Driehoek 273 IS, under the Magisterial District of Ermelo, Mpumalanga Province, South Africa. The project is situated approximately 14.31 north-west of Ermelo and approximately 32.02 km South-east of Hendrina. The mining permit area is covered by cultivated land, and the project covers an area extent of 5 hectares.

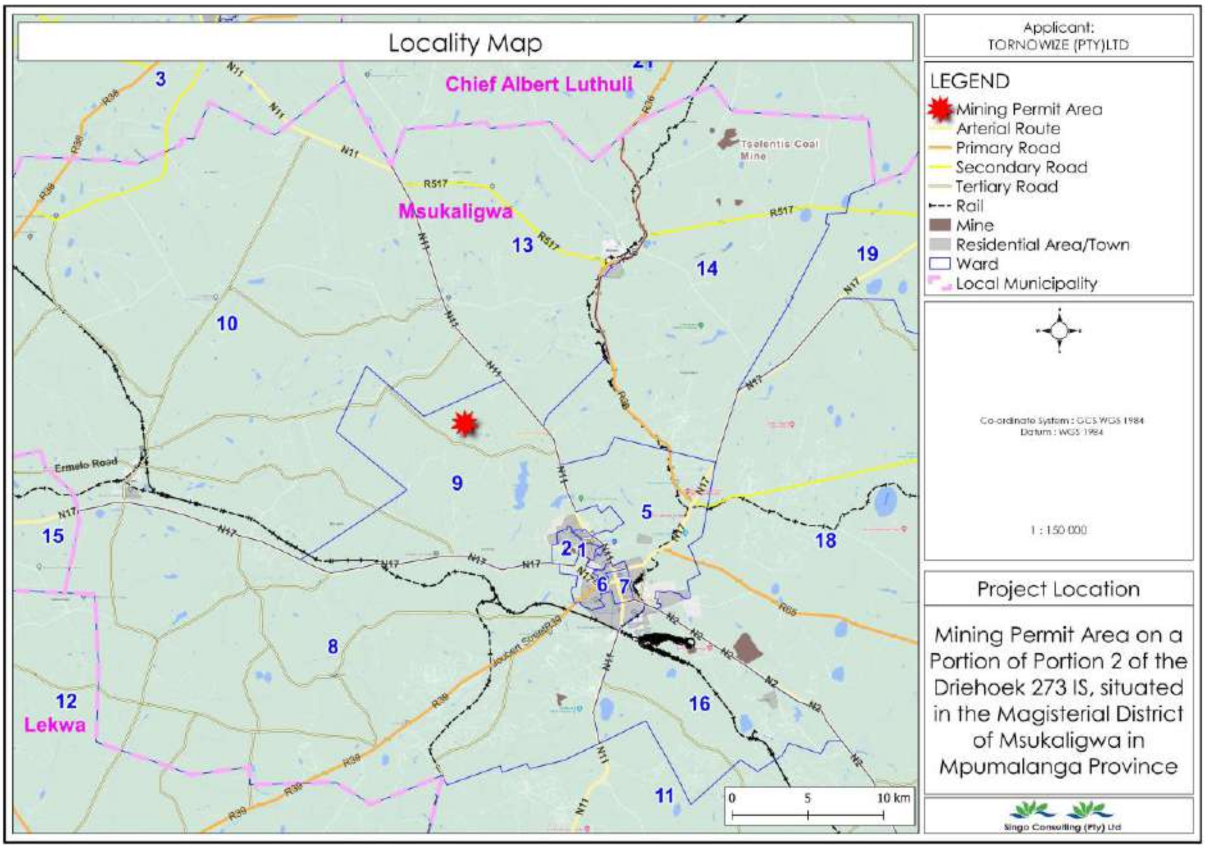
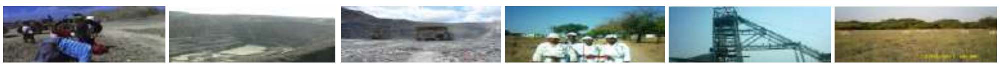


Figure 1: Locality map of the proposed mining area.

Anticipated Infrastructure relating to the mine include but not limited to the following:

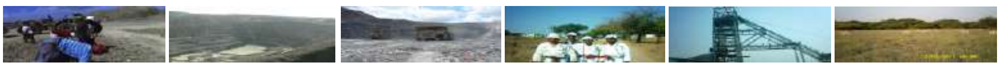
- Temporary offices
- Earth moving equipment.



- Drainage systems and PCD
- Roads
- Excavating equipment ROM stockpiling
- Mobile crushing and screening plant
- Fencing
- Parking area
- Workshops
- Chemical mobile toilets (Males and Females)
- Dirty Water Trench
- Clean Water Trench

3.2 Description of The Scope of the Overall Activity

The method of mining preferred for this proposed mining permit by Tornowize (Pty) Ltd Open cast method, which involves removal of ore from seam relatively near the surface by means of Open cast. Open cast method is a surface mining technique of extracting rock or minerals from the earth by their removal of rock from an Open cast or borrow. Open-cast mines are typically enlarged until either the mineral resource is exhausted, or an increasing ratio of overburden to ore makes further mining uneconomic. The open cast at the site will be worked by digging from topsoil to the until our reaching productive material from top layer. The mining method will make use of blasting and make use of ripper since it is close to the surface by means of explosives to loosen the hard rock (overburden) when necessary; the material (i.e. overburden) will then be loaded by excavators and hauled to the area designated for overburden stockpile on site while Coal will be loaded and hauled to a mobile crushing and screening plant that will be established within the boundaries of the mining area or elsewhere out of the mining area. Once crushed and screened the Coal will be then stockpiled and transported to clients via trucks and trailers. All activities will be contained within the boundaries of the mining site of the mining permit.



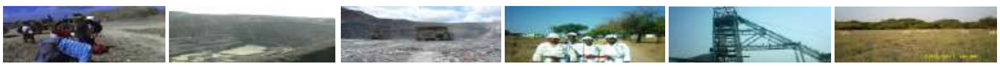
4 REHABILITATION OBJECTIVES

The scope and objectives of this report aims to ensure the Department of Mineral Resources & Energy (DMRE) is presented with a document that addresses all the legal requirements. As per Annexure 4 of the GNR 1147 regulations, "The minimum content of a final rehabilitation, decommissioning and mine closure plan", the objective of the final rehabilitation, decommissioning and mine closure plan, which must be measurable and auditable, is to identify a post-mining land use that is feasible. Internationally and in the South African context, the broad rehabilitation objectives include, explained below:

- Restoration of previous land capability and land use
- No net loss of biodiversity
- What the affected community wants, the affected community gets.

Rehabilitation objectives need to be tailored to the project at hand and be aligned with the Environmental Management Programme (EMPr) and Mine Closure Plan. And thus, the overall rehabilitation objectives for the project are as follows:

- Re-establishment of the pre-mining land capability to allow for a suitable post mining land use.
- Maintain and minimise impacts to the functioning wetlands and water bodies within the area.
- Implement progressive rehabilitation measures where possible.
- Prevent soil, surface water and groundwater contamination.
- Comply with the relevant local and national regulatory requirements; and
- Maintain and monitor the rehabilitated areas.



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5 BASELINE ENIRONMENT

5.1 Soils and Land Capability

Land capability is the ability of land to support a given land use without causing damage. It depends on soil capability in combination with climate. The land capability depends on soil depth which was determined at soil survey positions. Survey positions were recorded as waypoints using a handheld (Global Positioning System (GPS).

5.2 Soil profiles Interpretation

The soil classes map in Figure 2 below, shows that the mining permit area is covered with Association of Classes 1 – 4: Undifferentiated Structureless soil. This type of soil means that water is removed from the soil very rapidly. Soils commonly are coarse textured and have very high permeability or are very shallow. Diagnostic zone is entirely brownish, with few or no grey mottles or grey clay films. Some soils have silt coats in the upper B horizon.

Soil depth

Depth of the soil profile is from the top to the parent material or bedrock. This type of soil can be classified as a restricted soil depth. A restricted soil depth is a nearly continuous layer that has one or more physical, chemical, or thermal properties.

Soil Drainage

Soil drainage is a natural process by which water moves across and out of the soil because of the force of gravity. The soils in the proposed area have an excessive drainage due to the soils having very coarse texture. Their typical water table is less than 150.

Erodibility

Erodibility factor (K-factor) is the inherent yielding or non-resistance of soils and rocks to erosion by runoff and rainfall impact. The undifferentiated structureless soils have high erodibility. A high erodibility implies that the same amount of work exerted by the erosion processes lead to a larger removal of material.

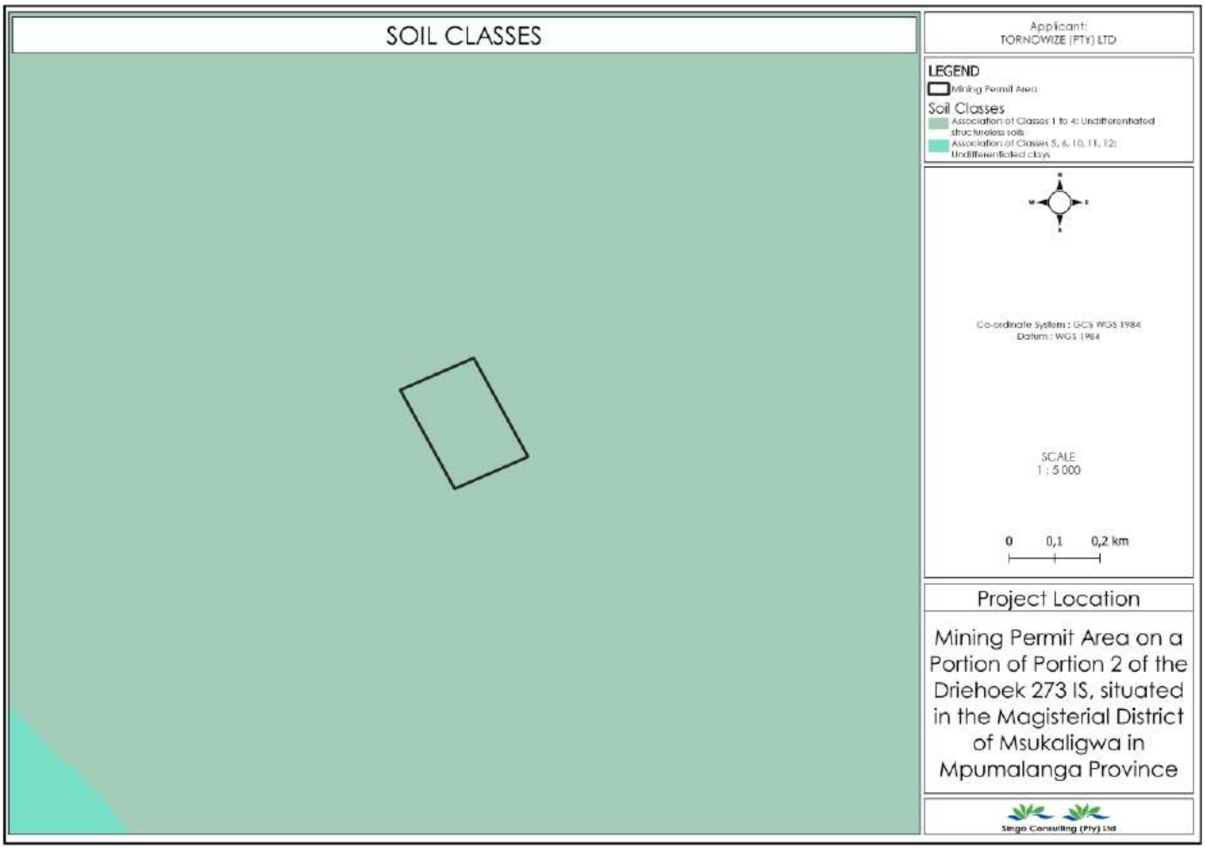


Figure 2: soil class map of the project area.

5.3 Land Capability and Land Use

The proposed project area is associated with an arable land, this is the type of land that does not qualify as a wetland and the soil has less than 10% (by volume) rocks or pedocrete fragments lager than 1000 mm. It is observed that approximately 1 km away from the project area there is a grazing land, grazing land is a land that does not qualify as wetland or arable land (refer to Figure 3). The land within which the proposed project area is located in a plantation land cover, and it is not associated with critical or sensitive biodiversity areas Figure 4.

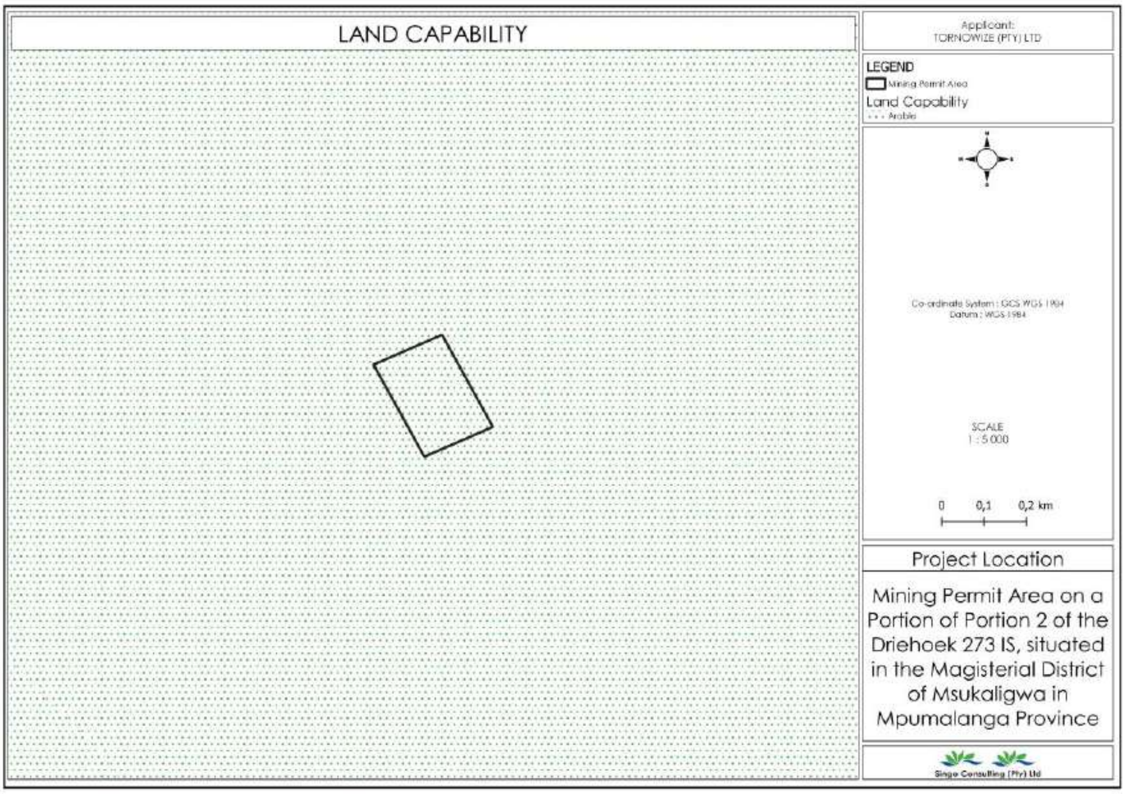


Figure 3: Land capability map of the area

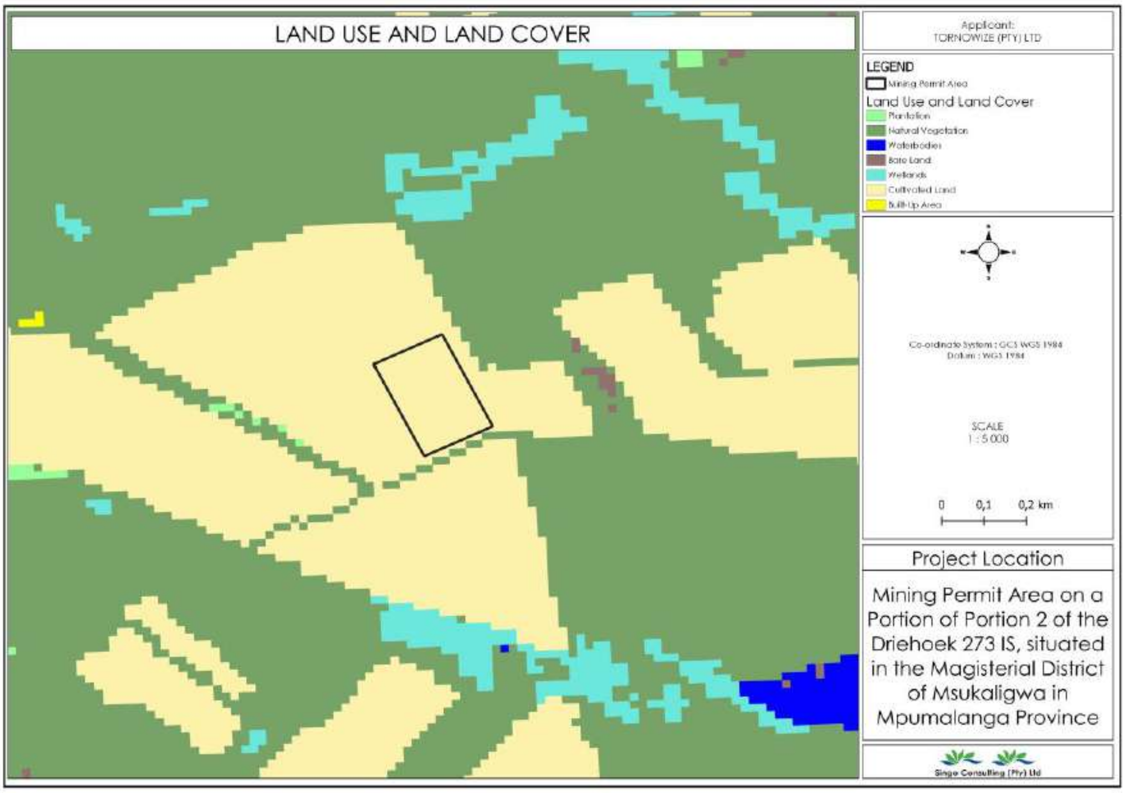
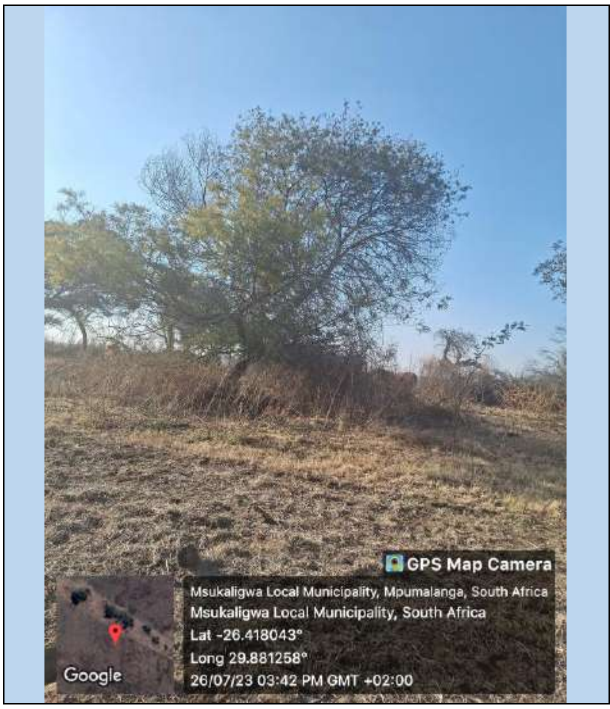


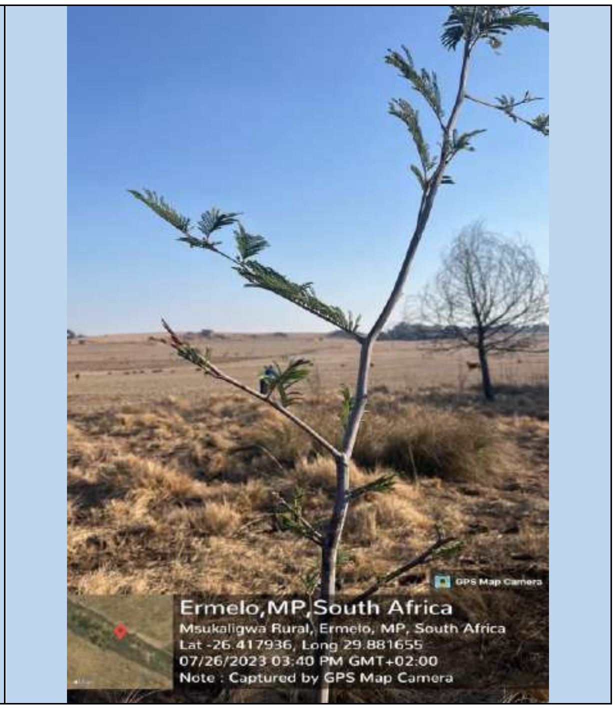
Figure 4: Land use map

5.4 Fauna and Flora

5.4.1 Flora

Table 1: Site Pictures





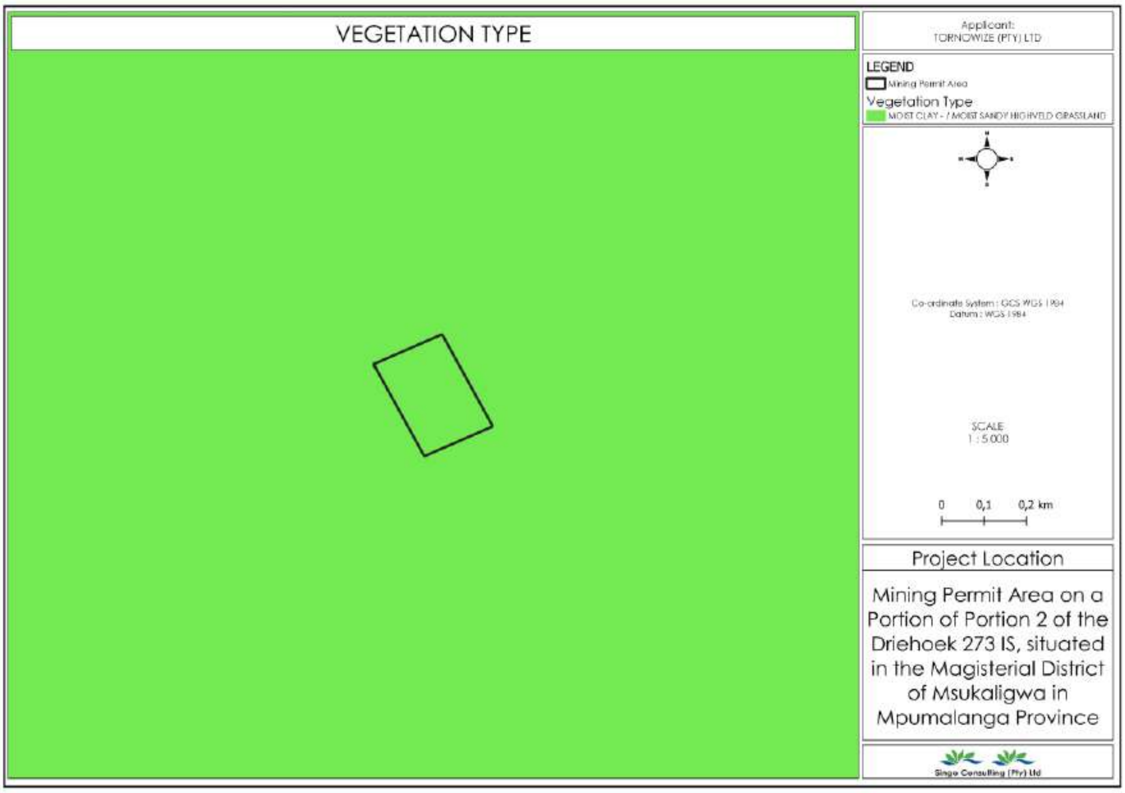


Figure 5: Vegetation map within the proposed area

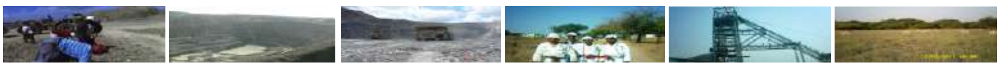
5.4.2 Fauna

Grassland biomes consist of large open areas of grass. Trees can be present, but they are infrequent. The animals found in grasslands range from African elephants (Loxodonta africana) to various species of prairie dogs (Cynomys spp.) including many endangered taxa. The majority of the proposed area has been transformed by livestock grazing and is considered to be at a low ecological sensitivity. No Red Data List (RDL) mammals were observed during the site survey within the study area. In terms of conservation, the likelihood that any threatened mammal species that are listed by the Mpumalanga Province should be encountered within the study area is deemed low due to the high levels of human activity, use of land for grazing by communities, limited favorable faunal habitat availability, transformed habitat within the study area and the existing mining infrastructure within the study area. During the assessment period low faunal species diversity was thus encountered within the proposed area.

5.5 Surface and Ground Water

The proposed mining permit area is located in the southern region of the Mpumalanga Province. The topographical map of the study area is depicted in Figure 6 which shows the elevation changes and landforms. Elevation is represented by contour lines and a contour interval of 5 m was used.

The mining permit area is situated in a gentle topography. The slope of the area is slightly deeping from the south towards the north-eastern direction. There are watercourses situated on the northern side and the southern side of the mining permit area. There is a dam situated on the south-eastern side of the project area, and a non-perennial river in the north-eastern direction. Two wetlands, namely the seep wetland and the channelled valley bottom wetland are situated approximately 382 m and 600m respectively on the northern side of the project area. Within the boundaries of the mining permit, no waterbodies were identified.



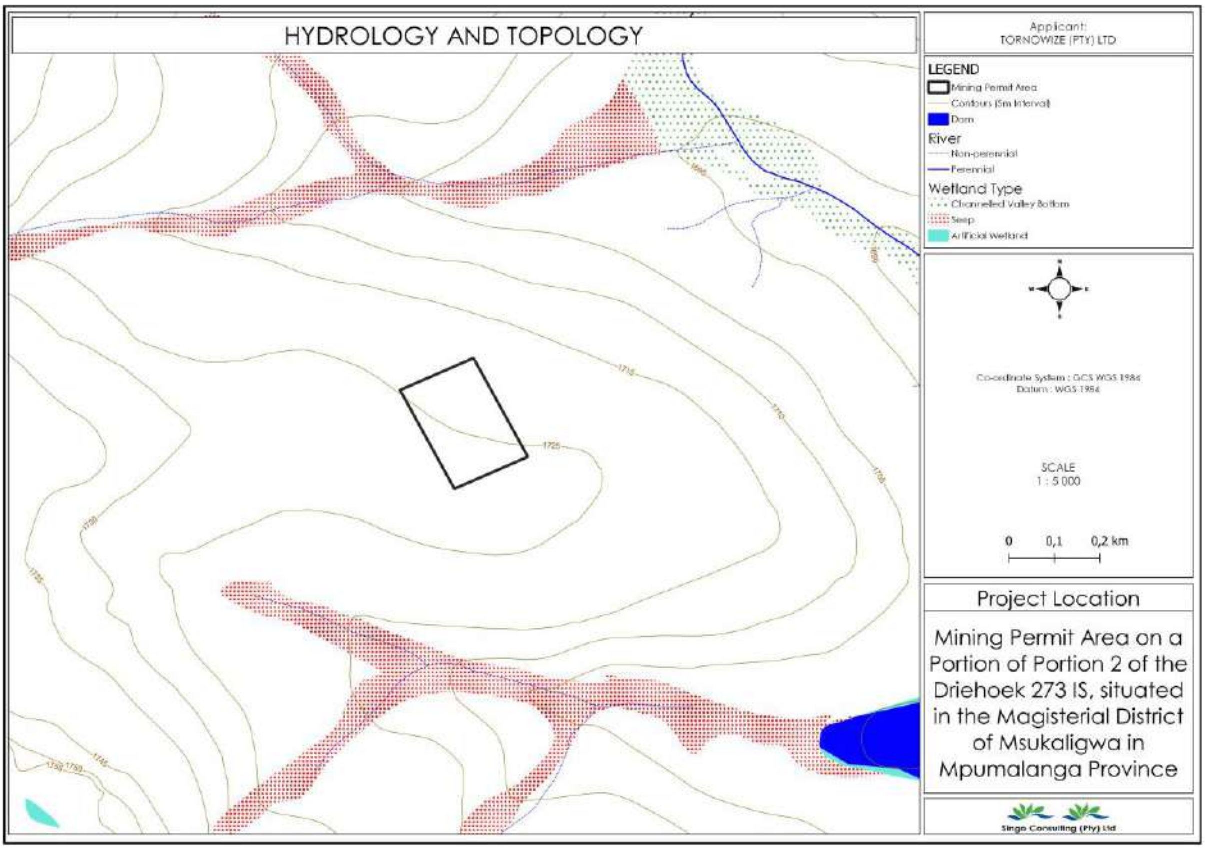
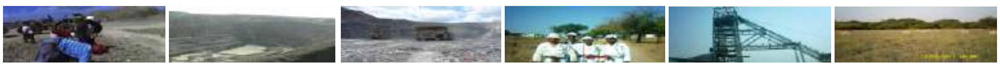


Figure 6: Hydrological map of the study area



6 LEGISLATIVE REQUIREMENTS

South Africa's legislation unambiguously places the responsibility of mitigating environmental damage as a result of mining operations on mining companies. The liability exists throughout the life of the mine, and beyond in terms of residual impacts. It includes commitments for remediation and/or rehabilitation.

The key legislation governing the requirements for legislation for rehabilitation is contained in the following acts:

- The Constitution of the Republic of South Africa (Act 108 of 1996) ("The Constitution")
- The National Environmental Management Act (Act 107 of 1998, NEMA)
- The Mineral and Petroleum Resources Development Act (Act 28 of 2002, MPRDA)
- The National Water Act (Act of 1998, NWA)
- The National Environmental Management: Biodiversity Act (Act No. 10 of 2004, NEMBA)
- Conservation of Agricultural Resources Act (Act 43 of 1983, CARA)
- National Forests Act (Act 84 of 1998, NFA)
- Mine Health and Safety Act (Act 29 of 1996)
- National Heritage Resources Act (Act 25 of 1999)
- Occupational Health and Safety Act of 1994
- Atmospheric Pollution Prevention Act (Act 45 of 1965)
- Hazardous Substances Act (Act 15 of 1973)
- National Environmental Management: Air Quality (Act 39 of 2004, NEM: AQA)
- National Environmental Management: Waste Management (Act 50 of 2008);
- National Veld and Forest Fire Act (Act 101 of 1998)
- Promotion of Access to Information Act (Act 2 of 2000)

6.1 The Constitution

The Constitution, whilst it does not contain specific provisions for rehabilitation, does enshrine the right of every citizen to an environment that is not harmful to health or wellbeing (Section 24). The inclusion of environmental rights as part of fundamental human rights ensures that environmental considerations are recognised and respected during the administrative and legal processes implemented during the closure and rehabilitation of mined land.

The Bill of Rights, which is an aspect of the Constitution, also provides for rights pertaining to administrative justice, capacity or standing to institute legal proceedings and access to information. These all become relevant within the context of protection and management of the environment during all stages of the mine's life cycle.

6.2 The National Environmental Management Act (Act 107 of 1998)

NEMA aims to establish overarching general guidelines and principles to facilitate environmental management. It promotes Integrated Environmental Management (IEM) (Sections 23 and 24), which aims to integrate environmental management with development.

The concept of rehabilitation has become an imperative part of South African environmental law. Section 28 of NEMA imposes a duty of care to prevent, or where authorised, to minimise environmental degradation. It also provides examples of steps that should be taken to prevent environmental degradation, including the provision for rehabilitation in Section 28 (3) (f), which states that the measures may include measures to "remedy the effects of pollution and degradation. Section 2 of the Act lists a set of principles, with which environmental management must comply and to which Section 37 (1) of the MPRDA refers directly as follows: "The principles set out in Section 2 of the National Environmental Management Act, 1998 (Act No.107 of 1998)

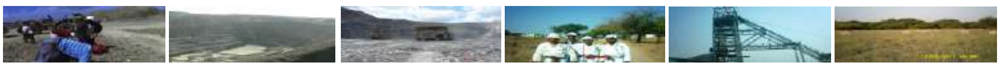
(a) apply to all prospecting and mining operations, as the case may be, and any matter relating to such operation; and

(b) serve as guidelines for the interpretation, administration and implementation of the environmental requirements of this Act.

Section 2 (b) of NEMA states that they "serve as the general framework within which environmental management and implementation plans must be formulated.

The principles of Section 2 of NEMA that are particularly applicable to rehabilitation are:

- The precautionary principle (2 (4) (a) (vii)), which lays the onus on the developer or operator to take a risk averse and cautious approach during decision making, that recognised the "limits of current knowledge about the consequences of decisions and actions". Where uncertainty exists action must be taken to limit the risk.
- The cradle-to-grave (or lifecycle responsibility) principle (2 (4) (e)) states that "responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle
- The project must comply with the requirements for sustainable development (2 (3)), which requires consideration of all relevant factors (2 (4) (a)). A holistic, integrated approach must be followed and the "best practicable environmental option (defined as being "the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term") must be selected.
- The polluter-pays principle (2 (4) (p)) is generally regarded as an important guiding principle for environmental management. The White Paper A Minerals and Mining Policy for South Africa October 1998 state that mining must internalise its external costs.



In Paragraph 4.4 (ii) it states that "The mining entrepreneur will be responsible for all costs pertaining to the impact of the operation on the environment.

6.3 The Minerals and Petroleum Resources Development Act (Act 28 of 2002)

The MPRDA is the principal legislation governing the mining industry and along with its regulations (GN R.517) has several provisions relating to rehabilitation. The objectives of the act in terms of rehabilitation are to give effect to environmental rights as outlined in the constitution. The cradle-to-grave principle (described above) is applied by means of the above-mentioned provisions, which cover the various stages of the project that apply from the period prior to mining through the construction, operation to closure and beyond.

6.4 Integrated Environmental Management and Responsibility to Remedy (Sections 38 and 39, Regulations 51 and 55 of GN R527)

The mining permit holder must give effect to the principles of IEM as laid down in Chapter 5 of NEMA. An annual review for financial provision and a biennial review (or as stipulated in the EMP, or as agreed to in writing by the Minister of Minerals and Energy) for auditing to ensure that the requirements of IEM are being met, are required (Regulation 55 (2) of GN R.527).

6.4.1 Rehabilitation

Furthermore, Section 38 (1) (d) states that the environment that has been affected by prospecting or mining operations must be rehabilitated to its natural or predetermined state or land use according to the principle of sustainable development (cf. Sections 2 (3) and 2 (4) (a) of NEMA as discussed above as well as Regulation 56, GN R.527 of the MPRDA).

6.4.2 Responsibility for and Management of Adverse Impacts

Section 38 (1) (e) of the MPRDA states that the holder of the mining permit is responsible for any adverse environmental impact resulting from the mining operations, "which may occur inside and outside the boundaries of the area to which such right, permit or permission relates." In addition, section 39 (3) (d) provides for a description in the EMPr of the manner whereby remediation of adverse environmental impacts and compliance with prescribed waste management standards are to be implemented.

This along with the provisions in Section 28 (1) of NEMA regarding care of duty and Regulation 56 of GN R527, which also provides for the land being rehabilitated, as far as is practicable, to its natural state, or to a predetermined and agreed standard of land use which conforms with the concept of sustainable development means that the land used by applicant as the permit holder must be restored to its previous state where appropriate, pending stakeholder approval.

6.5 Financial Provision (Sections 23 and 41 and Regulations 10, 52 – 54 of GN R527)

The applicant for a mining permit must make financial provision for the prevention, management, or rehabilitation of adverse environmental impacts before mining commences. In terms of Section 23, a mining permit is granted only if a number of conditions are met including the requirement that mining will not result in unacceptable pollution, ecological degradation, or damage to the environment. Regulation 10 requires that detailed documentary proof must be submitted to show that the applicant for a mining permit has the technical ability or access thereto to conduct the mining activities and to mitigate and rehabilitate relevant environmental impacts.

Section 41 stipulates that approval of an EMPr can only be granted once financial provision for rehabilitation or management of negative environmental impacts has been made.

The obligation for financial provision encompasses the entire life cycle of the mining operation from the stage prior to prospecting and/or mining operations through the various phases to closure and beyond as per the cradle-to-grave principle of NEMA. It remains in force until the Minister issues a closure certificate in terms of Section 43. Once the closure certificate has been issued the Minister "may" return the remaining portion of the financial provision. In the event that rehabilitation and closure are not done properly, the Minister may seize assets of the mineral rights holder to defray costs. In the event that this cannot be done then the cost of fixing the problem has to be paid from the Government fund. As a result, this is why there is such a strong focus on rehabilitation and closure plans and the financial provision for closure.

Regulation 54 deals with the quantum of financial provision and stipulates that it must be updated and reviewed annually. It must include, amongst others, a detailed breakdown of the cost required for post-closure management of residual and latent environmental impacts.

6.6 Financial Provision of the Project

CALCULATION OF THE QUANTUM

Applicant: Tornowize PTY (LTD)
Evaluator: **Singo Consulting (Pty) Ltd**

Ref No.: **MP 30/5/1/1/3/13557 MP**
Date: **31/07/2023**

No.	Description	Unit	A Quantity	B Master Rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	19	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	271	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	400	1	1	0
3	Rehabilitation of access roads	m2	0,05	49	1	0,01	0,0245
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	471	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	257	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	542	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	4,99	284292	0	1	0
7	Sealing of shafts adits and inclines	m3	0	146	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0,36	189528	0	1	0
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	236054	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	685612	1	1	0
9	Rehabilitation of subsided areas	ha	0	158701	1	0,01	0
10	General surface rehabilitation	ha	4,99	150138	1	1	749188,62
11	River diversions	ha	0	150138	1	1	0
12	Fencing	m	0	171	1	1	0
13	Water management	ha	0,104	57087	1	0,01	59,37048
14	2 to 3 years of maintenance and aftercare	ha	4,99	19980	1	1	99700,2
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
					Sub Total 1		848948,215

No.	Description	Amount	weighting factor 2	Amount
1	Preliminary and General	101873,7858	1	101873,7858
2	Contingencies	84894,8215		84894,8215
			Subtotal 2	1035716,82
			VAT (15%)	155357,52
			Grand Total	**1191074**

Signed
Date 31/07/2023

Figure 7: Financial Provision

The amount of **R1191074** for financial provision was calculated for the mining application. Financial provision was made in the form of a bank guarantee upon the successful granting of the mining permit.

7 Mine Closure

7.1 Principles of Mine Closure

Regulation 56 of the Regulations provides that the holder of a prospecting right, mining permit, retention permit or mining permit must ensure (amongst others) that:

- The land is rehabilitated, as far as is practicable, to its natural state, or to a predetermined and agreed standard of land use which conforms with the concept of sustainable development; and
- Prospecting or mining operations are closed efficiently and cost effectively.

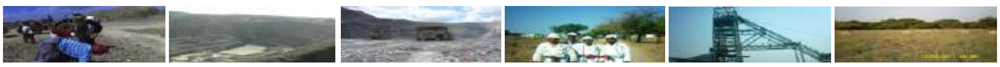
7.2 The National Water Act (Act 36 of 1998)

The NWA aims to regulate the protection, use, development, conservation, integrated management and control of water resources in the Republic of South Africa in an equitable, sustainable and efficient manner (a full description is given in Section 2 of the Act). An important principle of the Act is that water belongs to the state, which holds it in trust for the nation.

Section 19 of the NWA which imposes a duty of care on the holder of the mining permit in a similar way to Section 28 of NEMA, states that "An owner of land, a person in control of land or a person who occupies or uses the land on which any activity or process is or was performed or undertaken; or any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.". This implies that before any mining or related activity is opened, or closed, whether temporarily or permanently, the necessary pollution control measures should be in place.

The regulations contained in GN R704 published in terms of the NWA consist of regulations on the "use of water for mining and related activities" and are "aimed at the protection of water resources". GN R704 acknowledges the principle of co-operative governance and the respective roles for the DMRE, the Department of Environmental Affairs (DEA) and the DWA in regulating pollution from mining activities.

Regulation 9 of GN R704 promulgated in terms of the NWA, which deals with temporary or permanent mine closure, provides that any person in control of a mine or related activity must at the cessation of mining operations and its related activities, ensure that all pollution control measures have been designed, modified, constructed and maintained so as to comply with the regulations contained in GN R 704. Furthermore, the in-stream and riparian habitat of any water resource, which may have been affected or altered by the mine or activity, must be rehabilitated in accordance with the regulations contained in GN R. 704. Further applicable regulations in terms of GN 704 are discussed in Regulation 5 and Regulation 7.



Regulation 5 – Restrictions on Use of Material

The regulation provides that material that could potentially impact on a water resource should not be used for the construction of any feature. Consideration should also be given to the influence on pollution potential by the manner in which certain materials are used. The person in control of the mining activity will be responsible for proving that material used will have no impact.

Regulation 7 – Protection of Water Resources

Regulation 7 (b) applies to the prevention of pollution of any water resource by residue deposits near a water body (such as a pan) or a water course and the provision in Regulation 10(2) (b) provides that stockpiles or sand dumps established on the bank of any watercourse or estuary must be stockpiled or dumped outside of the 1:50 year flood-line or more than a horizontal distance of 100 metres from any watercourse or estuary.

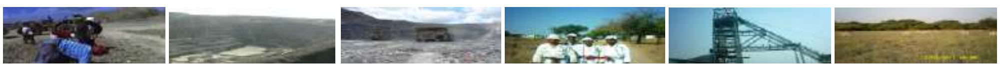
Regulation 7 (f) states that: "Every person in control of a mine or activity must take reasonable measures to- ensure that water used in any process at a mine or activity is recycled as far as practicable, and any facility, sump, pumping installation, catchment dam or other impoundment used for recycling water, is of adequate design and capacity to prevent the spillage, seepage or release of water containing waste at any time.

7.3 Conceptual Rehabilitation Plan

The rehabilitation of the Tornowize (Pty) Ltd project area is simultaneously a continuous and timeframe operation. In order to gain the best possible rehabilitation outcomes from the mining processes in the relatively sensitive area, different actions are required to occur at different times within the life of mining (expected to be two years) to closure. Similarly, there are management and monitoring actions that will be required throughout the life of the mine project and for years after the project has been closed.

Traditional mining phases include Construction, Operational and Closure phases. Prior to construction and preparation of the land for mining, best practices need to be implemented and compliance to legislation needs to be adhered to.

The Tornowize (Pty) Ltd is no exception and outlined below are the actions to occur through the three phases that are needed to ensure successful rehabilitation, see **Error! Reference source not found.**.



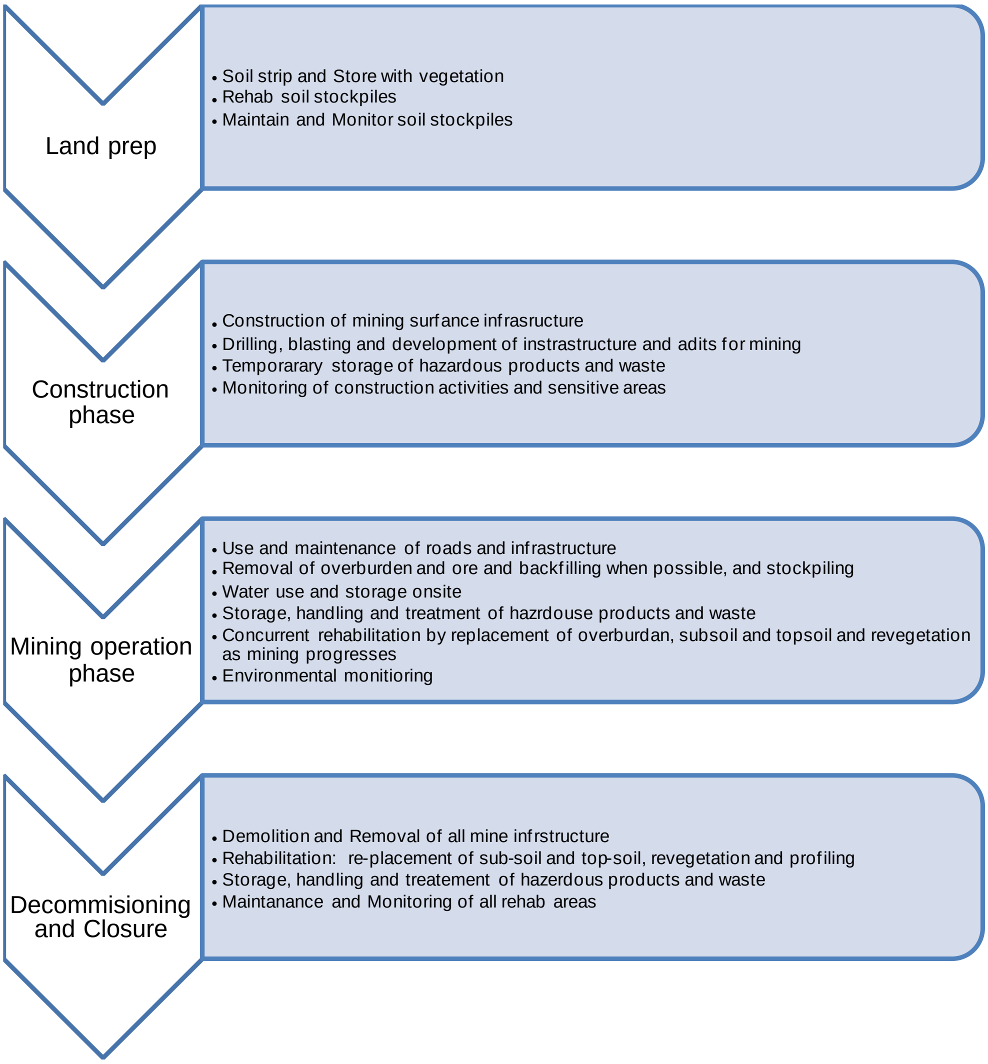
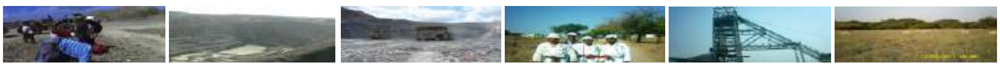


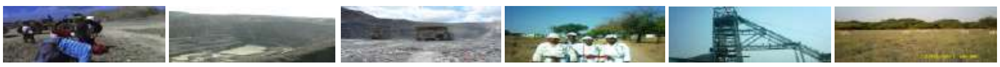
Figure 8: Actions to occur through the Life of Mine



The following points on the table below should be considered during the construction phase of the project:

Table 2: Highlighted points that should be considered during construction phase

Activity	Recommended Control Measures
Mine Planning	➢ Mine planning should minimize the area to be occupied by mine infrastructure. The affected area should be kept as small as practically possible and should be clearly defined and demarcated.
Sensitive Landscapes	➢ Care should be taken around sensitive landscapes e.g. wetlands to ensure that impacts to them are none to minimal and that the buffer zones around these sensitive landscapes are considered.
Construction	➢ Construction crews should restrict their activities to planned areas. Clear instructions and control systems should be in place and compliance to the instructions should be policed.
Stockpiles	➢ All stockpiles should be located in areas where they will not have to be removed prior to final placement. Materials should thus be placed in their final closure location or as close as practicable to it.
	➢ All stockpiles should be clearly and permanently demarcated and located in defined no-go areas, re-vegetated and monitored on an annual basis.
Infrastructure	➢ Infrastructure should be designed with closure in mind. Infrastructure should either have a clearly defined dual purpose or should be easy to demolish. This aspect of rehabilitation should be considered if changes in the mine design are made.
Soil Stripping	➢ Soil stripping is a very important process which determines rehabilitation effectiveness. It should be done in strict compliance with the soil stripping guidelines, which should define the soil horizons to be removed.



Rock quarry/burrow pit	➢ If rock quarries or borrow pits are required include them into the environmental plans, however it is suggested that other material could be utilised to avoid further impacts to soil.

7.5 Soil Management Plan

7.5.1 Soil Stripping

This section explains the correct measures that should be followed during the stripping of soil. This is a key rehabilitation activity as soils lost cannot be regenerated in the lifetime of the mine. Correct stripping of soils will firstly ensure that enough soils are available for rehabilitation and secondly, that the soils are of adequate quality to support vegetation growth and thus ensure successful rehabilitation.

It is proposed that topsoil removal will be restricted to the exact footprint of areas required during the operational phase of the activity. The topsoil will be stockpiled at a designated signposted area within the mining boundary to be replaced during the rehabilitation of the area. It will be part of the obligations of site management to prevent the mixing of topsoil heaps with overburden/other soil heaps.

Confirmed sites within the project area that require soil stripping in preparation for mining activity included the infrastructure areas, the landfill area and the TSF area.

The soil depth to be stripped where the Red apedal and Yellow apedal soil occurs is generally 1 m or deeper. This depth includes both the topsoil (depth where plant roots are most active) and the subsoil. It is recommended that a 1.5m soil layer is stripped and stored in a stockpile with slopes of 1:5 to 1:7 (mainly for erosion protection).

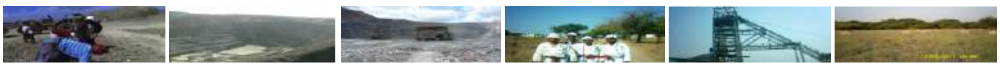
The positions of the soil stockpiles should be indicated on a map and the soil stockpiles should be protected using a fence because soil loss due to unauthorized use can and will occur. The topsoil stockpile should be re-vegetated to protect the soil from water and wind erosion.

Restrictive stockpile heights are usually recommended because soil quality is affected negatively by anaerobic conditions occurring in large stockpiles. The stockpile height in the case of the **Tornowize (Pty) Ltd** Project can be adjusted according to the space needed because the soil will be stored for a long time before used for rehabilitation purposes.

The remainder of material excavated deeper than 1.5 meter should be stored in a separate stockpile for later use such as to fill up the borrow pit.

The steps that should be taken during soil stripping are as follows:

- ➢ Soil should be stripped making use of the mining area soil plan.



- Removal of hydromorphic soil should be avoided where possible. In the event wetlands have to be impacted upon, then hydromorphic soil should be stripped to a depth defined by the pre-mining soil survey. Typically, 0.3 m to 0.5 m of usable soil material can be stripped from wetland areas
- Well-drained soil should be stripped to a depth of 1.5 m
- Demarcate the boundaries of the different soil types
- Define the cut-off horizons in simple terms that they are clear to the stripping operator (avoid mixing of different horizons and try to ensure horizons and soil types are stockpiled separately)
- Stripping should be supervised to ensure that the various soils are not mixed
- Soil should only be stripped when the moisture content will minimise the compaction risk (i.e. when they are dry)
- The subsoil clay layers which can be found under certain hydromorphic soil need to be stripped and stockpiled separately. This clay material can be used as a compacted clay cap over rehabilitated areas that will become wetlands post-rehabilitation (stripping of wetland soils should be avoided, however if stripping does occur the above is recommended for stripping and stockpiling)
- Where possible, minimise soil handling, i.e. soil should only be handled once instead of moving it around two or more times. However, it is paramount that the correct soil types are replaced at the correct locations in the post-mining topography and accordingly there will always be a need to stockpile some soil; and
- Truck and shovel should preferably be used as a means of moving soil, instead of bowl scrapers.

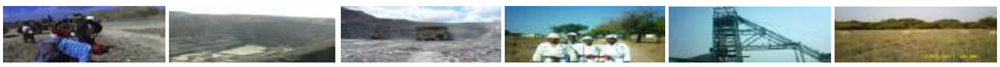
7.6 Soil Plan

A soil assessment was conducted during the EIA phase of the project. The information from the soils report was used to provide information regarding the recommended depth of soil stripping. This plan should be used to map and peg out the various soil types prior to the commencement of construction activities.

The soil, land use and land capability assessment report by Singo Consulting (Pty) Ltd describes the baseline soil conditions, the physical and chemical characteristics, land capability and current land uses of the mining area. This report should be consulted before areas are cleared in preparation for the placement of infrastructure.

7.6.1 Soil Stripping Guidelines

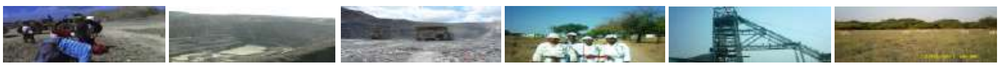
The soil survey that was conducted for the project must be utilized to generate the soil stripping guideline. The boundaries of the different soil types should be demarcated, and each soil horizon (within each soil type's suitability for rehabilitation) should be defined. If possible, the



stripped soils should be replaced immediately in a similar location in the topographical slope to their natural location (for the project soil will be stripped and used to construct a berm and the unused balance stockpiled. After vegetation has been stripped, soil types need to be pegged out accurately (pegging out soils types ahead of stripping). The topsoil and subsoil should also be removed from the areas associated with the mine infrastructure and dumps. Table below provides measures that should be considered during the stripping of soil during the construction phase of the project.

Table 3: Soil stripping measures during construction and operation

Soil Stripping measures during construction and operation	
Construction **(Including Site Preparation)**	➢ Plan site clearance and alteration activities for the dry season (May to October)
	➢ Minimise the period of exposure of soil surfaces through dedicated planning
	➢ Stripping operations should only be executed when soil moisture content is low as this will minimise the risk of compaction (during dry season)
	➢ During stockpiling, preferably use the 'end-tipping' method to keep the stockpiled soils loose
	➢ Ensure stockpiles are placed on a free draining location to limit waterlogging; and
	➢ Limit stockpile height – a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material.
Operation	➢ Preserve looseness of stockpiled soil by executing Fertilisation and seeding operations by hand
	➢ Soil stockpiles should be monitored for fertility via sampling and testing
	➢ Monitoring of the condition of all unpaved roads is necessary due to the high rainfall and potential water runoff. Water runoff from compacted road surfaces may cause erosion of road shoulders degrading the road



	surface. Weekly inspections need to be carried out of all unpaved roads especially during the rainy season.

7.6.2 Supervision

A particularly important aspect is the supervision and monitoring during the stripping process. Close supervision will ensure that soil being stripped from the correct areas and to the correct depths and placed on the correct stockpiles with a minimum of compaction. Monitoring requires an assessment of the depth of the soil, the degree of mixing of soil materials and the volumes of soil that are being replaced directly or being placed on stockpiles. Contracts for the stripping of soils should not only be awarded on the volumes being stripped but also on the capability to strip and place soil accurately.

A soil balance sheet needs to be developed to record all soil types and stripping volumes transported to the stockpiles. This soil balance sheet will aid in the management of the soil stockpiles in addition to keeping record of available soil volumes for rehabilitation.

7.6.3 Moisture Content

Soil is most susceptible to compaction when the moisture content is high. The dry winter months (April - August) are thus more suitable for the stripping and replacement of soils. If soils have to be moved during wet months, then special care should be taken to adopt methods that cause minimum compaction.

7.6.4 Stripping Method

Soil should be stripped and replaced using the truck and shovel method as far as possible. This method will limit the compaction of soils. If bowl scrapers are used, then the soils must be dry during stripping to minimise compaction (it is recommended that bowl scrapers are not used).

7.6.5 Stockpiling

This section explains the correct measures to be followed during the stockpiling of soil. Stockpiling should be minimised as far as possible since it increases compaction and decreases the viability of the seed bank.

The steps that should be taken during soil stockpiling are as follows:

- Mark stockpile locations accurately on a plan to ensure that re-handling is minimised (i.e. soils will not have to be moved a second or third time).
- Ensure that the location is free draining to minimise erosion loss and waterlogging.

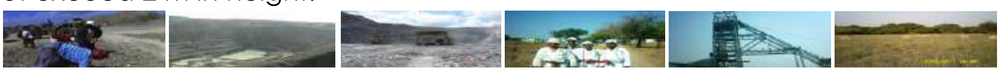
- Minimise compaction during stockpile formation. The soils should be kept loose by, preferably, tipping at the edge of the stockpile not driving over the stockpile (avoid end tipping as this causes compaction).
- The positions of the soil stockpiles should be indicated on a map and the soil stockpiles should be protected by means of a fence because soil loss due to unauthorized use can and will occur.
- Restrictive stockpile heights are usually recommended because soil quality is affected negatively by anaerobic conditions occurring in large stockpiles. The stockpile height in the case of the mining project can be adjusted according to the space needed because the soil will be stored for a long time before used for rehabilitation purposes. Limit the stockpile height so as to prevent internal compaction (soil stockpiles should be <2 m in height)
- Re-vegetate with a seed mixture similar to the final rehabilitation seed mixture
- Ensure that the stockpiled soil is only used for the intended purposes.

7.6.6 Stockpile Location

The materials that will be removed from the areas where infrastructure will be placed should be placed as close as possible to where it will be placed in the final landscape. Appropriate mitigation measures for the management of topsoil stockpiles needs to be implemented to ensure that wetlands and drainage paths are not affected and that the loss of topsoil is mitigated against. Progressive monitoring of stockpiles and replacing of topsoil will ensure successful post-mining land and soil reclamation. Assessing post-mining soil characteristics and associated land capability and land uses is necessary to ensure that the end land uses goals can be met. The following information needs to be recorded when stripping and stockpiling of soils:

- Location of same soil types can be stripped and stockpiled together
- Stripping depths of different soil types
- The location, dimensions and volume of planned stockpiles for different soil types

Soil stripped from the tailings facility will be stored near the facility. Soil stripped from the remaining infrastructure areas will need to be stockpiled for use during rehabilitation. This includes soil that will be removed to construct the access shafts and vents. It is envisaged that a berm (screening berm) will be constructed around the plant area. This berm will be constructed from waste material removed from the underground workings. Once the berm has been constructed, soil will be placed on the berm and vegetated. It is envisaged that the berm will remain post closure. It has been assumed that an additional stockpile will be required for the excess topsoil that will not be placed on the berm. This area will be 200 m by 200 m and should not exceed 2 m in height.



7.6.7 Free Draining Locations

Soil should normally be replaced in the landscape positions it was stripped from. Well drained soil should therefore be replaced in high landscape positions while the wet soil is replaced in lower lying landscape positions.

The locations of the soil stockpiles should be on a topographical crest to ensure free drainage in all directions. If this is not possible then an alternative is a side-slope location with suitable cut-off berms constructed upslope.

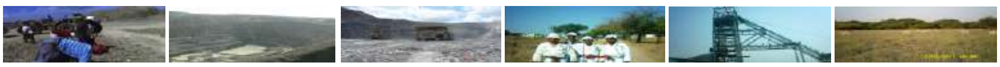
Stockpiles that are placed in drainage lines result in soils becoming waterlogged and a loss of desirable physical and chemical characteristics. Such situations also result in a loss of soils due to erosion. If stockpiles need to be placed in drainage lines, hydromorphic soils should be stockpiled in the wetter sections.

7.6.8 Soil Reclamation

Rehabilitation and soil reclamation of the property affected by the placement of infrastructure; mining should take into consideration that during stockpiling soil's natural carbon content deteriorates over time.

The following should be reserved:

- The stripping and stockpiling of topsoil should be handled in a responsible way. Organic material should be retained in the topsoil by stripping and stockpiling the topsoil with the vegetation.
- Shallow rooted vegetation will not pose any problem but deeper-rooted vegetation like shrubs and trees should be chipped first then incorporated into the topsoil through the stripping and stockpiling process.
- Rehabilitated land should be reconstructed to pre-mining arable land capabilities within the areas where the initial surface infrastructure will be.
- The topsoil and subsoil materials should not be mixed during stockpiling or reclamation.
- Compaction by vehicle traffic should be avoided when reclamation takes place. Soil physical problems are of real concern as impacts, such as compaction, on reclaimed vegetation are severe due to restricted root growth, low water penetration and low water holding capacity.
- Soil fertility and acidity status should be established through representative soil sampling and analyses to ensure optimal post reclamation vegetative growth. Any nutritional problems should be corrected prior to any vegetation establishment on reclaimed soil.



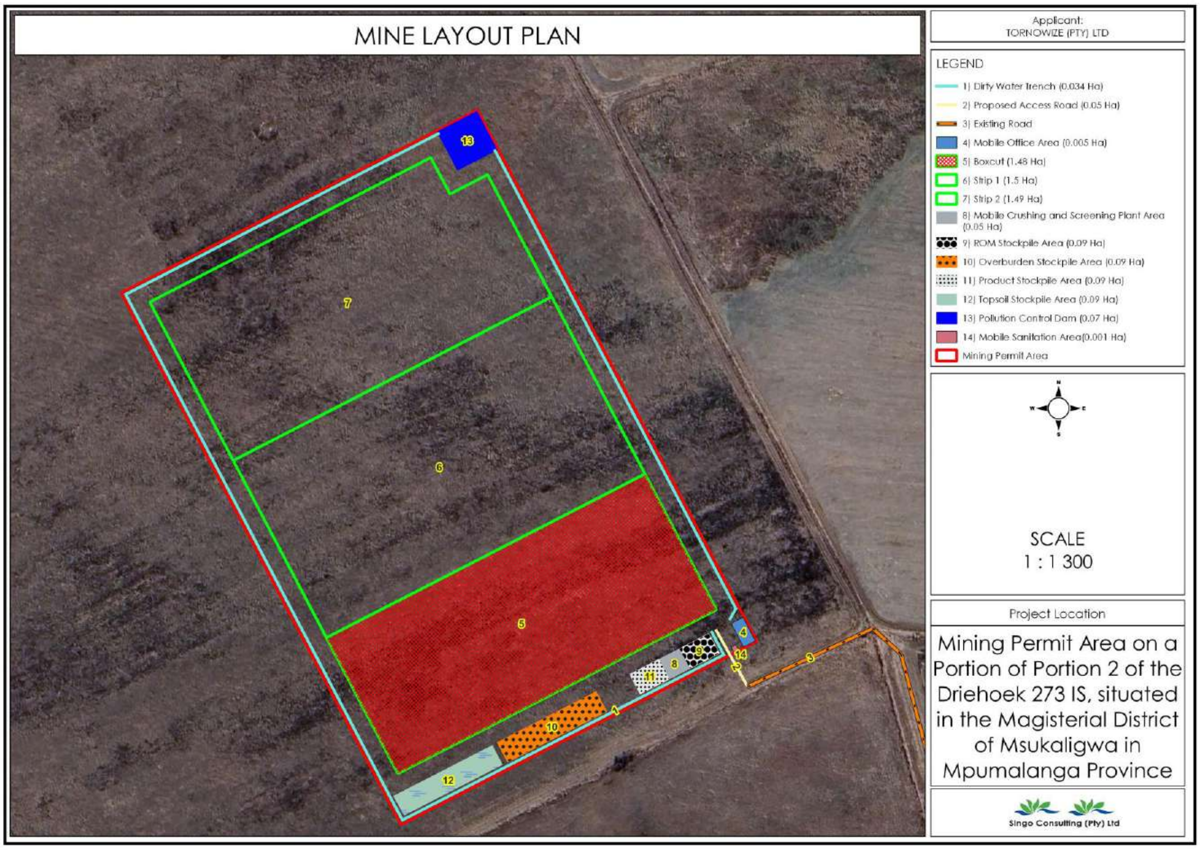


Figure 9: Mine Layout plan according to the proposed activities.

7.6.9 Compaction

Pertaining to Compaction:

- Soils should be stockpiled loosely. Achieving this will depend on the equipment being used during the stripping and stockpiling process.
- Soils should be dumped in a single lift if truck and shovel methods are used. If the dumps are too low, then the height could be increased by using a dozer blade or back actor bucket to raise the materials.
- The use of heavy machinery should be avoided as it results in the compaction of soils and destruction of the soil structure. It is not recommended that a bowl scraper or grader be used to level and shape the stockpiles. If heavy machinery must be used, then compaction can be reduced by stripping and dumping as thick a cut as possible. Deposition of soils in a single track line may also reduce the compaction of the dumped or replaced soil.

7.6.10 Stockpile Management

Established stockpiles should be managed to ensure that soil losses are minimised and that additional damage to the physical, chemical or biotic content is minimised. Stockpile soil health, volume and biotic integrity can potentially be harmed by factors including erosion, 'borrowing' for other purposes, contamination and water logging.

Stockpiles should be re-vegetated to avoid soil loss due to erosion and weed colonisation if stockpiles remain in the same location for more than one growing season and have not revegetated naturally. A similar seed mixture to the final mixture recommended for rehabilitation should be used. The looseness of the soil in stockpiles should be preserved (assuming stripping and construction of the stockpiles are done correctly) by fertilising and seeding by hand, hydroseeding (is the norm in the industry) or seeding aerially to minimise the introduction of compaction. If stockpiles are already compacted, standard agricultural equipment can be used to establish grass cover. Weed infestation should also be controlled on the stockpiles by approved methods and herbicides (e.g. Roundup).

It is important that soil only used for the intended purposes. The dumping of waste materials next to or on stockpiles and the pumping out of contaminated water from infrastructure areas are hazards to stockpiles. Employees must be made aware of these hazards and a detailed management and monitoring programme should be put in place.

7.6.11Compaction and Equipment

Compaction limits the effectiveness of replaced soils. The equipment used during the replacement of the soils has a major impact on the compaction levels. Ideally heavy machinery should not be used to spread and level soils during replacement. The truck and shovel method should be used since it causes less compaction than, for example, a bowl scraper.

When using trucks to deposit soils, the full thickness of the soil required can be placed in one lift. This does, however, require careful management to ensure that the correct volumes of soil are replaced. The soil piles deposited by the trucks will have to be smoothed before re-vegetating the area.

7.6.12 Compaction and Soil Moisture

The soil moisture content is a determining factor in the degree to which the soils are subject to compaction. Each soil type has a moisture content at which the compactability is maximized. The aim during the replacement (and removal) of soils should be to avoid the moisture content of maximum compaction when moving soils. The best time for stripping and replacement of soils is thus when soil moisture content is lowest which will be during the dry season.

7.6.13 Smoothing Equipment

The soils that are deposited with trucks need to be smoothed before re-vegetation can take place. A dozer (rather than a grader) should preferably be used to smooth the soils since it exerts a lower bearing pressure and thus compacts less than wheeled systems. If the top- and sub-soils have been mixed during the stripping process, then the seed-bank has been diluted excessively and the creation of a seed-bed for planting purposes will be required. For stockpiles that have stood for several years will need to be seeded and thus the preparation of the seed bed is important to the success of re-vegetation.

8.7 Amelioration

The steps that should be taken during the improvement of soils are as follows:

- The deposited soils must be ripped to ensure reduced compaction
- An acceptable seed bed should be produced by surface tillage
- Restore soil fertility (if top and sub-soils have been mixed) using the soil analytical data as a guideline
- Incorporate the immobile fertilisers into the plant rooting zone before ripping
- Apply maintenance dressing of fertilisers on an annual basis until the soil fertility cycle has been restored.

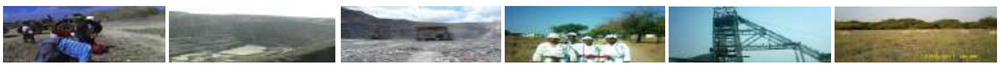
8.7.1 Soil Ripping

Deep ripping should be applied to loosen compacted soils (if they occur), preferably done in areas where hard compaction has occurred, to a depth of at least 1 m (this should be limited to sections occurring out of the wetlands, for example along haul roads).

The soil moisture content for maximum disturbance and the desired spacing between the rip lines must be established before ripping starts. In general terms, ripping effectiveness is greatest when soils are slightly moist throughout, and not too wet or dry. The ripping process normally requires the use of a dozer with one or two (maximum) ripper tines that operate to a depth of at least 1 m. The desired rip pattern will be determined by the breakout pattern of the disturbance caused by each ripper tine. Usually, this breakout pattern is at 45 degrees to the tine tip, so if spacing between lines is 1 m, then shattering effect between tines is only to 500 mm. Note that standard agricultural equipment has proved to be ineffective for this task. Soil bulk density should be measured to establish the degree of compaction in the rehabilitation areas, and ripping should be carried out accordingly.

8.8 Infrastructure Removal

After mining has stopped the processing facilities, administration, mining, transport, and storage facilities should be removed in order to meet the requirements of the post closure land use (Cultivation). In some cases, portions of the existing infrastructure can be used by land users after closure. These structures should be identified and protected prior to commencement of



decommissioning. Attention should be paid to managing safety risks during the removal of infrastructure since is it a dangerous occupation.

The following steps should be followed during infrastructure removal:

- Identify infrastructure items that may be of use to the future land users
- In association with those users and the authorities, define what could be left, how it would be used and how sustainable that use would be
- The remaining infrastructure should be assessed for its suitability for reuse/recycling
- The re-usable items should be removed from the site
- Hazardous material locations and deposits require specialized assessment and analysis to determine how these materials should be decontaminated and to ensure that all residual hazardous materials are deposited in officially-sanctioned hazardous waste deposit sites
- Mining infrastructure that will be left on site must be rendered safe
- Remaining structures should be demolished, and the demolition rubble removed
- The final landform agreed for the infrastructure areas should be created
- Soil should be replaced on the disturbed area and revegetated

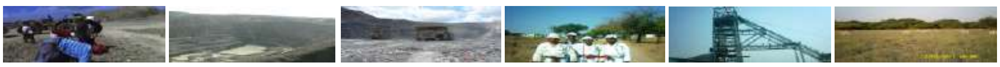
8.8.1 Infrastructure for Future Use

All the structures on site should be assessed in conjunction with the ultimate land users, and the authorities, to determine which items could be used in future. Care should be taken when this assessment is undertaken to ensure that the infrastructure left behind will not become abandoned due to unsuccessful enterprises. In cases where the retention of services (e.g. roads, electricity supply, and sewage plants) is requested, the ability of the land users to maintain the various structures should be assessed.

8.8.2 Decontamination of Hazardous Material Locations

The storage and use of hazardous materials such as degreasers and hydrocarbons could result in the contamination of the environment during the life of the operation. During the life of the mine these substances will be off loaded and stored in bunded concrete lined facilities with oil/water traps for storm water management. Care should always be taken when handling and storing hazardous materials and spillages should be cleaned up and remediated immediately. During closure, the mine site should be assessed for contaminated areas. These areas should then be cleaned up by removing the contaminated soil and overburden materials and disposing of it in an officially registered hazardous waste site.

In the event that large areas have become contaminated, the required Authorisation and permit must be obtained for the disposal of this waste as a registered/authorised landfill site.



Cognisance must be taken that the decommissioning of hazardous storage areas (such as the Hydrocarbon Storage Areas).

8.8.3 Removal of Infrastructure

Infrastructure that will be demolished should be assessed for its suitability to be re-used or recycled. Items such as cladding, roofing, electrical components and equipment should be removed from the site before demolition of the structures starts. All foundations should be removed to a depth of 1 m. The hard surfaces of roads should also be ripped to a depth of 1 m. Concrete structures contaminated with hazardous materials should be isolated and disposed of at hazardous waste disposal sites. All other inert material can be disposed of in the shafts during the decommissioning phase of the project.

8.8.4 Final Landform

Once the mine site has been cleared of all infrastructure and rubble the exposed underlying materials should be reshaped to create a gently sloping, free-draining topography. The topsoil that was removed during the construction phase should be replaced, fertilized and ripped.

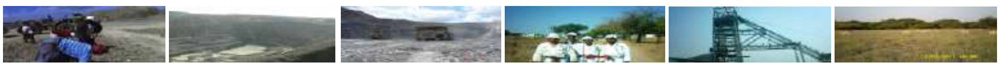
In cases where the foundations of the structures are impractical to remove, the foundations should be covered with a combination of soft overburden or B horizon material topped with a layer of topsoil. This layer should be at least 1 m thick. After these tasks have been completed the infrastructure sites can be included in the rehabilitation process for the rest of the mining area for re-vegetation, monitoring and maintenance.

8.8.5 Reshaping

During the reshaping of the disturbed areas the overburden (waste rock) material, which is being replaced should be compacted by the action of the trucks running repeatedly over the replaced materials. This will compact the surface to a certain degree. The soft overburden material should be placed on top of the overburden material to a depth of at least 1 m and shaped to produce the final landform. Compaction that will occur during the placement of this soft material will be sufficient. Compaction of the topsoil layer (or top- and sub- soils, where soil is stripped in layers) should be avoided by using the truck and shovel method. The slopes, where present, should be designed to minimise erosion potential.

8.8.6 Landform Design

Areas where specific land capabilities need to be achieved should be considered when the final landform is designed. The topography and soils are two of the most important factors which will determine the land capability classification. The final land capability should be in accordance with the commitments made in the approved EMPr. The maximum ideal slope to



achieve grazing should be between 1:5 or 1:7 if grazing is the pre–determined end land use. When determining the final slope factors such as regional rainfall intensity and soil type should be considered since they will affect the erodibility rate. Excessively steep slopes will also reduce the land capability class. A general rule of thumb is not to have diagonal slopes of more than 5 m. Contour drains or log pegging can be used to break erosional force of runoff water.

8.8.7 Rehabilitation to Arable Land

Consideration must be taken that rehabilitation is much more difficult during opencast mining and that underground mines impact on smaller areas and are easier to rehab so the impacts are smaller. To determine the success of rehabilitation post mining it is important to understand the current land use and the land capability of the area in question prior to mining. For this it is recommended that pre-mining land capability is proportionally emulated by post mining rehabilitation.

The classification system is made up of four orders and eight classes namely:

- Order A: Arable land – high potential land with few limitations (Classes I and II)
- Order B: Arable land – moderate to severe limitations (Classes III and IV);
- Order C: Grazing and forestry land (Classes V, VI and VII) – applicable land use
- Order D: Land not suitable for agriculture (Class VIII).

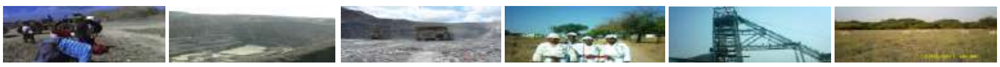
The following criteria are used for rehabilitated land capabilities mentioned above:

- **ARABLE**: The soil depth exceeds 0.6 m, the soil material must not be saline or sodic and the slope (%) will be such that when multiplied by the soil erodibility factor K, the product will not exceed 2.0
- **GRAZING**: The soil depth will be at least 0.25 m – applicable for the location of site infrastructure
- **WILDERNESS**: The soil depth is less than 0.25 m but more than 0.15 m
- **WETLAND**: The soil depths as for grazing are used but wetland soils must be used for the construction of wetlands. Wetland soils must be separately stockpiled with other stockpiled soil.

8.8.8 Drainage Channel Designs

The construction of erosion management channels on the rehabilitated areas should be avoided as so much as possible. This could be done if reshaping and soil replacement are done throughout the dry months, the slopes are short and helpful vegetation cover establishes in the first rains. In areas wherever surface water drainage systems are unavoidable, care should be taken that these structures do not create erosion worse.

The consolidation of mine spoils takes many years to complete and once mining stops the water table re-establishes and also the wetting-up of the overburden materials could end in any settlement. This could be countered by constructing slopes within the contour banks that are significantly steeper than their equivalents on un-mined land and by ensuring that the batters are higher. The steeper slopes would possibly result in scouring within the channel however the risk of contour banks or drains breaking are greatly reduced. All evacuation channels, if needed, ought to be designed by a "competent person" (usually an engineer), who has experience in planning such structures on rehabilitated ground.



9. VEGETATION AND FERTILISERS MANAGEMENT PLAN

9.1 Vegetation Management

9.1.1 Vegetation Establishment

This section explains the procedure that should be followed during the re-vegetation of rehabilitated areas.

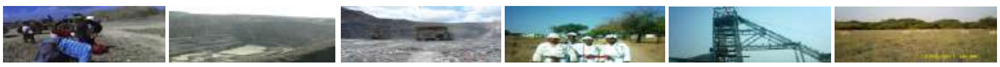
The common ways that used to establish vegetation include seeding and hydroseeding. Flat areas should be seeded using tractor implements and slopes too steep for tractors should be hydroseeded. among the event where soils are stripped and came back directly (i.e. no stockpiling) and therefore the areas stripped have good vegetation cover with applicable species present, natural re-colonization would possibly occur and there'll be no need for re-seeding. during this case, it should be best to easily replace the stripped soils, gently level and rip thoroughly, and leave for one season to assess the extent and quality of the natural re-vegetation, however, this methodology isn't appropriate for any areas previously troubled with alien trespasser species like wattle.

The objectives for the re-vegetation of reshaped and top-soiled land are to:

- Prevent erosion
- Re-establish eco-system processes to ensure that a sustainable land use can be established without requiring fertilizer additions
- Restore the biodiversity of the area as far as possible.

9.1.2 Re-vegetation Steps

- Ensure that the soils have been replaced correctly according to the soil replacement guideline
- All soils are to be ripped to full potential rooting depth to correct compaction induced by the soil replacement activity
- Analysed the topsoil to determine the lime and fertilizers requirements
- Prepare the soil by adding lime and fertilizer and ploughing the area, followed by tillage to prepare the seed bed
- Plant a grass seed mixture consisting of a range of indigenous or non-invasive naturalised species. For wetland areas, *Imperata cylindrica* (Cotton Wool Grass) can be hand planted and hydrophilic species can be worked into the seed mix. Recommendations regarding the seed mixtures for both grassland areas and wetland areas is provided further on in the report (Where good quality grazing land or wilderness land soil is replaced by direct transfer – this will be avoiding the need to plant grass mixtures. The majority of plant species present in the un-mined areas will re-establish naturally, provided the soils are replaced correctly and the tillage is done correctly



- Inspect the area after a good rainfall event
- Control and remove weeds where necessary
- Repeat the procedure for the next growing season
- Application of fertilisers is crop and site specific, analysis of the soils and stockpiles should be undertaken to determine the appropriate fertilisers to be used, if required
- Define and establish the long-term land management system (grass needs regular defoliation if it is to be sustainable)
- Leave pasture to allow natural grasses to become re-established
- Conduct annual monitoring (repeatable demarcated transect surveys).

9.1.3 Species Selection

Some of the criteria that should be considered during the selection of the appropriate species for rehabilitation include:

(i) Use species which are perennial and adapted to the area
(ii) The species should be tolerant of adverse soil conditions
(iii) Species should have a large biomass and prolific root system
(iv) As areas of rehabilitation expand, maintenance costs increase, so species selected should be those with minimal maintenance cost, or with production and financial returns that exceed the cost.

9.1.4 Re-vegetation Methods

The common ways in which used to establish vegetation include seeding and hydroseeding. Flat areas should be seeded using tractor implements and slopes too steep for tractors should be hydroseeded. within the event where soils are stripped and came back directly (i.e. no stockpiling) and therefore the areas stripped have good vegetation cover with appropriate species present, natural re-colonisation might occur and there will be no want for re-seeding. during this case, it's attending to be best to simply replace the stripped soils, gently level and rip completely, and leave for one season to assess the extent and suitableness of the natural re-vegetation, however, this methodology isn't suitable for any areas previously infested with alien invader species like wattle.

9.1.5 Climatic Condition for Plantation

The most successful plantation is done after the first rains and freshly prepared fine tilled seedbeds. Water seed zone will stimulate germination and can be supported by the application of light vegetation.

9.1.6 Vegetation Maintenance and Conservation

Once the plants are planted, they need regular maintenance. If the growth medium consists of low fertility soils (i.e. dirt and dirt mixed) and overburden material, then regular application of plant nutrients is required until the natural fertility cycle has been restored. Annual fertilizer application should continue for three to five years.

Grasses should be defoliate initially through grazing for the first three years so mowing to prevent it from becoming moribund which may increase soil erosion risk. Some ecosystems may have fire at strictly outlined intervals for their propagation and perpetuation. Mowing typically desires less supervision than grazing but this results in giant quantities of plant nutrient (especially potassium) being removed through the hay (this will only occur if the hay is removed, then the nutrients are lost). Larger dressing of fertilizer will need to be applied to maintain the soil fertility establishment. Grazing desires, a lot of management but it ensures nutrient recycling which organic matter returns to the soil. Close superintendence is required for land that is used out to make sure that overgrazing doesn't manifest itself. Management and management of alien vegetation will contribute to the conservation of the natural vegetation. The alien species ought to, therefore, be removed from site and management measures should be implemented to form certain spreading of these species does not occur to alternative elements of the project area or the encompassing lands.

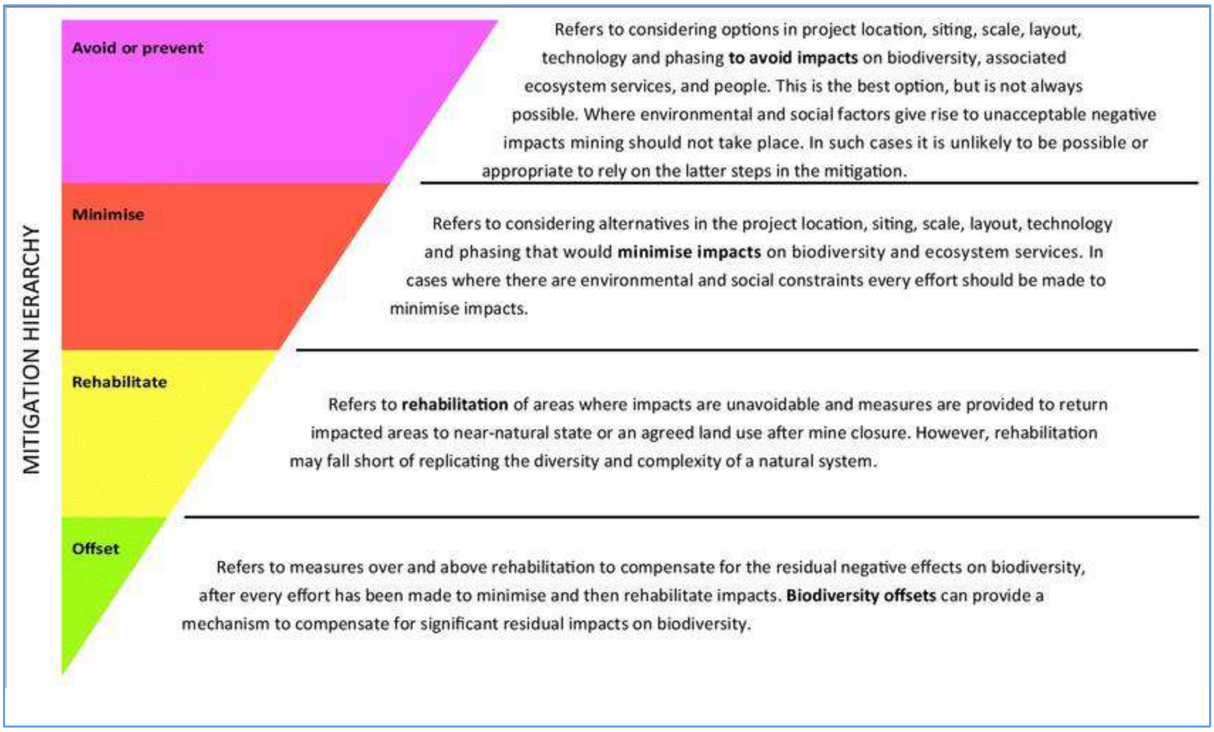
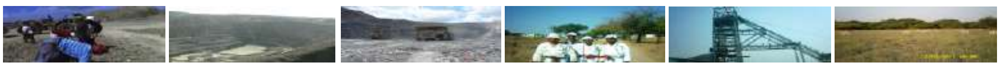


Figure 10: The mitigation hierarchy for dealing with negative impacts on biodiversity

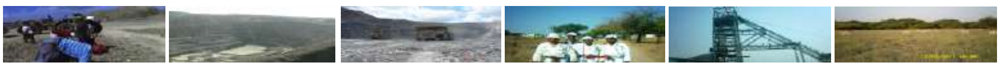


9.2 Fertilisers Management

9.2.1 Soil Fertilization

Deterioration of the fertility regime of soils may well be minimised if the surface soils are stripped separately from the sub-soils and have been replaced at the surface throughout the replacement method, however, once topsoil has been mixed with sub-soil in the removal and replacement method, the end product could be a soil with low fertility. Topsoil fertility should be reinstated in order to determine and maintain good plant growth. The soil should be sampled throughout mining closure and analysed to work out the soil nutrient content as this varies from site to site. Fertilizer should then be applied to boost the soil nutrient content to the required levels if it's recommended to do so by the specialist.

The fertiliser mixture needs to be determined throughout rehabilitation and should vary from site to site. It's recommended that soil analysis is conducted to work out the acceptable application of fertilisers. Normally once fertilisers are applied, the first couple of years sensible vegetation cover will be established as a result of the high fertility, but as time passes there's the chance that the grass cover starts to deteriorate due to misdirection and lack of nutrients.



10 WEED CONTROL

Alien invasive species tend out-compete the indigenous vegetation; this is due to the fact that they are energetic growers that are adaptable and able to invade a wide range of ecological niches (Bromilow, 1995). They are tough, can withstand unfavorable conditions and are easily spread. Alien species in South Africa are categorised according to CARA and NEMBA.

Declared alien and invasive species have been divided according to Conservation of Agriculture Resources Act 1983 (Act 43 of 1983)198 Invasive Alien Plants (IAPs) are legislated in three categories:

- **Category 1**: Declared weeds that are prohibited on any land or water surface in South Africa. These species must be controlled, or eradicated where possible
- **Category 2:** Declared invader species that are only allowed in demarcated areas under controlled conditions and prohibited within 30m of the 1:50 year flood line of any watercourse or wetland
- **Category 3**: Declared invader species that may remain but must be prevented from spreading. No further planting of these species is allowed.

The draft NEMBA categories for invasive species according to Section 21 are as follows:

- **Category 1a**: Species requiring compulsory control
- **Category 1b:** Invasive species controlled by an invasive species management programme
- **Category 2**: Invasive species controlled by area
- **Category 3**: Invasive species controlled by activity.

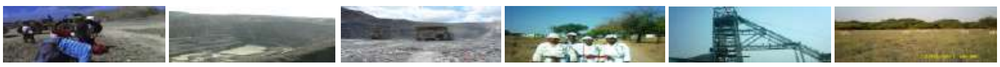
10.1 Alien Invasive Control Plan

Alien invasive species tend to out-compete the indigenous vegetation. Invasive alien plants are a major threat to biodiversity in catchment areas, potentially disrupting the delicate natural balance in ecosystems. As we depend on biodiversity for water, food, wood, clean air, medicine and much more, it is vitally important that we protect this resource.

10.2 Alien Species Control

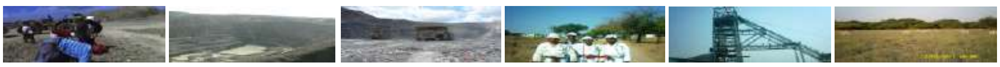
Invasive alien plant species are problematic to control. Methods should be used that are appropriate for the species concerned, as well as to the ecosystem in which they occur. When controlling weeds and invaders, damage to the environment must be limited to a minimum.

There are four basic methods by which encroachers or weeds are controlled: Physical (mechanical), Chemical and Soil treatment.



10.3 Integrated Control Strategies

The satisfactory management of weeds and alternative invasive species is usually only achieved when several complementary strategies, together with biological management, improved land management practices, herbicides and mechanical strategies, are carefully integrated. Before beginning new management operations on new infestations, all needed follow-up management and rehabilitation work should be completed in areas that are originally prioritized for clearing and rehabilitation.



11 MONITORING AND MAINTENANCE

The main purpose of monitoring is to make sure that the objectives of rehabilitation are met, and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully monitored as well as during the progress of establishment of desired final ecosystems.

The following items should be monitored continuously:

- Vegetation basal cover and vegetation species diversity
- Fauna species recolonized
- Groundwater quality at agreed locations
- Surface drainage systems and surface water quality
- Chemical, physical, and biological status of replaced soil
- Depth of topsoil stripped and placed
- Final topography alignment to agreed planned landform
- Monitoring of erosion status

11.1 Vegetation basal cover and vegetation species diversity

Basal cover refers to the proportion of ground at root level which is covered by vegetation and by the rooting portion of the cover plants. The line-transect (or the quadrat bridge) method can be used to establish sampling positions. A target of 15% basal cover should be set for fully established vegetation. Biodiversity assessments and surveys should be undertaken by external experts to establish the full range of plants that have become established. Summer and winter samplings should be done during these assessments.

11.2 Fauna species recolonized

The growth and recolonization of fauna on rehabilitated land should be recorded in relation to climatic conditions. This should be done in order to gather evidence of the relative capability of the new profile to support the pastures in relation to unmined conditions. This can be done by recording the number of grazing days, hay bales produced.

11.3 Groundwater & Surface Water

The groundwater levels and quality should be measured and monitored in a similar way to the surface water to determine the impact of the mining activities on the groundwater resources. A hydrogeologist, together with the relevant authorities, should determine the locations of the monitoring boreholes. The monitoring frequency will be determined by the regulator.

11.4 Surface Water

The functionality of the surface water drainage systems should be assessed on an annual basis. This could preferably be done when the first major rains of the season so after any major storm.

An assessment of those structures can ensure that the drainage on the recreated profile matches the rehabilitation plan as well on find early on when any drainage structures are not functioning efficiently. These will then be repaired or replaced before it causes vital erosion harm.

The quality of all water departure the property should be monitored on a daily basis (as per the EMP) to ensure compliance of the various constituents with the standards approved by the DWA. Extra monitoring should include aquatic biomonitoring (invertebrates, habitat, water quality and fish) on a bi-annual basis (high and low flow) to determine the ecological functioning and health of the rivers and streams, in and around the restored areas. The ecological functioning of the wetlands ought to similarly be assessed on an annual basis.

11.5 Chemical, Physical and Biological Status of Replaced Soils

Assess the depth of the replaced soils using a soil auger in a very regular grid pattern. The standard spacing of auger holes is 100 m by 100 m which results in one hole per hectare. Make sure that every auger hole is geo-referenced and that the results are plotted. The auger points are used to identify compact soil layers, the degree of disturbance of the soil and also the plant rooting pattern. Undertake soil fertility sampling independently of the auger survey. The land should be split into logical land use units and should not be bigger than 100 ha. These assessments should be conducted pre-establishment to ensure that immobile nutrients are applied and incorporated deep into the plant rooting zone throughout the initial tillage process.

11.6 Depth of Topsoil Stripped and Replaced

The recovery and effective use of the usable topsoil available is extremely important. It's also important to undertake regular reconciliation of the volumes stripped, stockpiled, and returned to the rehabilitated areas. A topsoil balance can be used to keep track of soil resources on the mine. A final post-mining rehabilitation performance assessment should be done, and information should be adequate for closure applications that involve:

- Assessment of rehabilitated soil thickness and soil characteristics by means of auger observations using a detailed grid
- A post-mining land capability map based on soil thickness and characteristics
- A post-mining land use map
- Erosion occurrences
- Fertility analysis and soil analysis
- Representative bulk density analysis

11.7 Final Topography

The topography that is achieved during rehabilitation should be monitored and compared to the planned topography. The final profile achieved should be acceptable in terms of the surface water drainage requirements and also the end land use objectives. The survey department should do an assessment of the reshaping applied on the site and signoff should be obtained from the rehabilitation specialist before the topsoil is replaced.

11.8 Monitoring of Erosion

If there is any sign of erosion known during operation monitoring should be implemented to avoid more erosion to the site. Continuous erosion monitoring of rehabilitated areas should be undertaken and zones with excessive erosion should be identified. Erosion will either be quantified or the occurrence there-of simply recorded for the particular location.

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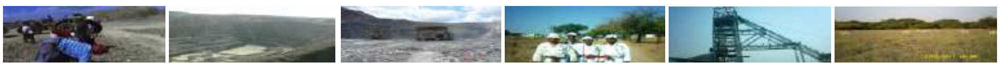
12 CONCLUSION AND RECOMMENDATIONS

12.1 Conclusion

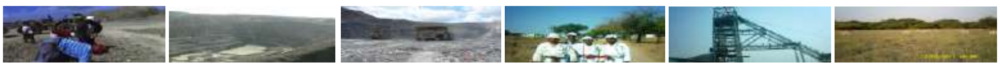
- Life of the mine is expected to last a period of two years.
- Topsoil needs to be stripped and stockpiled for later use in mine site rehabilitation particularly from the stockyards, laydown.
- The use of stripped stockpiled soil for rehabilitation purposes has to include detailed post rehabilitation however pre-vegetation soil analysis as well as detailed liming and fertilizer recommendations based on the soil analytical results, as well as the type of vegetation to be established.
- The surrounding land uses are associated with Natural vegetation.
- These planned project activities that may be implemented within the applied land will change the land capability for the lifetime of mine, whereas land use is modified from wild to mining among the mine sites.
- Be that as it may, rehabilitation and mitigation will change the land capability at the best back to cultivation.
- This pre-assessment of the soil condition before mining is more important when post-closure analysis will be conducted in the future, to know exactly how much the mine has impacted the area.

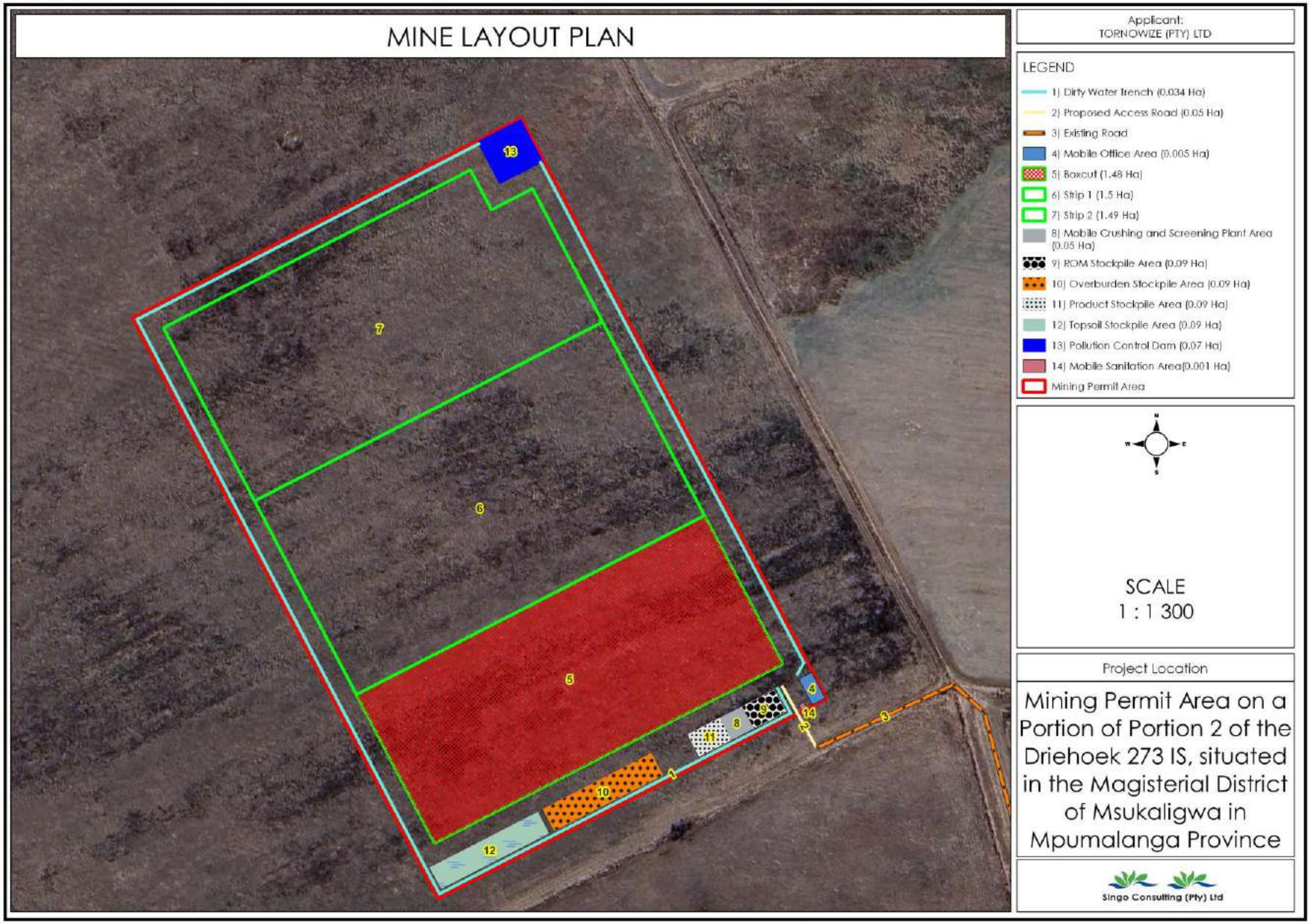


12.2 Recommendations

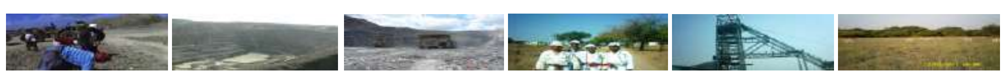
The following recommendations regarding rehabilitation of the mine site are applicable:

- It is recommended that the financial provision for closure and rehabilitation be annually updated as per the requirements of the MPRDA
- Surface water monitoring of the pans and associated wetlands surrounding the project area is to be undertaken to determine the impacts associated with operations of the mine
- Regular audits should be undertaken by a soil scientist during the soil stripping process. This will guarantee that soil is stripped and stockpiled correctly
- Regular audits should be undertaken to monitor the progress of areas that have been rehabilitated
- Long term management of the rehabilitated areas will be required via contractual agreements with landowners in the area and rehabilitation should also be undertaken to best practice
- An independent Environmental Assessment Practitioner shall be appointed to ensure compliance with requirements of the Final Rehabilitation, decommissioning and Closure Plan





MINE LAYOUT PLAN
Applicant:
TORNOWIZE (PTY) LTD
LEGEND
1) Dirty Water Trench (0.034 Ha)
2) Proposed Access Road (0.05 Ha)
3) Existing Road
4) Mobile Office Area (0.005 Ha)
5) Boxcut (1.48 Ha)
6) Strip 1 (1.5 Ha)
7) Strip 2 (1.49 Ha)
8) Mobile Crushing and Screening Plant Area (0.05 Ha)
9) ROM Stockpile Area (0.09 Ha)
10) Overburden Stockpile Area (0.09 Ha)
11) Product Stockpile Area (0.09 Ha)
12) Topsoil Stockpile Area (0.09 Ha)
13) Pollution Control Dam (0.07 Ha)
14) Mobile Sanitation Area(0.001 Ha)
Mining Permit Area
SCALE
1 : 1 300
Project Location
Mining Permit Area on a Portion of Portion 2 of the Driehoek 273 IS, situated in the Magisterial District of Msukaligwa in Mpumalanga Province
Singo Consulting (Pty) Ltd



MINING PERMIT APPLICATION

SOIL, LAND USE AND LAND CAPABILITY STUDY

Soil, Land Use and Land Capability Study for the proposed Mining Permit Application for Tornowize (Pty) Ltd on portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province.

Tornowize PTY (LTD)

REPORT PREPARED BY:

Singo Consulting (Pty) Ltd

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DMRE REF: MP 30/5/1/1/3/13557 MP

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Project details

Report type	**Soil, Land Use and Land Capability Study for a mining right application**
Project title	Soil, Land Use and Land Capability Study for the proposed mining permit application on portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province.
Mineral (s)	Coal resources
Client	Tornowize (Pty) Ltd
Site location	Portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province, South Africa.
Version	1
Date	20 July 2023

		Electronic signatures
Compiled by	Mutali Guduvheni (Hydrogeologist) Singo Consulting (Pty) Ltd, South African Council for Natural Scientific Professions (SACNASP: Earth Science (Candidate Natural Scientist) Reg. No: 141174)	
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Final review and approval	Dr. Kenneth Singo (Principal Consultant of Singo Consulting (Pty) Ltd)	

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Table 1: Critical Report Information

Critical Information incorporated within the Basic Soil, Land Use and Land Capability Study:	Relevant section in report
Details of the specialist who prepared the report	Project details, P: 3
The expertise of that person to compile a specialist report including a curriculum vitae	Appendix A, 46
Project Background Information, including the proposed activities description	Project background information, P: 10
An indication of the scope of, and the purpose for which, the report was prepared	Scope of work, P: 11-12
An indication of the quality and age of base data used for the specialist report	Project details, P: 3
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	N/A
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	
A description of the methodology implemented in preparing the report or carrying out the specialised process comprehensive of equipment and modelling used;	Methodology, P: 14
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternative;	N/A
An identification of any areas to be avoided, including buffers	N/A
A map overlaying the proposed activity including the associated infrastructures on the environmental sensitivities of the site including containing buffer zones	N/A
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Impact assessment, P: 29
Any mitigation and conditions measures for inclusion in the EMPr	Soil management plan, P: 31
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Monitoring, P: 39
An analytic opinion as to whether the proposed activity or portions thereof should be Authorised-i.e. specific recommendations	Recommendations, P: 41
Regarding the acceptability of the proposed activity or activities; and	Refer to bar
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Soil management during the operational phase, P: 33
A description of any consultation process that was undertaken during carrying out the study	Refer to the bar
Any other information requested by the competent authority.	N/A

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1 INTRODUCTION

1.1 Project Background Information

Tornowize (Pty) Ltd has appointed Singo Consulting (Pty) Ltd as an independent consulting company to conduct a specialist soil, land use and land capability study. The soil, land use and land capability study are being conducted in support of a mining permit application for Coal, on portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province.

This document is a soil study incorporating soil classification and agricultural potential prepared for the Tornowize (Pty) Ltd. The main aim of conducting this study is to find information with regards to the soil potential, land use as well as land capability.

1.2 Proposed Activities

The activities to take place are categorized based on phases of the life of the mine. The outlined activities have the potential of negatively or positively affecting the soil regime in the area.

Construction phase:

- Clearing of vegetation.
- Hardening surfaces to create roads.
- Installation of mobile machinery such as crusher and screening unit.

Operational Phase:

- Movement of machinery.
- Drilling, blasting, and hauling of material.
- Gravel, Aggregate and Sand processing which include but not limited to crushing.

The following infrastructure are required for the establishment of the opencast mining operations:

- Pit access ramps
- Haul roads

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- Waste dump areas for topsoil, soft overburden, and hard overburden (includes inter burden)
- ROM stockpiles for each of the four seams
- Clean water cut-off canals around the: ROM stockpile area, including crushing,
- Contractor's laydown area, along the haul roads, Around the waste dumps and Dirty water catchment drains.
- In-pit sumps for water management
- Pollution control dam (PCD)
- Piping system for water management

The construction of all infrastructure associated with the project will be within the mine project boundary. This report describes the soil types and properties present thereby giving a detailed baseline soil assessment of the undisturbed areas. The major soil types of presents are the Association of Classes 1 to 4: Undifferentiated structureless soils.

1.3 Scope of Work

Singo Consulting (Pty) Ltd was appointed by Tornowize (Pty) Ltd to conduct a detailed soil study for the mining permit application on portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province.

Singo Consulting (Pty) Ltd was tasked to collect soil samples to test for soil chemistry and the soil fraction percentages within the project area. The soil samples will be collected within the mining permit area.

The mining permit method will be an open cast mining and will be operating for over 2 years lifespan. During site establishment, the applicant must demarcate the site boundaries and clear the topsoil. Thereafter, softs will be removed and stored at the designated material stockpiles.

- The topsoil will be stockpiled elsewhere on site preferably next to the farm boundary and will be used during rehabilitation period.
- Once a box cut has been made, the overburden and mineral resources where necessary will be loosened by blasting.
- The loosened material will then be loaded onto trucks by excavators.
- A haul road will be situated at the side of the open cast, forming a ramp up which trucks can drive, carrying ore and waste rock.

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- Waste rock will be piled up at the surface, near the edge of the open cast (waste dump).
- The waste dump will be tiered and stepped, to minimize degradation.

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2 TERMS OF REFERENCE

- Conduct a detailed soil assessment of the proposed opencast mining areas and infrastructure areas.
- Classify and map soil forms according to the South African Taxonomic Soil Classification System, 1991.
- Derive and map land capability based on soil properties.
- Map all pre-mining and current land uses.
- Determine all possible impacts by the proposed operations and provide associated mitigation measures.

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3 METHODOLOGY

3.1 Desktop study and literature review

This allows soil surveyors to enter and study colour, texture, structure, and other soil properties as well to differentiate between horizons. This allows for classification. Chemical tests can be carried out in the field (e.g., pH, test for carbonates and test for Mn oxides). Classification is done at this stage, which provides information on the chemical, physical and mineralogical characterization of the soil. Soil scientists that map the area, familiarize themselves with soils they expect to find and use characteristics to distinguish them from other soils in the area by doing desktop study.

Delineating soil boundaries

Pits cannot be dug randomly, usually a map of the area is taken and a grid is made on the map to determine where samples will be taken from. An efficient soil mapper looks at changes in vegetation, topography, and soil colour. A bare soil map can also be looked at to see where changes in colour occur indicating differences in soil. Once sites are established, soil samples are taken with a soil auger. Soil auguring is the principal method used but intrusive and labour intensive.

3.2 Site Assessment

Site inspection will be conducted on portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province. The holes were drilled up to 30 cm below the ground level. The soil was described and classified according to the South African Taxonomic Soil Classification System.

The following procedure was followed to record soil properties and classify soils accordingly:

- Identification of applicable diagnostic horizons by stating the physical properties such as:
    - ➢ Effective depth (depth of soil suitable for root development),
    - ➢ Colour (in accordance with Munsell colour chart),
    - ➢ Texture (refers to the particle size distribution),
    - ➢ Structure (aggregation of soil particles into structural units),
    - ➢ Mottling (alterations due to continued exposure to wetness),

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- Concretions (cohesion of minerals into hard fragments), Leaching (removal of soluble constituents by percolating water),
- Gleying (reduction of ferric oxides under anaerobic conditions resulting in grey, low soil colours), and
- Illuviation of colloidal mater from one horizon to another resulting in the development of grey sandy E-horizons and grey clay G-horizon.

- Determine according to above properties the appropriate soil form and soil family

3.3 Analysis of samples at soil laboratory

Equipment's used during the soil sampling includes the GPS, camera, spade, auger, and sampling bags. A soil field form was completed during the sampling procedure, recording the moisture, colour, texture, and origin the soil origin. The soil is uniform within the project area.

Soil samples were collected from portion of portion 2 of the Farm Driehoek 273 IS, within ward 9 under the Magisterial District of Ermelo, where the mining activities will be taking place. The collected soil samples were submitted to ARC-Soil Climate and Water in Pretoria lab to test for soil chemistry and the soil fraction percentages within the project area.

3.4 Land capability classification

The Land capability classification is one of several interpretation groups that was made for agricultural purposes. As with all the interpretation groups, the land capability classification starts with one soil-mapping unit, which is the building block of the system.

The land capability is classified into grazing, arable and wilderness. In this classification the arable soils are grouped according to their potentialities and limitations for sustained production of the common cultivated crops that do not require specialized site conditioning or site treatment. Nonarable soils (soils unsuitable for long time sustained use for cultivated crops) are grouped according to their potentialities and limitations to produce permanent vegetation and according to their risks of soil damage if mismanaged.

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4 PHYSIOGRAPHICAL AND SOIL SETTING

4.1 Project Location

The locality map created by the QGIS illustrates the location of the mining permit area. The project area is situated on portion of portion 2 of the farm Driehoek 273 IS, situated in the Magisterial District of Ermelo in Mpumalanga Province. The study area is situated approximately 9.30 km North-East of Spitskop farm.

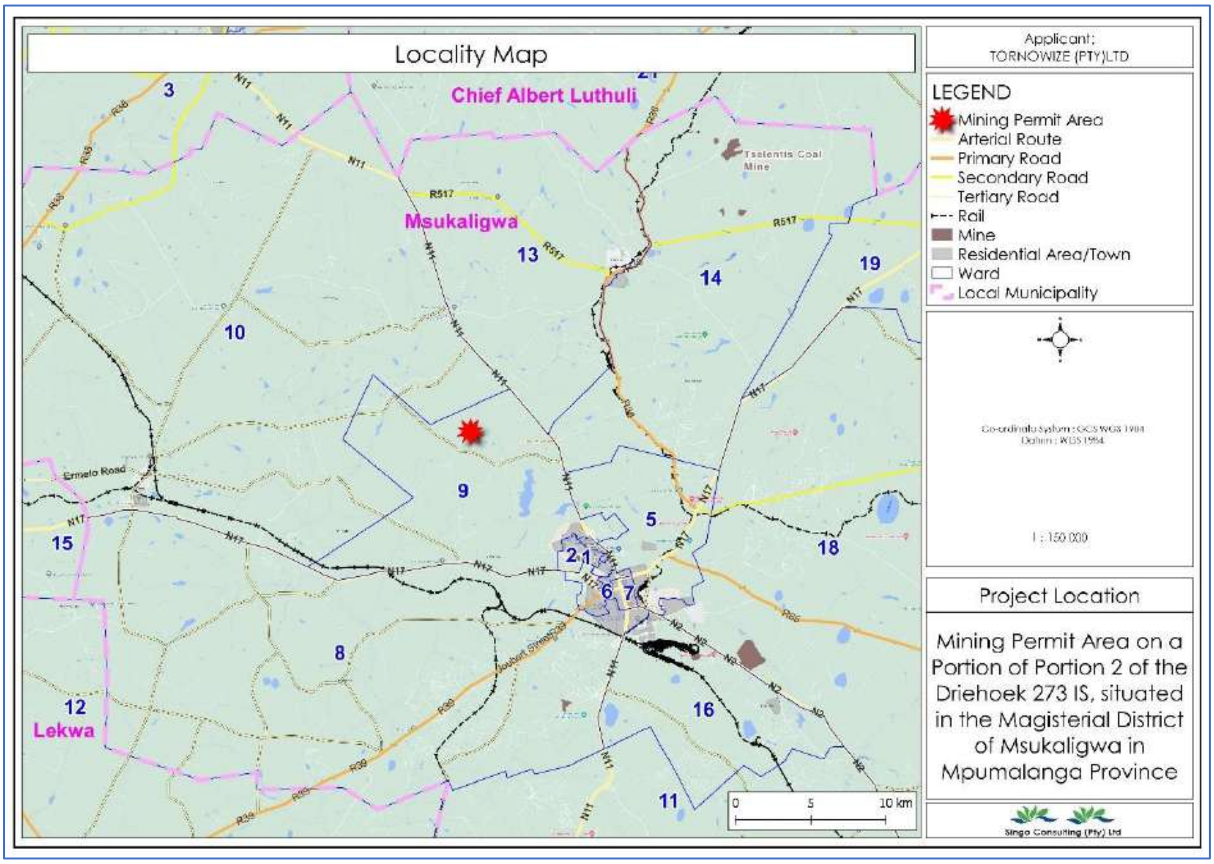

Figure 1: Locality map of the study area

4.2 Climate

Climate is the state of the atmosphere over a long period of time, such as over years, decades, centuries or greater and weather is defined as atmospheric conditions of an area over a short period of time (Naomi, 2004). Climate for the purpose of the study is chosen based on the fact that it does not change over a long period of time whereas weather conditions fluctuate more rapidly, and its data cannot be relied upon.

In Ermelo, the wet season is comfortable and partly cloudy and the dry season is cool and mostly clear. Over the course of the year, the temperature typically varies from -1°C to 23°C and is rarely below -4°C or above 26°C (https://weatherspark.com/, n.d.)., the rainfall and temperature of the project area is shown in Figure 2 and Figure 3.

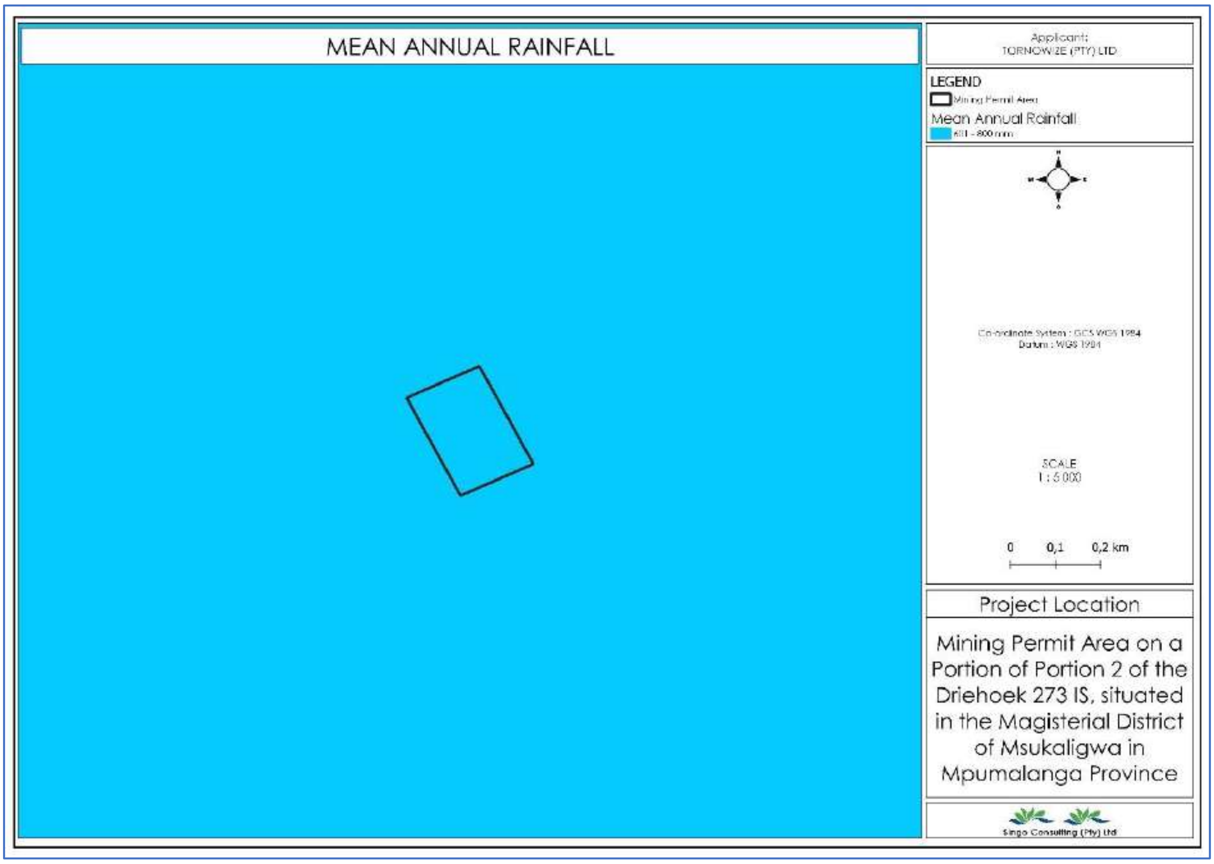

Figure 2: Mean annual rainfall map

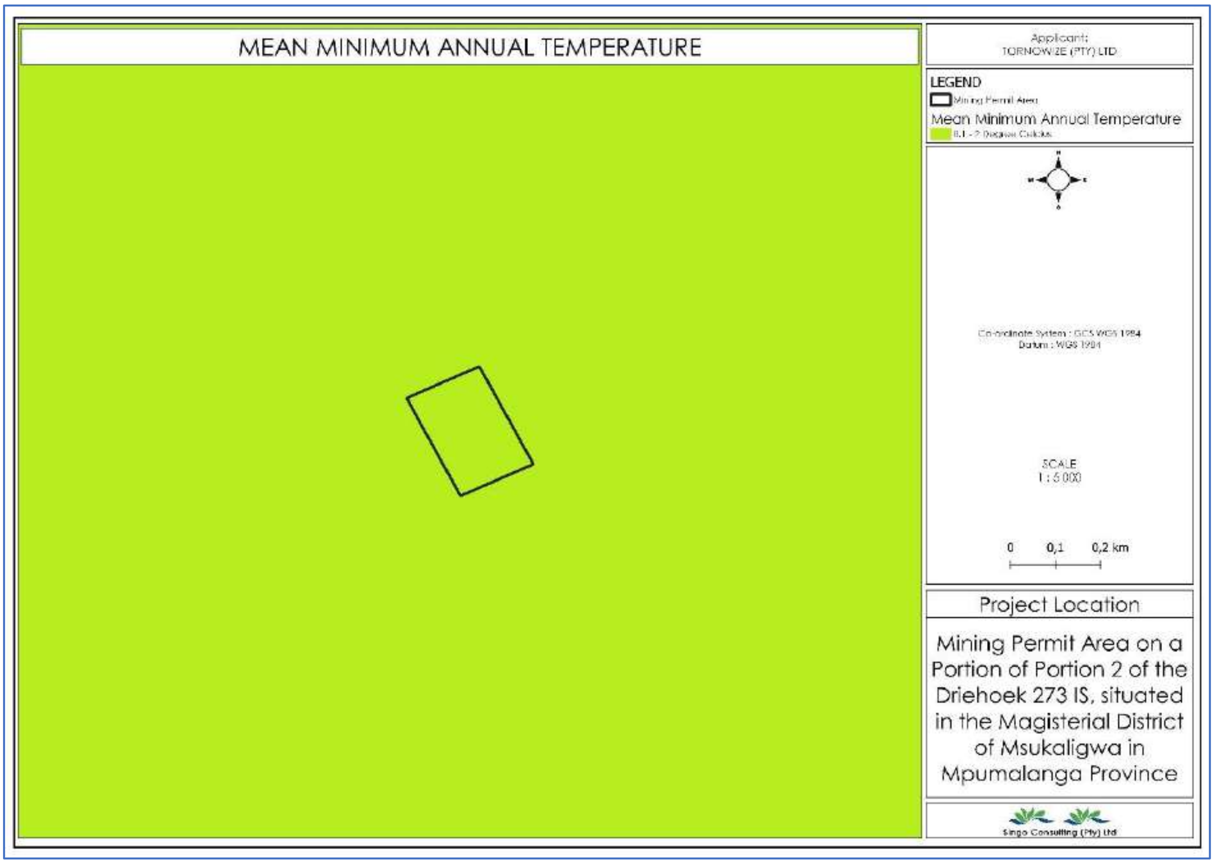

Figure 3: Mean minimum annual temperature map.

4.3 Soil forms present in the study area

The soil classes map in Figure 4 below, shows that the mining permit area is largely covered Association of Classes 1 to 4: Undifferentiated structureless soils.

Soil class	Favourable properties	Limitations
Association of Classes 1 to 4: Undifferentiated structureless soils	Favourable physical properties	One or more of: low base status, restricted soil depth, excessive or imperfect drainage, high erodibility.

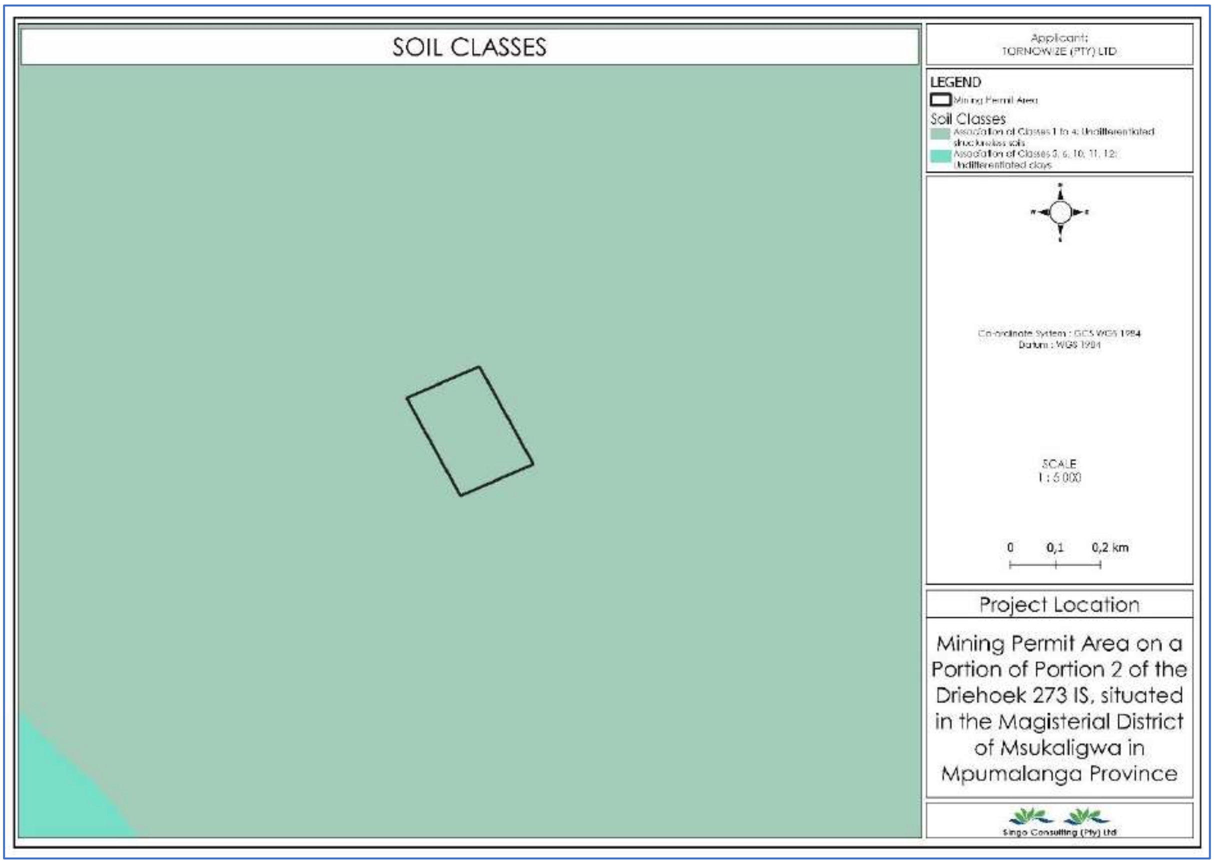

Figure 4: soil class map of the project area.

4.4 Soil chemical conditions of the study area

The main aim for soil sampling is to identify the soil moisture, colour, consistency, structure, soil type and origin (MCCSSO) of the soil.

Table 2: Site pictures and description

Site pictures and equipment's	Description
The equipment's used included: • Auger/TLB • plastics, • shovel, • GPS, • Buff tags,	Operation of soil Sampling Selecting an acceptable sampling location, then collecting a soil sample with an Auger/ TLB while identifying the different layers of soil in the area are all part of the method. The soil samples are stored in various plastics and recorded before being sent to the lab for analysis. Some of the types of analyses undertaken include pH (alkalinity and

• Sampling forms. • Cable ties	acidity), Soil Texture Composition, and Chemical Compositions.
	The Auger was used to remove ground samples and capture the many different strata found underground. Soil samples were collected to determine chemical composition, soil texture, pH level, and soil nutrients.

4.5 Agricultural potential

The study area consists of arable land capability class. Arable land is any land capable of being ploughed and used to grow crops. Arable land is the land that is being worked regularly, generally under a system of crop rotation.

Table 3: Land capability classification (Scotney et al., 1987)

Land Capability Group	Limitations
Arable Land	This land group can be grouped into: • **No or Few limitations:** Very high arable potential and very low erosion hazard. • **Slightly Limitations:** High arable potential, with low erosion hazard. • **Severe Limitations:** Low arable potential and high erosion hazard.

4.6 Land use

The proposed area is covered by Cultivated land.

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Cultivated land - arable land that is worked by plowing and sowing and raising crops ploughland, plowland, tillage, tilled land, tilth, farmland fallow - cultivated land that is not seeded for one or more growing seasons.

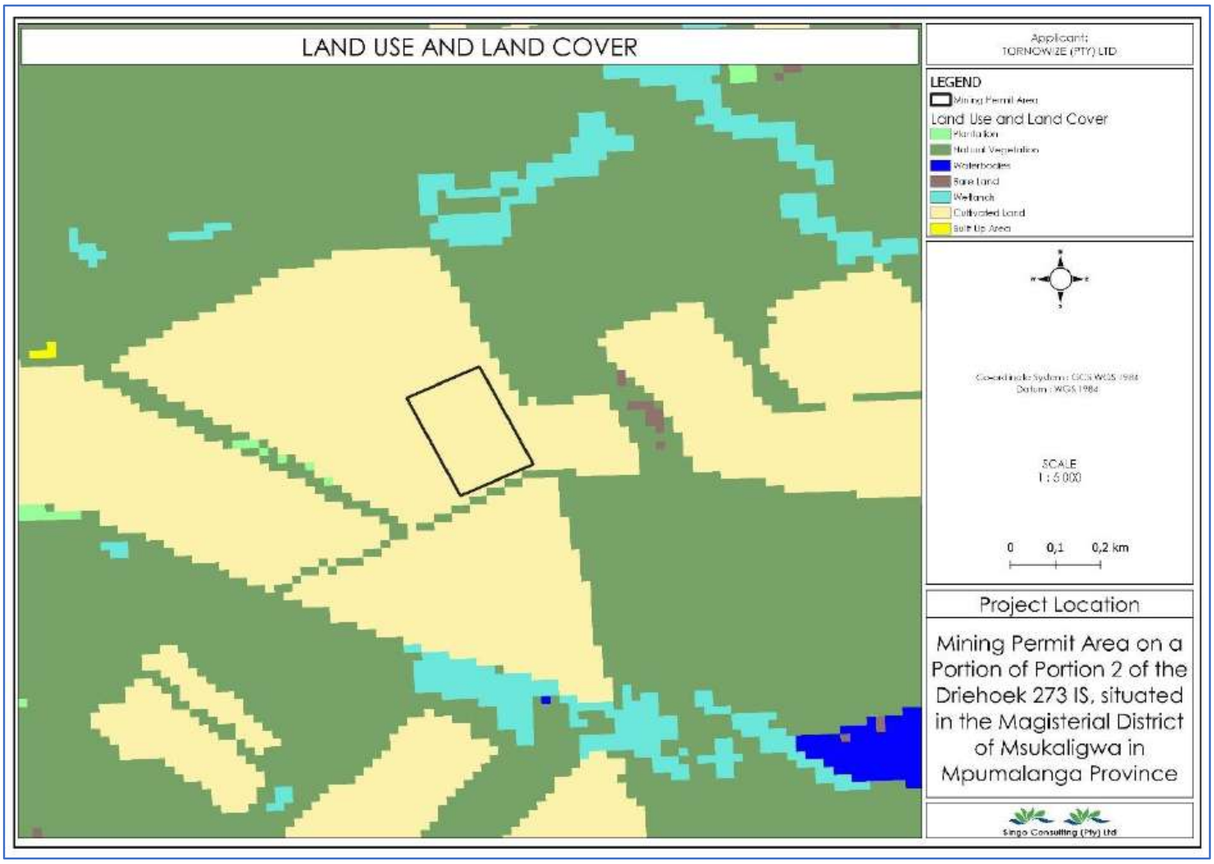

Figure 5: Land use and Land cover map

4.7 Land capability

The Land capability classification is one of several interpretation groups that was made for agricultural purposes. As with all the interpretation groups, the land capability classification starts with one soil-mapping unit, which is the building block of the system.

The land capability is classified into grazing, arable and wilderness. In this classification the arable soils are grouped according to their potentialities and limitations for sustained production of the common cultivated crops that do not require specialized site conditioning or site treatment. Nonarable soils (soils unsuitable for long time sustained use for cultivated crops) are grouped according to their potentialities and limitations to produce permanent vegetation and according to their risks of soil damage if mismanaged. The land capability of the proposed area is classified as an arable land and grazing. Arable land is any land capable of being ploughed and used to grow crops.

The mining permit area is situated within the arable land capability group.

The capability grouping of soils is designed:

0. To help landowners and others use and interpret the soil maps,
1. To introduce users to the detail of the soil map itself, and
2. To make possible broad generalizations based on soil potentialities, limitations in use, and management problems'

The capability classification provides three major categories of soil groupings:

0. Capability unit,
1. Capability subclass, and
2. Capability class.

The first category, capability unit, is a grouping of soils that have about the same responses to systems of management of common cultivated crops and pasture plants. Soils in any one capability unit are adapted to the same kinds of common cultivated and pasture plants and require similar alternative systems of management for these crops. Long-time estimated yields of adapted crops for individual soils within the unit under comparable management do not vary more than about 25 percent.

The second category, the subclass, is a grouping of capability units having similar kinds of limitations and hazards. Four general kinds of limitations or hazards are recognized: (1) Erosion hazard, (2) wetness, (3) rooting zone limitations, and (4) climate.

The third and broadest category in the capability classification places all the soils in eight capability classes. The risks of soil damage or limitations in use become progressively greater from class I to class VIII. Soils in the first four classes under good management can produce adapted plants, such as forest trees or range plants, and the common cultivated field crops ^ and pasture plants. Soils in classes V, VI, and VII are suited to the use of adapted native plants. Some soils in classes V and VI are also capable of producing specialized crops, such as certain fruits and ornamentals, and even field and vegetable crops under highly intensive management involving elaborate practices for soil and water conservation. Soils in class VIII

do not return on-site benefits for inputs of management for crops, grasses, or trees without major reclamation.

The grouping of soils into capability units, subclasses, and classes is done primarily based on their capability to produce common cultivated crops and pasture plants without deterioration over a long period of time. To express suitability of the soils for range and woodland use, the soil mapping units are grouped into range sites and woodland-suitability group.

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Table 4: Relationship of soil-mapping unit to capability classification (Source: Kellogo, 1961)

Soil-mapping unit	Capability unit	Capability subclass	Capability class
A soil mapping unit is the part of the landscape' that has the same qualities and characteristics and whose limits are static by accurate definitions. Within the cartographic limitations and considering the purpose for which the map is made, the soil mapping unit is the unit at which the highest number of accurate statements and predictions can be done. The soil mapping units gives more information about the details of soils. The basis for all the interpretation is the basic mapping units. They provide the information required for the	A group of one or more individual soil mapping units having similar potentials and continuing limitations or hazards is termed as capability unit. The soils in a capability unit are sufficiently uniform to (1) produce similar kinds of cultivated crops and pasture plants with similar management practices, (2) require similar conservation treatment and management under the same kind and condition of vegetative cover, (3) have comparable potential productivity. The capability unit condenses and simplifies soils information for planning individual tracts of land,	are the groupings of capability units that have the same major conservation problem are called Subclasses. The problems include— 1.E>Erosion and runoff. 2. W>Excess water. 3.S>Root-zone limitations. 4.C>Climatic limitations. The information about the involved limitations and the kind of problems related to conservation are provided by capability Subclass. The information about the map user relating to the limitation degree and the kind of problems involved in	Capability classes are groups of capability subclasses or capability units that have the same relative degree of hazard or limitation. The limitation and risks of soil damage in use become more from class I to class VIII. The capability classes are useful as a means of introducing the map user to the more detailed information on the soil map. The classes show the location, amount, and general suitability of the soils for agricultural use. Only information concerning general agricultural limitations in soil use are obtained at the capability class level.

development of capability units, forest site groups, crop suitability groups, range site groups, engineering groups, and other interpretation groups. The most specific management ways and estimated yields relates to the individual mapping unit.	field by field. Capability units with the class and subclass furnish information about the degree of limitation, kind of conservation problems and the management practices needed.	broad program planning, conservation need studies, and similar purposes are provided by the class and sub class.	

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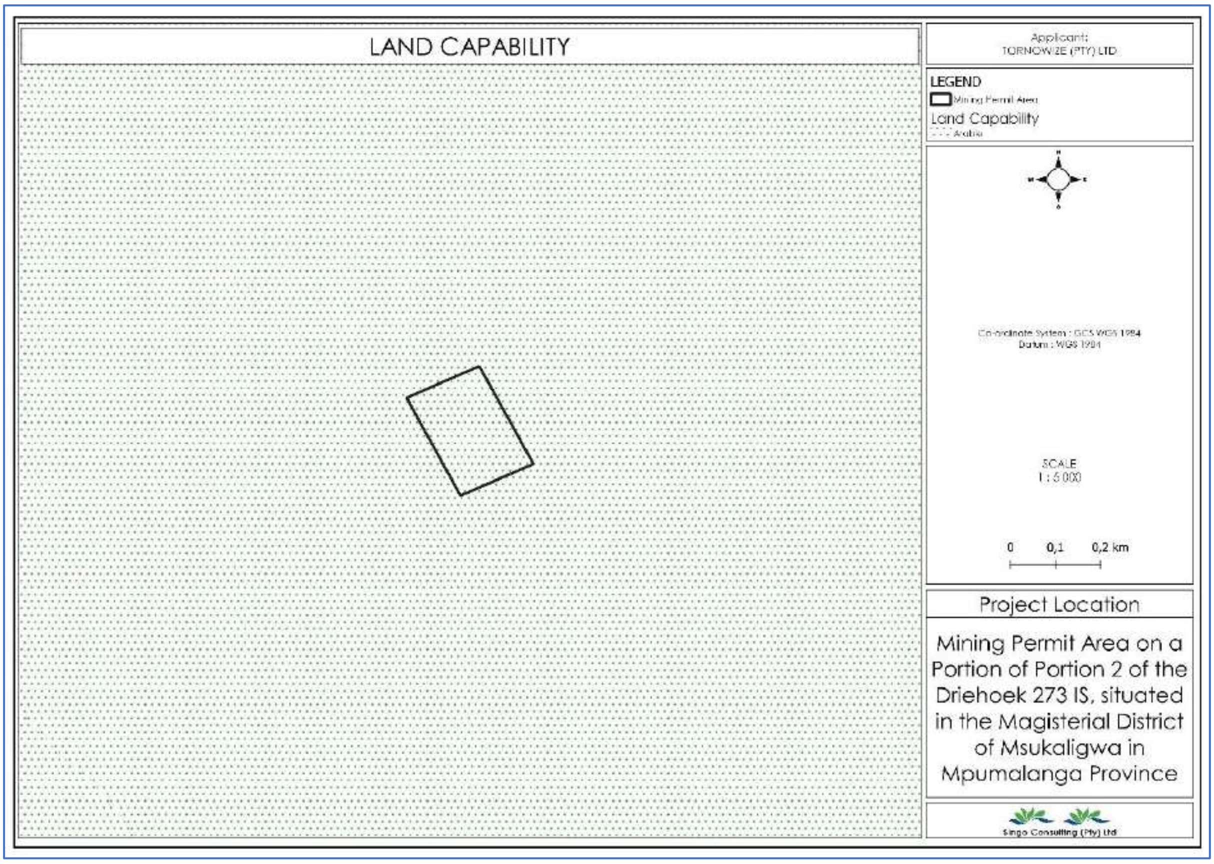

Figure 6: Land capability map of the study area

5 IMPACT ASSESSMENT

5.1 Assessment methodology

Pits cannot be dug randomly, usually a Soil map of the area is taken and a grid is made on the map to determine where samples will be taken from. An efficient soil mapper looks at changes in vegetation, topography, and soil colour. A bare soil map can also be looked at to see where changes in colour occur indicating differences in soil. Once sites are established, soil samples are taken with a soil auger. Soil auguring is the principal method used but intrusive and labour intensive.

5.2 Impact assessment per project phase

5.2.1 Construction phase

During the construction phase of the above listed mining activities, the work carried out will mainly be the construction of the beneficiation plants and associated infrastructure, and expansion of stock yard and stockpiles.

This will entail the clearing of areas and the disturbance of the topsoil through excavations as well as the construction of a soil stockpile. The topography and natural drainage lines may also be disturbed. The overall impact will be loss of topsoil because of erosion and possible contamination of the soil by gravel, aggregate and sand dust, fuel, and oils (hydrocarbons) as a result of general construction activities. Soil compaction caused by heavy vehicles and machinery may also be a problem.

Construction activities will change the land use from uncategorised to mining, beneficiation plants and associated infrastructure, conveyors, power line, new roads and expansion of stock yard and stockpile sites, there will be no substantial change to the land use within these areas. Areas that have been categorised as uncategorised land use will change and will be unsuitable for any further farming or game farming use during the life of the project.

5.2.2 Operational phase

Soil erosion through wind and storm water run-off and soil pollution by means of hydrocarbon contamination and potentially gravel, aggregate and sand dust may be encountered during the operational phase. Water runoff from roads and plant areas must be controlled and managed by means of proper storm water management facilities in order to prevent soil erosion. Diesel and oil spills are common at mine sites due to the large volumes of diesel and

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oil consumed by construction vehicles. Pollution may however be localized. Small pockets of localized pollution may be cleared up easily using commercially available hydrocarbon emergency clean-up kits.

An additional impact that could occur is when soils are stripped and stockpiled as the natural sequence of the soil horizons is lost when stripping and stockpiling is undertaken. An associated impact could be compaction of soil stockpiles, if they are repeatedly driven over, which would result in compaction of soil stockpiles if the appropriate dumping techniques were not adopted. This can be mitigated against by demarcating soil stockpiles and minimise or prevent driving over stockpiles should be avoided were possible to avoid compaction. End tipping as a method of creating stockpiles can be adopted to avoid unnecessary compaction.

5.2.3 Decommissioning and rehabilitation phase

Mining infrastructure must be removed during the deconstruction phase. All foundation excavations must be backfilled and then covered with subsoil material and topsoil on the top layer, fertilised and re-vegetated. Backfilling of soil will impact on the land capability by restoring the land capability because vegetation can be supported and therefore returned to its original land use. As open cast mining progresses and enough space is available concurrent rehabilitation should be undertaken, this would include backfilling, contouring, re-vegetation of impacted areas and this would typically be done during the operational phase, as concurrent rehabilitation, and during the decommissioning phase.

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6. SOIL MANAGEMENT PLAN

6.1 Soil management during the construction phase

6.1.1 Minimise mining infrastructure footprint

- The footprint of the proposed infrastructure area should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint.
- The construction of all infrastructure associated with the project will be within the mine project boundary.

6.1.2 Management and supervision of construction teams

On both large and small construction sites, supervision is critical in preventing accidents. Planning and distributing work, making decisions, monitoring performance and compliance, giving leadership and teamwork, and ensuring staff involvement are all typical supervisory duties. As a result, supervision plays a significant role in the success of a typical construction project, particularly in terms of ensuring that health and safety is successfully managed.

6.1.3 Location of stockpiles

- Ensure stockpiles are placed on a free draining location to limit erosion loss

6.1.4 Topsoil stripping

- Soils will be stripped according to the soil types and recommended depths.
- strip the topsoil from all areas that will be disturbed by construction activities or driven over by vehicles.
- The topsoil will be stripped and loaded onto dump trucks.
- Topsoil is to be stripped when the soil is dry (as far as practical possible), as to reduce compaction; and
- To be stripped according to the stripping guideline and management plan, contained within this report and further recommendations contained within the rehabilitation plan, and stockpiled accordingly.

6.1.5 Stockpiling of topsoil

- Stockpiles are to be maintained in a fertile and erosion free state by sampling them annually for macro nutrients and pH.
- Prevent unauthorised borrowing of stockpiled soil.

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6.1.6 Demarcation of topsoil stockpiles

- Berms should be placed around stockpiled soil to prevent soil loss due to erosion.
- The stockpiles area should be clearly demarcated.

6.1.7 Prevention of stockpile contamination

- The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate.
- Prevent any spills from occurring.
- If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities.

6.1.8 Terrain stability to minimise erosion potential

- Stockpiles are to be maintained in a fertile and erosion free state by sampling them annually for macro nutrients and pH.
- Berms should be placed around stockpiled soil to prevent soil loss due to erosion.
- The stockpiles will be vegetated where the natural establishment of vegetation by the natural occurring seed bank is not sufficient (details contained in rehabilitation plan) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil.

6.1.9 Management of access and haulage roads

- strict access control practiced preventing vehicles driving on the stockpile.
- Compaction of the removed topsoil should be avoided by prohibiting traffic on stockpiles.

6.1.10 Prevention of soil contamination

- Landfilling, sometimes known as "dig and haul," is the most basic method of soil restoration. This method involves removing contaminated soil from its original location and transporting it to a secure landfill, which is a constructed structure with impermeable liners, leachate drains, and dike enclosures. Landfilling is a well-known method of cleaning up hazardous waste sites.
- Soil washing refers to the size separation, gravity separation, or attrition scrubbing of pollutants absorbed to discover soil particles in an aqueous solution. Soil washing relies on the ionic strength, soil acidity, redox potential, and complexation of washing

solutions to mobilize heavy metals. An ideal washing solution would boost the solubility and mobility of heavy metal pollutants while interacting only weakly with soil constituents and being biodegradable and harmless.

6.2 Soil management during the operational phase

6.2.1 Managing potential soil contamination during the operational phase

- Prevent any spills from occurring.
- If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities.
- All storage areas (for fuels and lubricants) will be compacted and have bunded containers to prevent soil pollution and appropriate oil separators installed.
- Water runoff traps should be constructed at the vehicle service sites to prevent polluted water runoff into areas that are not impacted upon.
- All vehicles are to be serviced regularly in a correctly bunded area.
- Hydrocarbon management procedure to contain details of emergency clean-up procedures and
- Leaking vehicles will have drip trays place under them where the leak is occurring.
- Pipelines conveying waste material must be monitored for leaks on a regular basis.

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Table 5: Soil management during operational phase

OPERATIONAL PHASE									
Impact		**Management**	**Severity**	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**
Activity	Establishment of the open cast pit areas							
• Operation of the open cast pit will highly likely result in a loss of soil depth and volume since the ore material will be transported off-site and sold as product.		Unmanaged	H	H	M	H	H	H
		Managed	M	L	L	L	L	L
• Potential leakages of hydrocarbons resulting from machinery / construction vehicles, and spillage of other heavy metals leading to soil contamination		Unmanaged	M	M	L	M	H	M
		Managed	M	L	L	L	L	L
• Movement of heavy machinery / construction vehicles off existing/demarcated roads, leading to soil compaction		Unmanaged	M	M	L	M	H	M
		Managed	M	L	L	L	L	L
Activity	Development of waste facilities (i.e., Waste Rock Dump)							

*Stockpiling on Waste Rock Dump (WRD) areas alongside the open cast pit area. Waste rock will potentially result in soil compaction of underlying soil material.	Unmanaged	M	M	L	M	H	M
	Managed	M	L	L	L	L	L
Mitigation Measures	• An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur. • The footprint areas of the ore stockpiles as well waste rock dumps should be lined to prevent seepage of contaminants. The footprint areas should also be rehabilitated post closure to a manner that will allow for land use such as housing or industrial development. • Stockpiles should be revegetated to establish a vegetation cover as an erosion control measure. These stockpiles should also be always kept alien vegetation free to prevent loss of soil quality; and • Compacted soil associated footprint areas can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation.						

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6.3 Soil management during the decommissioning and rehabilitation phase

6.3.1 Management and supervision of decommissioning teams

6.3.2 Infrastructure removal

- During the decommissioning phase the footprint should be thoroughly cleaned, and all building material should be removed to a suitable disposal facility.
- Remove buildings to foundation level.
- All rubble to be relocated to a specified approved rubble dump.
- Rip all roads.

6.3.3 Site preparation

- Backfill foundations using stockpiled soil material.
- Rip all roads.

6.3.4 Seeding and re-vegetation

- Undertake inspection of rehabilitated area to ascertain level of success of rehabilitation efforts and effectiveness (vegetation growth, erosion monitoring);
- Additional top soiling and revegetation of affected areas should be undertaken if required.
- Re-vegetate the entire site.

6.3.5 Prevention of soil contamination

Toxic chemical compounds, salts, radioactive agents, toxins, and other waste contribute to soil contamination/pollution, and these results in severe negative impact on plant and animal health.

6.4 Soil management during the closure phase

Table 6: Soil management during closure phase

Closure phase								
Impact	**Management**	**Severity**	**Duration**	**patial Scale**	**Consequence**	**obability**	**Significance**
Activity Backfilling of the open cast pit areas							
• Demolition of structures and ripping of soil and hard surfaces, leading to further soil disturbances leading to compaction	Unmanaged	M	L	L	L	L	L
	Managed	M	L	L	L	L	L
• Restoration of natural topography and revegetation leading to further soil erosion, compaction, and contamination. Resurfacing may lead to water ponding if not done properly	Unmanaged	M	M	L	M	H	M
	Managed	M	L	L	L	L	L
Mitigation Measures	• The landscape should be backfilled and re-profiled to mimic the natural topography (if possible) for potential post mining activities including housing and industrial development. • Soil amelioration should be done according to soil analyses as recommended by a soil specialist, to correct the pH and nutrition status before revegetation. • The footprint should be re-vegetated with a grass seed mixture as soon as possible, preferably in spring and early summer to stabilize the soil and prevent soil loss during the rainy season.						

	• The footprint should be ripped to alleviate compaction post closure before revegetation;

7 MONITORING

7.1 Monitoring Locations

- Monitoring of backfilled sites should be undertaken to ensure that the landscape is free draining to prevent water logging condition.
- Undertake inspection of rehabilitated area to ascertain level of success of rehabilitation efforts and effectiveness (vegetation growth, erosion monitoring)
- The topsoil should be ameliorated according to soil chemical analysis and monitoring data.
- Monitoring of erosion must take place throughout the life of mine, in order to prevent the formation of erosion gullies as a result of altered flow paths, and the possible sedimentation of the freshwater resources.
- Soil monitoring should be undertaken to ensure that the natural chemical status of the soil is re-instated.

7.2 Monitoring Methodology

Soil monitoring is essential for preserving soil quality. Monitoring is done using indicators (also known as soil characteristics) of soil condition at various stages over time. It includes studying the soil through soil testing and field observations, as well as observing how the soil changes following intervention. Following the implementation of an intervention plan, soil changes must be monitored using indicators. This necessitates soil sampling and analysis on a seasonal/yearly basis.

7.3 Monitoring Records

For maintaining soil quality, soil monitoring is critical. It includes studying the soil through soil testing and field observations, as well as monitoring how the soil responds to intervention. It is vital to monitor the change in the soil by measuring indicators once an intervention plan has been implemented.

7.4 Analytical Parameters

Physical, chemical, and biological components exist in soil. Indicators derived from these elements should be quantitative, straightforward, and sensitive enough to be managed using interventions aimed at bringing an indicator or a collection of indicators to an acceptable level. Many soil quality indicators are critical to the system's successful operation. For the system to perform successfully, all indicators of soil quality must be at optimal levels. For sandy, silty, and clayey soils, the ideal bulk density levels are 0.92, 0.81, and 0.64 oz/in3, respectively (Table 1). Any value that is higher (than) the reference or standard value is regarded as undesirable.

The use of an indicator to determine soil quality necessitates a thorough understanding of the indication. Some measured variables have optimum values, and any value higher or lower than that is unsatisfactory. Several field crops, for example, tolerate pH values between 5.8 and 7.2. Organic carbon (C) and total nitrogen (N) levels in the soil should be high, but sodium (Na) adsorption ratio (SAR) values should be low.

7.5 Reporting

A soil test is used to determine the position and shape of a hidden mineralised structure, as well as to identify any better grade areas within the structure. This information is important for establishing soil fertility levels and making good nutrient management decisions.

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8 CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion and Summary

A specialist from Singo Consulting (Pty) Ltd was appointed to conduct a soil, land use, land capability and agricultural potential assessment as part of the Environmental Impact Assessment process for the proposed mining permit application.

Based on observations during the site assessment and scrutiny of satellite imagery, the area is overlain by the Association of Classes 1 to 4: Undifferentiated structureless soils.

The land capability map of the study area shows that the area is situated on arable land and is suitable for being ploughed and used to grow crops.

8.2 Recommendations

- The proposed mining land should be returned to its origin as before mining activities and the rehabilitation performance assessment in the proposed land must be done progressively (annually) during the operational phase by a soil specialist
- Final surface rehabilitation of all disturbed areas during mining activities. Rehabilitation of unnecessary water management facilities once appropriate to do so.
- Specialists should be used to evaluate the erosion and other possible impacts during the entire mining process
- Limit impacts to the footprints to keep physical impacts as small as possible. Areas for road, site lay-out should be minimized, dust generation.
- Ensure all stockpiles (especially topsoil) are clearly and permanently demarcated and located in defined no-go areas.
- Stockpile height should be restricted, A maximum height of 2-3 m is therefore proposed.
- Stockpiles should also be always kept free of alien vegetation to prevent loss of soil quality.
- The recovered soils should be re-used to rehabilitate the mine footprint following mine closure.

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9 REFERENCES

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- Soil Classification Working Group, 1991. Soil Classification – a taxonomic system for South Africa. ARC-Institute for Soil, Climate and Water, Pretoria
- Land Type Survey Staff. 1972 – 2006. Land Types of South Africa: Digital map (1:250 000 scale) and soil inventory databases. ARC-Institute for Soil, Climate and Water, Pretoria

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APPENDICES

Appendix A: Specialist's qualifications

Available upon request

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SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 13557 MP

Project name: Mining Permit Area on Portion of Portion 2 of the Farm Driehoek 273 IS

Project title: Mining Permit Area on Portion of Portion 2 of the Farm Driehoek 273 IS

Date screening report generated: 22/06/2023 13:42:25

Applicant: Tornowize (Pty) Ltd

Compiler: Singo Consulting (Pty) Ltd

Compiler signature:

……………………………………………………………………………………………

Application Category: Mining|Mining Permit

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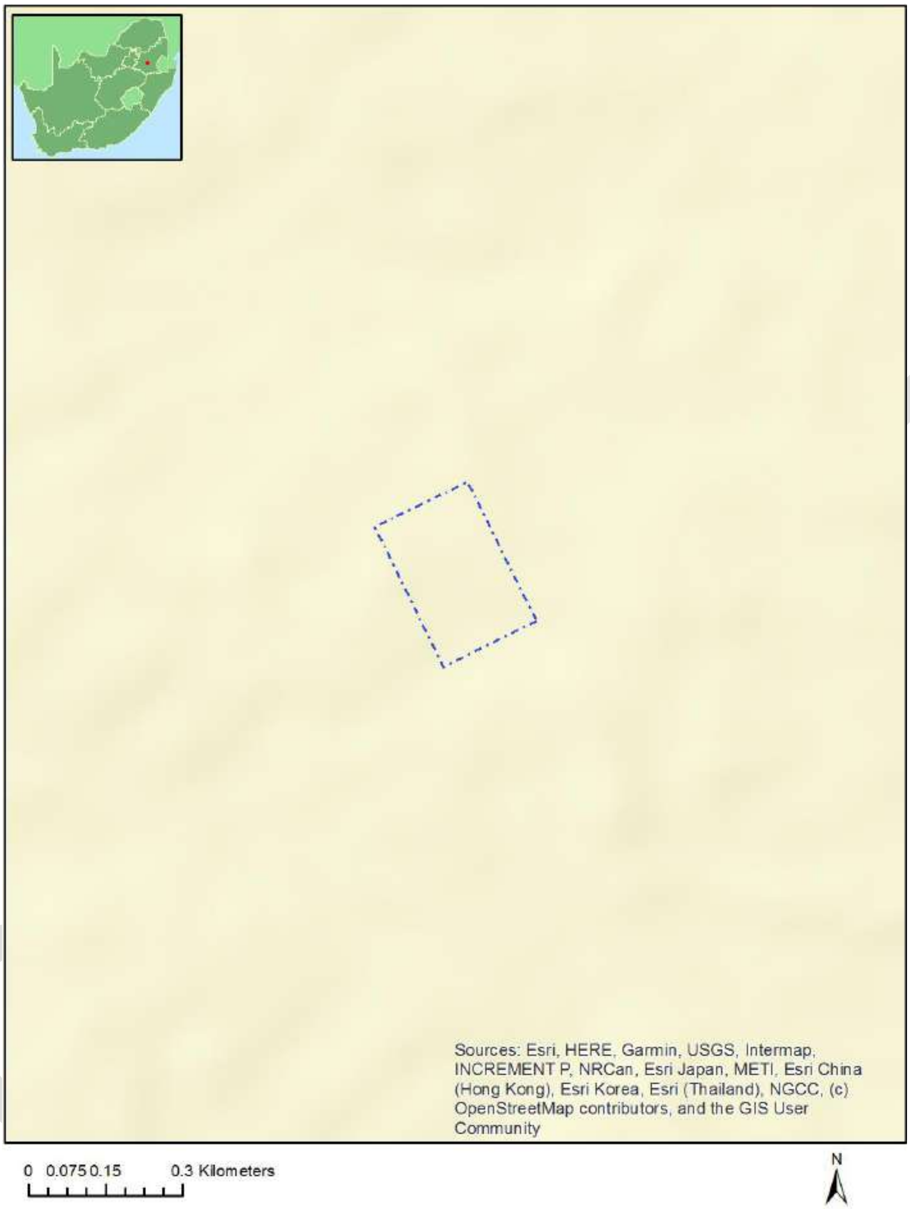
Proposed Project Location

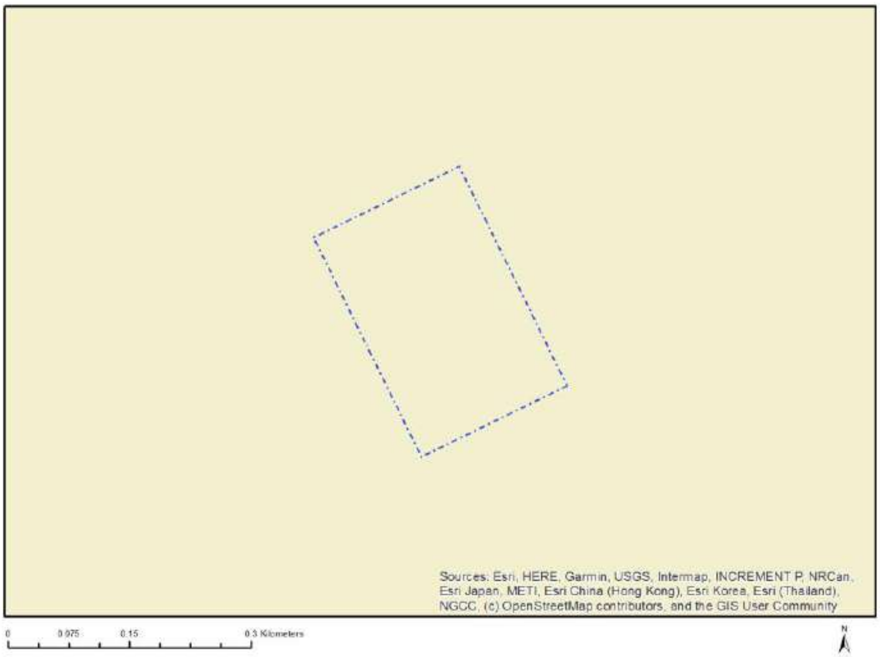
Orientation map 1: General location

General Orientation: Mining Permit Area on Portion of Portion 2 of the Farm Driehoek 273 IS



22/06/2023

Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	DRIEHOEK -	273	0	26°26'17.57S	29°53'16.97E	Farm
2	DRIEHOEK -	273	2	26°24'49.85S	29°52'23.98E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No nearby wind or solar developments found.

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Mining|Mining Permit**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Air Quality-Highveld Priority Area	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/HIGHVELD_PRIORITY_AREA_AQMP.pdf
Strategic Gas Pipeline Corridors-Phase 8: Rompco Pipeline Corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_GAS.pdf

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol

1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Hydrology Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
8	Radioactivity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
9	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
13	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

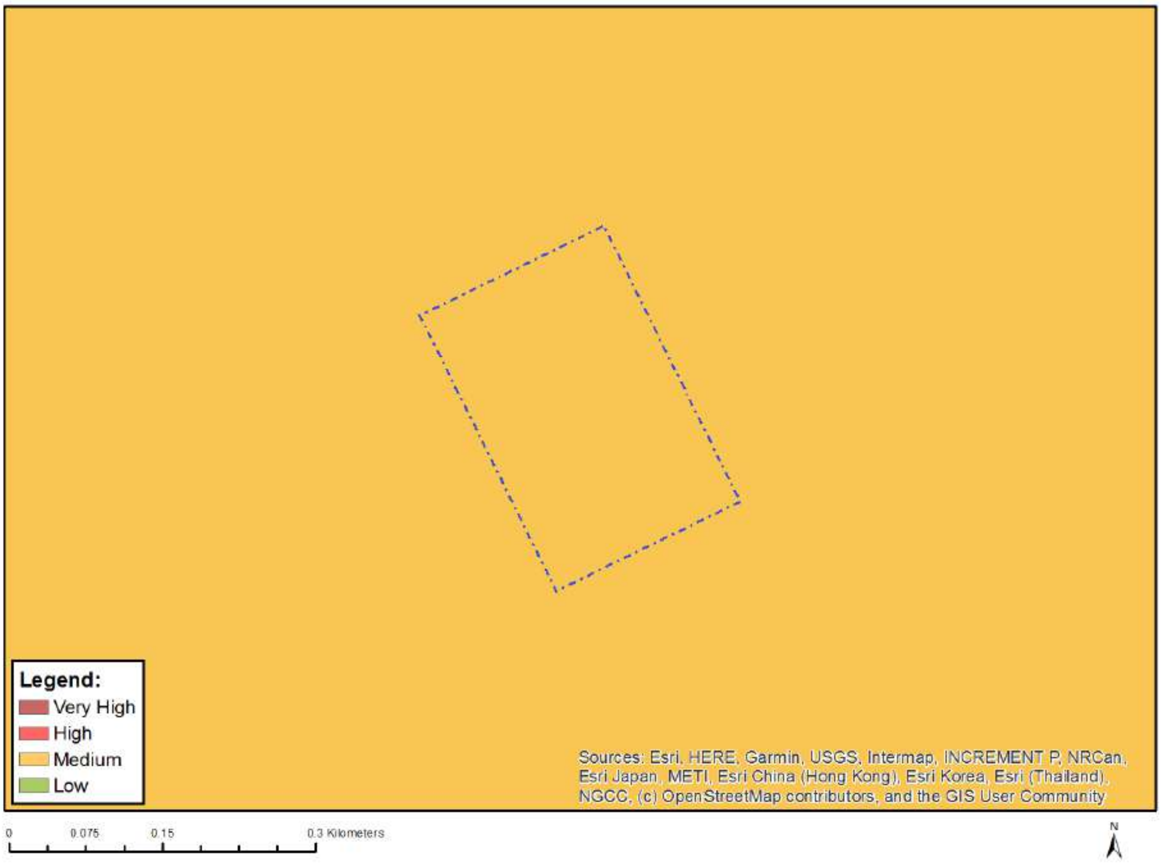
MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Ourebia ourebi ourebi

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

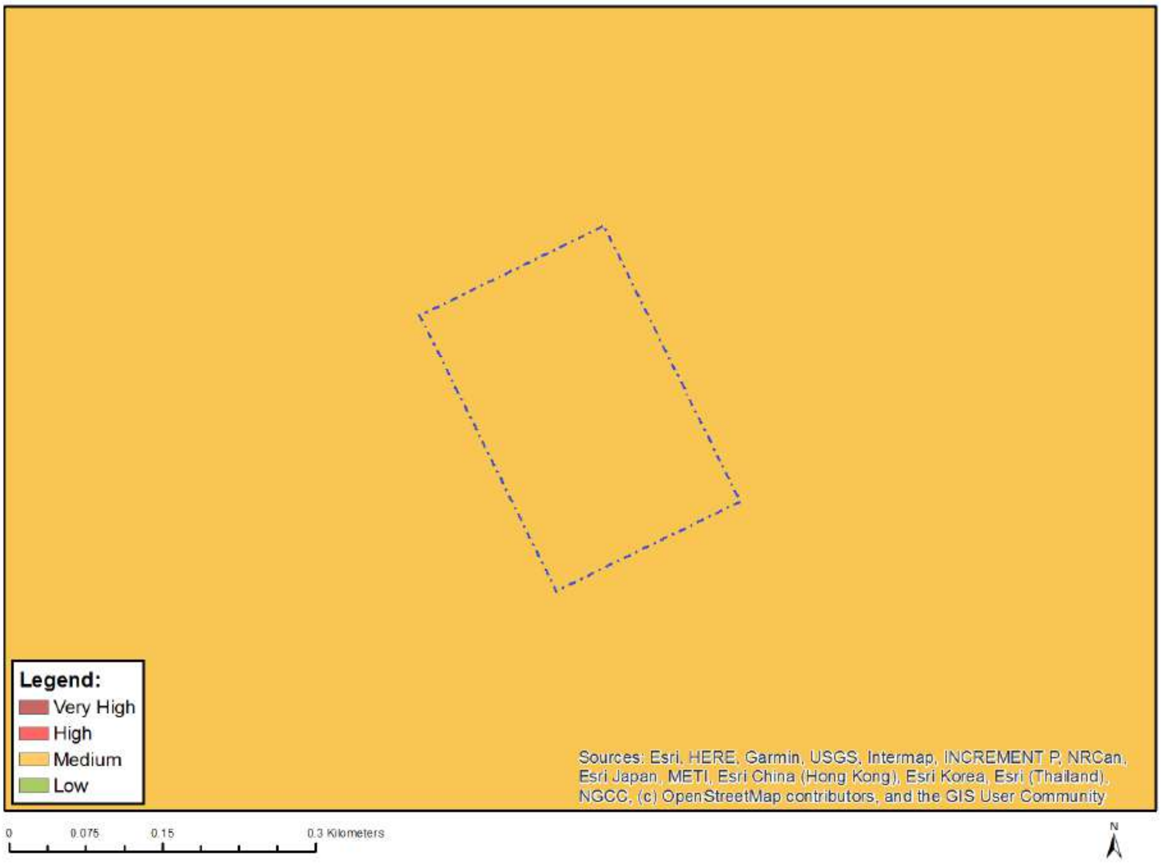
MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Between 8 and 15 km of other civil aviation aerodrome

22/06/2023

MAP OF RELATIVE DEFENCE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

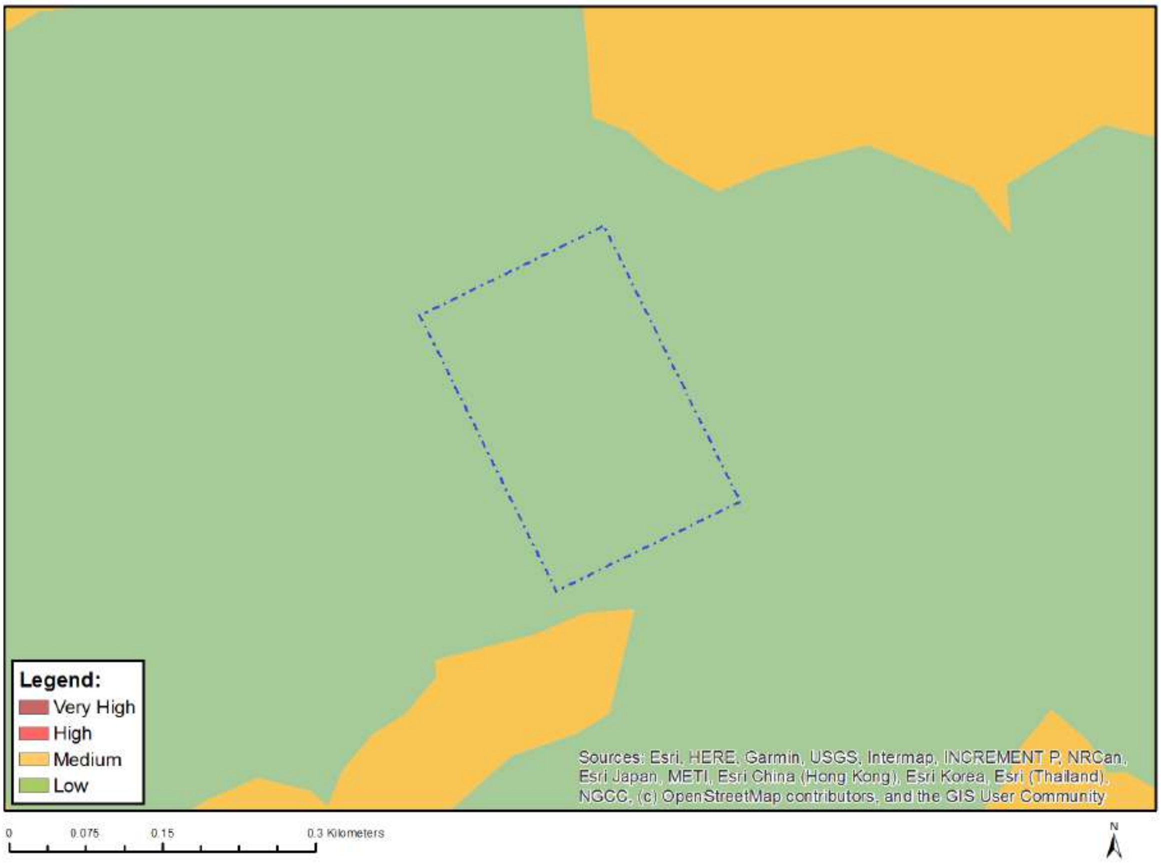
MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



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Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	EN_Eastern Highveld Grassland