DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIA)
AND
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT (EMPR)
FOR

ARENGO 297 (PTY) LTD APPLIED FOR MINING RIGHT (EIA) FOR MINING DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE MINERALS IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY.

FILE REFERENCE NUMBER SAMRAD: LP 30/5/1/2/3/2/1 10287 MR

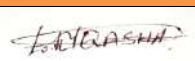
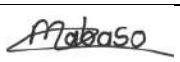
NAME OF THE APPLICANT: Arengo 297 (Pty) Ltd

TEL NO: 083 333 0000

POSTAL ADDRESS: P.O. Box 96023, Waterkloof Valley 0145

PHYSICAL ADDRESS: 533 Cliff Avenue, Waterkloof Ridge, Pretoria 0181

This document has been prepared by:

Name	Responsibility	Signature	Date
Lusizo Nqasha	Report Compiler		May 2026
Precious Mabaso	Stakeholder Engagement Trainee		May 2026
Sunday M Mabaso	Project Manager/Reviewer		May 2026

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IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a mining operation permit or mining right 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 an instruction that the prescribed reports required for applications for environmental authorization for listed activities triggered by an application for a right or a permit are submitted in the exact format of this template and provide all the information required in terms of this template. Furthermore, please be advised that failure to submit the required information 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 required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of this report process is to:

a) Determine the policy and legislative context within which the proposed activity is located and how the 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 and activity, including the need and desirability of the activity in the context of the preferred location;

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 the impact of the proposed activity and technology alternatives on these aspects to determine:

i. The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
ii. The degree to which these impacts—

(aa) Can be reversed;
(bb) May cause irreplaceable loss of resources; and
(cc) Can be managed, avoided, or mitigated;

e) Identify the most recent environmental dynamic in the proposed location for the activity based on the condition of environmental sensitivity identified during the assessment;
f) Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
g) Identify sustainable measures to manage, avoid or mitigate identified impacts; and
h) Identify residual risks that need to be managed and monitored.

EXECUTIVE SUMMARY

On December 2, 2025, Scoping report for Arengo 297 (Pty) Ltd's application for the mining right for the planned diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals mining project using the opencast method was accepted. This acceptance shows that the main environmental concerns, legal requirements, and possible hazards related to the proposed mining activity have been adequately identified during the scoping process. As a result, the project is now permitted to move on with the Environmental Impact Assessment (EIA) phase, which attempts to give a thorough evaluation of expected environmental impacts and collaborate with specific studies to provide appropriate environmental mitigation. The mining project is earmarked in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the farm Koedoevlei 128 KQ, within the Thabazimbi Local Municipality under the Waterberg District Municipality. The application area for the mining right covers approximately 3 892.0 ha. The project requires an environmental authorization in terms of the National Environmental Management Act (NEMA, Act No. 107 of 1998) and a mining right (in terms of the MPRDA): A mining right is an authorization issued under Sections 22 and 23 of the Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002, which allows an applicant to conduct large-scale mining operations for a period of up to 30 years, renewable for a further period of 30 years. It grants the holder the exclusive right to mine the identified mineral resource within the approved area, subject to compliance with environmental legislation, including the requirement to obtain an environmental authorization following an EIA process.

In order to make sure that the project is in line with the concepts of sustainable and responsible resource development, this phase will include specialist studies, cognitive stakeholder participation, and the creation of strong mitigation strategies. Additionally, both positive and negative possible effects on environmental and societal problems are presented throughout the EIA process, and these prospective consequences are complemented with efficient mitigation strategies. These include concerns including polluted water seeping into waterbodies through soil layers, poor soil quality, biodiversity loss, deteriorating air quality from diesel and dust emissions, and noise pollution that might affect nearby populations.

This report describes the proposed development's extent, points out possible environmental effects, and suggests mitigating actions to guarantee that the surrounding environment is not severely

disrupted. Specialist studies in the fields including biodiversity, geohydrology, heritage, agriculture, palaeontology, and wetlands were carried out to address these plausible environmental implications. The applicant contributes to the regional economy while showcasing their dedication to ethical mining methods and environmental management.

Details of the Applicant

Table 1: Showing details of the applicant

Name of Applicant:	Allen Tavakoli		
Registration number (if any):	2008/008/151/07		
Trading name (if any):	Arengo 297 (Pty) Ltd		
Responsible person: **(E.g., CEO, Director, etc.)**	Director		
Contact person:	Allen Tavakoli		
Physical address:	533 Cliff Avenue, Waterkloof Ridge, Pretoria 0181		
Postal address:	P.O Box 96023, Waterkloof Valley		
Postal code:	0145	**Cellphone:**	+27 83 333 0000
Email:	dlxsteelhq@gmail.com		

Scope of Project

The mining right area for Arengo 297 (Pty) Ltd covers an area of approximately 3 892.0 ha, where the applicant intends to use an excavator to extract the proposed minerals. To undertake this mining activity, the following infrastructure is required, which includes:

- Pre-Construction and Site Preparation
- Drilling and Blasting
- Loading and Hauling
- Ore Processing and Handling
- Waste and Tailings
- Management Support Infrastructure
- Environmental Management Activities
- Closure and Rehabilitation (long-term)

Project Location

The proposed study area is accessible from the existing R510 road, which passes through most of the mining right application area from Thabazimbi. In presence of Hamlets human settlement, no relocation or physical displacement may occur unless a legally compliant, consultative and fair resettlement or livelihood-restoration process has been completed. The Applicant will identify all landowners, lawful occupiers, households, farm workers, tenants and livelihood users potentially affected by the mining sequence. Any relocation will be subject to documented consultation, compensation, livelihood-restoration measures, grievance procedures, and applicable statutory approvals. These mining phases will also help on how mining coexists with game farming.

Environmental Consultants

Vahlengwe Mining Advisory and Consulting (Pty) Ltd is the appointed independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) for the mining right applied for in terms of MPRDA Act 28 of 2002. "Vahlengwe" has been appointed by Arengo 297 (Pty) Ltd to facilitate the Environmental Authorization (EA) for the mining right application for mining diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals in Thabazimbi.

Table 2: Showing details of the EAP

Company name:	Vahlengwe Mining Advisory and Consulting (Pty) Ltd
Contact person:	Sunday Mabaso
Physical address:	238 Vorster Ave, Glenvista Extension 3, Johannesburg South 2190
Telephone:	+27 11 432 0062 / +27 74 569 7312
Email:	info@vahlengweadvisory.co.za Sunday@vahlengweadvisory.co.za

Public Participation Process Methodology

Public Participation Process (PPP) has been undertaken as required in terms of Regulation 41 of NEMA: EIA Regulations, 2017 (as amended). During the undertakings of the PPP, the environmental and social impacts were investigated, and all stakeholders affected by the project will be allowed to comment, raise concerns, and contribute to the assessment to ensure that local knowledge, needs, and values are taken into consideration throughout the process.

The draft EIA will be made available for public review and comments for 30 days, and all comments

or concerns raised will be recorded and responded to in the Comments and Responses Report (CRR).

The following processes have been followed to undertake the PPP:

- A newspaper advertisement was published and advertised on the 1st of May and the 8th of May 2026 in the local newspaper.
- A Background Information Document (BID), including Interested and Affected Parties (IAPs) Registration Forms, was distributed to various stakeholders, including the I&APs, via email and hand delivery on the 7th of May, 2026.
- Site notices were placed or posted at various places within the vicinity of the site on the 7th of May 2026.
- A public consultation with the local community will be held on the 20th of May 2026, but the final EIR will be submitted on the 18th of June 2026. This date will enable the I&APs to make comments and express concerns on the draft EIR until the 12th of June 2026. Therefore, the final EIR/EMPr will only be submitted after the full public review period has closed, all comments have been captured in the CRR, the EAP has considered whether amendments are required, and interested and affected parties have been given a fair opportunity to review material responses where necessary.
- An electronic copy can be accessed and downloaded from www.vahlengweadvisory.co.za.

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CHAPTER 1: SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT

1.1 Introduction

Arengo 297 (Pty) Ltd (hereafter referred to as "the applicant") has applied for a mining right in terms of Sections 22 and 23 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002). Therefore, Vahlengwe Mining Advisory and Consulting (VMAC) has been appointed by the applicant as an independent Environmental Assessment Practitioner (EAP) to facilitate and conduct Environmental Authorisation process (EA) for the mining right application for the mining of diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals project. The mining activity involves the use of opencast as an operation method. The project is earmarked in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality. The application area for the mining right covers approximately 3 892.0 ha. The site is accessible via existing road infrastructure, which is R510 from Thabazimbi.

The applicant plans to use mechanized equipment, such as an excavator, to streamline the operating process and guarantee the effective and regulated removal of the minerals. Open-cast, blasting, and drilling will be the mining techniques used. to reduce environmental disruption and guarantee adherence to relevant laws, such as the Environmental Impact Assessment (EIA) Regulations and the National Environmental Management Act (NEMA). Therefore, the EIA process necessitates a comprehensive environmental evaluation of the planned activities, assesses potential consequences that might worsen the quality of the environment, and suggests effective mitigation strategies to repair the land. In keeping with national environmental management objectives, this approach encourages sustainable resource exploitation. It also considers the applicant's dedication to rehabilitation and appropriate land management after mining, as well as the socioeconomic circumstances of the areas nearby and any cumulative effects.

The purpose of this report, which is an important role of the environmental authorisation process, is to educate the public and stakeholders, as well as decision-makers on the nature and consequences of the planned development. By means of this procedure, the applicant aims to exhibit its commitment to sustainable practices, adherence to regulations, and support of regional economic development.

1.2 Expertise of the EAP

1.2.1 The qualifications of the EAP (with evidence as an appendix)

This section describes the EAP's qualifications and experience for the proposed project. Appendix A contains the EAPs' curriculum vitae and qualifications.

Table 3 Expertise of the EAPs

NAME	**Sunday Mishack Mabaso**
QUALIFICATIONS	MBA; GDE: Mining Engineering, NHD: Mineral Resource Management, Certificates: (i) Global Environmental Management, (ii) Climate Change and Energy Law, (iii) Mine Closure and Land Rehabilitation, (iv) Integrated Waste Management, and (v) Energy Efficiency and Sustainability.
RESPONSIBILITY FOR THE PROJECT	Project Leader and Reviewer
PROFESSIONAL REGISTRATION	EAPASA (Reg. No. 2022/4485) SAIMM (709244) IAIAsa (7442) LaRSSA
EXPERIENCE	Sunday Mabaso has been the Principal Consultant at Vahlengwe since May 2021, with more than 30 years of experience in the mining industry, including over 20 years of service at the Department of Mineral Resources and Energy, of which he served seven (7) years as a Regional Manager (3 years in Northern Cape and 4 years in Gauteng). He has acquired various qualifications in mining, including a Graduate Diploma in Engineering: Mining, a Post Graduate Certificate in Climate Change and Energy Law from the University of the Witwatersrand, and a Certificate in Global Environmental Management from the Technical University of Denmark, a Certificate in Mine Closure and Land Rehabilitation from the University of Pretoria and Certificate in Integrated Waste Management Program with the Institute of Waste management. His areas of expertise include Environmental Management, Mining Legislation, Mine Economics, and Social and Labour Plans. Sunday has published several academic papers, including: Mabaso SM. (2025) The impact of gold mine closures and future planning for sustainable development in the Witwatersrand Goldfields: Mine Closure Conference 2025, 19-20 February 2025, The Southern Institute of Mining and Metallurgy: ISBN 9781-1-7764673-8-9 Mabaso, SM. (2023) Legacy Gold Mine Sites & Dumps in the Witwatersrand: Challenges and Required Action. Natural Resources, 14,

	65-77. https://doi.org/10.4236/nr.2023.145005 Mabaso, SM. (2023). Social and Environmental Challenges caused by Legacy Gold Mining in Johannesburg: Government's Action Plan. eBook: ISBN: 978-81-19491-53-7.DOI: 10.9734/bpi/npgees/v9/10672F Ramontja, T. and Mabaso, S. 2022. Evolution of South Africa's Mining Regulatory Framework as it relates to the Empowerment and Participation of Mining Communities. https://doi.org/10.1007/978-3-031-07048-8_6
NAME	Lusizo Nqasha
QUALIFICATIONS	Bachelor of Arts in Environmental Geography Bachelor of Arts Honours in Geography Master of Science Candidate in Geography
RESPONSIBILITY FOR THE PROJECT	Report compiler
PROFESSIONAL REGISTRATION	EAPASA Candidate (Reg. No. 2024/9364) SAIMM (711284)
EXPERIENCE	Nqasha Lusizo is a passionate geoscientist and environmental specialist with excellent knowledge in remote sensing, GIS, and environmental science and management. Having worked as an environmental consultant for more than a year, he has a solid background in environmental audits, mining rehabilitation, environmental impact assessments (EIAs), and geospatial analysis for sustainable development. Lusizo is now employed at Vahlengwe Mining Advisory and Consulting as a GIS and EIA Consultant. He has expertise in mineral rights applications, environmental survey maps, and remote sensing models that facilitate strategic decision-making and regulatory compliance. His technological expertise includes sophisticated geospatial programming (Java-Script for environmental change detection and land use/land cover (LULC) monitoring, water assessment as well as ArcGIS Pro, QGIS, Google Earth Engine, and ERDAS. Lusizo's background includes a Master of Science in Geography from the University of the Witwatersrand, where he studied geospatial modeling, environmental

	science, and the effects of mining. By co-supervising Honors students in GIS and RS modeling, he has supported environmental research and capacity growth. He has expertise in waste management, water quality analysis, environmental health and safety (EHS), and field-based environmental evaluations. In order to address difficult ecological problems and promote responsible resource management, Lusizo is dedicated to combining scientific rigor, cutting-edge geospatial technology, and sustainable environmental practices.

2 Location of the overall activity

2.1 Description of the location

Table 4: Details of the overall activity location

Farm Name:	portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ
Application area (Ha)	**3,892.0** ha
Magisterial district:	Waterberg District Municipality]
Distance and direction from the nearest town	The proposed project area is earmarked on the northwestern side of Thabazimbi, approximately 5.98 km away from the mining right (MR) area. The mining right application area is situated approximately 5.022 km north of Thabazimbi, 201 km northwest of Bela-Bela and 111.569 km southwest of Lephalale. The R510 road cut through the project area from Thabazimbi to Hartbeesbult.
21-digit Surveyor General Code for each farm portion	T0KQ00000000031300002 T0KQ00000000031300003 T0KQ00000000031300004 T0KQ00000000012800002 T0KQ00000000012800005 T0KQ00000000012800000 T0KQ00000000031300007 T0KQ00000000031300008

	T0KQ00000000012800009 T0KQ00000000012800010 T0KQ00000000012800011]

2.2 Description of the scope of the proposed overall activity

Attach a plan drawn to a scale acceptable to the competent authority but not less than 1:10,000 that shows the location, and area (hectares) of all the aforesaid main and listed activities and infrastructure to be placed on site.

a) Illustration of the MR area

The proposed mining right area depicted in Figure 1, showing the MR activities to be undertaken in this area. The operation will be conducted under a mining right as defined by the Mineral and Petroleum Resources Development Act (Act 28 of 2002), which allows for limited mining activities with a maximum duration of 30 years, subject to renewal for an additional 30 years.

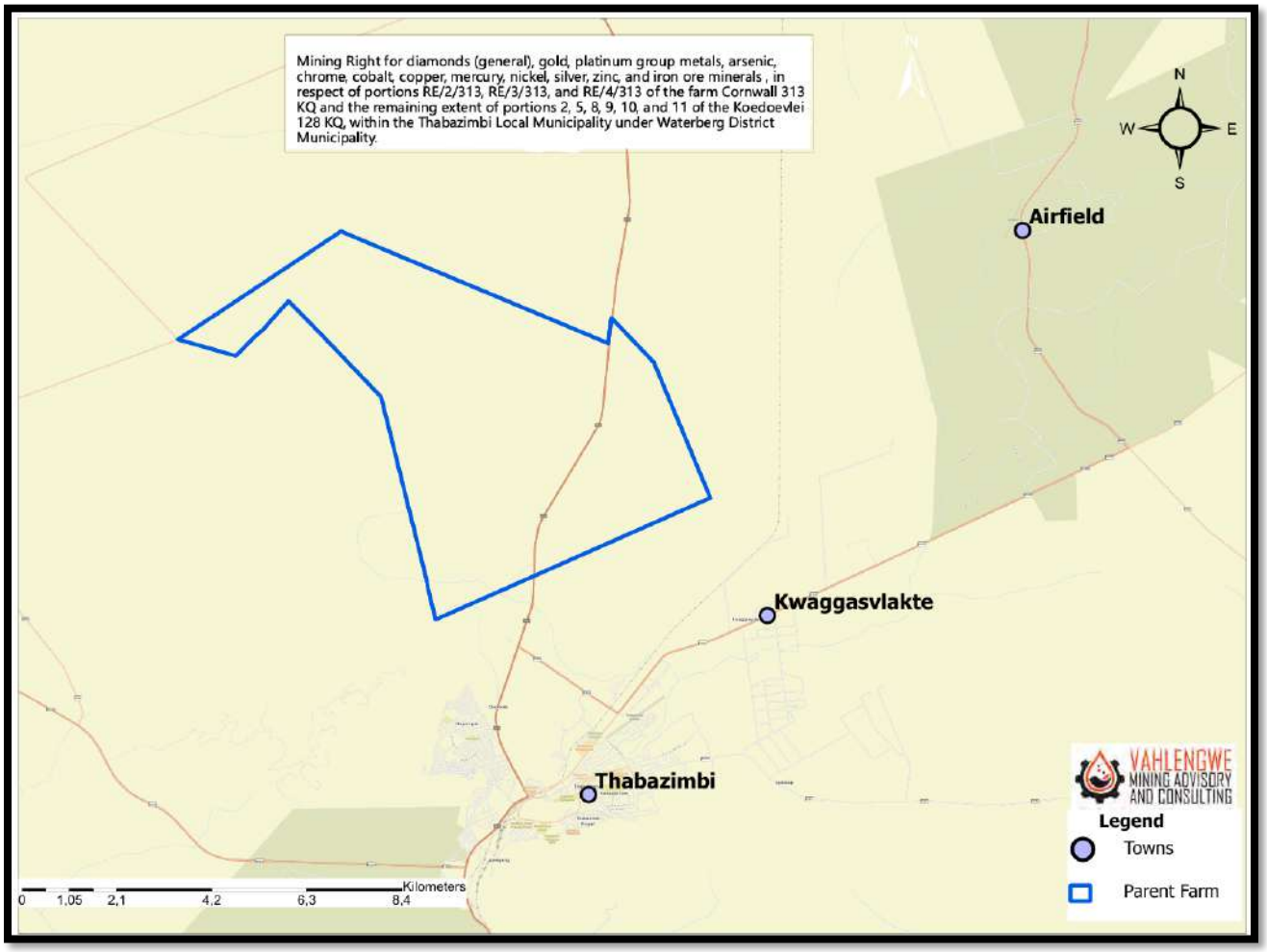


Figure 1: Locality map of the proposed mining right area

b) Description of the undertaken mining activities

The scope of the activity includes:

- Site preparation includes removing vegetation, building access roads, and setting up makeshift facilities like storage spaces and site offices.
- Mining Operation and Method: Open-cast mining is used to recover minerals from the earth and remove overburden. Excavation comes after drilling and blasting to break up the ore-bearing rock.
- Equipment Deployment: The use of machinery such as drilling rigs, transport trucks, and excavators. In order to transfer broken ore to processing or stockpiling facilities inside the MR region, excavators will load it into haul trucks.
- Ore Extraction Process: Blast holes are prepared using controlled drilling patterns. The ore is broken up into workable pieces by blasting operations. To guarantee efficiency, loading and excavation happen right after blasting.
- Material Handling: To lessen environmental disruption, ore and aggregates are removed methodically. Overburden, or waste rock, is stored separately for use in rehabilitation at a later stage.
- Environmental Management: Water spraying on haul routes is one way to reduce dust. management of noise during equipment operation and blasting. restoration of land capabilities by progressive rehabilitation of mined-out regions.
- Sustainability and Compliance: All operations are carried out in accordance with the National Environmental Management Act (NEMA) and the Mineral and Petroleum Resources Development Act (MPRDA). Mitigation strategies to reduce ecological and socioeconomic effects are guided by the Environmental Impact Assessment (EIA) process. dedication to post-mining restoration and careful land management.

c) Listed and Specified Activities

The proposed mining right application triggers activities **listed in NEMA Listing Notices 1, 2, and 3**. Table 5 presents a summary of the NEMA-listed activities triggered by the proposed project. The listed-activities table has been reviewed and corrected to reflect only those activities lawfully triggered by the proposed mining-right application and associated infrastructure. The legal triggers have been cross-referenced to the final site layout, infrastructure footprint, waste facilities, water uses and specialist findings.

Table 5: Listing notices that triggered the MR project's listed activities

NAME OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY (HA OR M²)	APPLICABLE LISTING NOTICE *GNR 983, GNR 984 or GNR 985*
Mining Right area Any activity including the operation of that activity, that requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource [,] ; or (b) [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)] the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.	**3,892.0** ha	GN 325, Activity 17
Vegetation clearance The clearance of an area of 1 ha or more but less than 20 ha of indigenous vegetation.	2, 5 ha	GN 983, Activity 27
Buildings (e.g. offices, change houses, etc.)	0,06 ha	Activity 12 GNR 985
Surface workshops	0,8 ha	Activity 12 GNR 985
Haul roads The clearance of an area of 1 ha or more, but less than 20 ha, of indigenous vegetation.	13 ha	GN 983, Activity 27

[**Crushing and screening** Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing, but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.]	0,02 ha	GN 325, Activity 21
Access Road The clearance of an area of 1 ha or more, but less than 20 ha, of indigenous vegetation.	1 ha	Listing Notice 1 (GNR 983 of 2014) Activity 27
Bulk storage for fuel The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers 24 | Page with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	<1 ha	Listing Notice 1 (GNR 983 of 2014) Activity 14
Vegetation clearance The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. (e) Limpopo (i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; (ii) Within critical biodiversity areas identified in bioregional plans; or (iii) On land, where, at the time of the coming into effect of this Notice or thereafter, such land was zoned open space, conservation or had an equivalent zoning.	3 564,38 ha	GN 324, Activity 12
Water storage	5 ha	Listing Notice 1 (GNR 984 of 2014) Activity 19

The development of facilities or infrastructure for the storage of water where the dam wall exceeds 5 m in height or has a capacity of 50 000 m³ or more.		
Storm water storage Storm water infrastructure (Clean and dirty water channels, culverts, sumps)	3 ha	Activity 9 GNR 983 Activity 12 GNR 985 Activity 14 GNR 985
Hard overburden & Soft Overburden "The infilling or depositing of any material of more than 10 m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from a watercourse.	18 ha	Listing Notice 2 (GNR 984 of 2014) Activity 19 Activity 10 Category B Activity 11 Category B

2.3 Description of the activities to be undertaken

(Describe the methodology or technology to be employed, including the type of commodity to be prospected/mined and for a linear activity, a description of the route of the activity)

The pre-construction phase of the proposed opencast mining method focuses on preparatory tasks that establish the foundation for safe, effective, and compliant operations. The commodities to be mined include general diamonds, gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals, which are essential raw materials to produce various commodities. Preliminary work includes extensive geological mapping, geophysical surveys, and confirmatory drilling to locate mineral reserves and verify deposit grade. Environmental assessments of soil, water, air, plants, and wildlife were conducted to give baseline data on environmental sensitivity to inform impact studies and mitigation methods. Hydrological and geotechnical studies are also carried out to build pit slopes, drainage systems, and waste-rock facilities. Stakeholder participation and regulatory filings, in tandem with technical research, guarantee openness and adherence to the Mineral and Petroleum Resources Development Act (MPRDA) and National Environmental Management Act (NEMA).

For linear activities like establishing access roads, haul routes, or conveyor alignments, the pre-construction stage entails route selection and design based on geography, property ownership, and environmental sensitivity. The chosen path is evaluated to minimize disturbance to delicate ecosystems, wetlands, and cultural heritage regions while optimizing access to processing facilities and transportation infrastructure. While environmental experts assess possible impacts, engineering teams develop complex layouts, drainage systems, and erosion-control techniques. Before any actual work begins, this all-encompassing strategy ensures that the project possesses are transparent, technically sound, and environmentally responsible strategy for the mining pit and associated linear infrastructure.

- **Construction phase activities**

A series of preliminary tasks that provide the operational and physical foundation for safe, effective extraction make up the open cast mine's building stage. Clearing and preparing the site, creating gateways and workspaces, installing necessary infrastructure and safety systems, putting environmental protection measures in place, and conducting thorough pre-operational testing are some of the activities. These duties are meticulously carried out to guarantee the mining infrastructure's structural integrity and operation, to facilitate the recovery of resources later, to safeguard worker safety, and to minimize environmental disruption.

The phase also entails a number of specific, short-term projects, such as building and upgrading access roads connected to current routes; setting up site facilities like parking, ablution blocks, workshops, maintenance areas, and security offices; stripping and stockpiling topsoil for future rehabilitation; building a runoff settling dam and bulk fuel storage; and separating and storing topsoil, subsoil, and overburden for future use. After assembly, the screening plant will be prepared for use. There will be no on-site housing; all construction activities are temporary with set start and end dates; staff and equipment will be housed in temporary offices; portable chemical toilets are the preferred ablution solution, and employees will be transported daily to and from off-site housing.

- **Operating Method**

Arengo 297 (Pty) Ltd is going to utilize mechanized machinery to aid in the open-cast (open-cut) method of mining ore minerals. The operation will begin with the establishment of the site and the clearance of the approved footprint. Staged drilling and controlled blasting will then be utilized to break up the ore deposit. Excavators, front-end loaders, articulated haul trucks, and ancillary support equipment will be used to remove blasted material, separate ore minerals from overburden, and transfer ore to on-site stockpiles or a primary crushing/screening area, as needed. To minimize off-site effects, blasting must follow a documented blast design and vibration monitoring program; when possible, covered haulage and water sprays will be employed to manage dust. Overburden as well as waste rock will be handled at a designated disposal area and gradually restored according to the restoration plan, whereas topsoil will be collected and stored separately for future restoration.

Figure 2: An example of the open-pit method and processes of the mineral

A network of engineered internal haul roads and bridges will be created to connect working benches, stockpiles, and processing/dispatch areas within the 3,892.0 ha mining right area, which already includes an R510 road crossing. To avoid vulnerable characteristics and reduce clearance, all linear infrastructure (access roads, conveyor alignments if necessary, and service corridors) shall take the most direct, least-impact paths specified during site planning. Fuel, water, and electrical supply lines will be routed along these corridors using bunding and spill-control technologies; temporary site offices, workshops, and laydown areas will be built on previously damaged or low-sensitivity landscapes and then reinstalled at closure.

- **Access Roads**

The proposed mining right is accessible via the existing road infrastructure. Accessibility to the application area will be via the existing regional road network (R510 from Thabazimbi), but new roads will be built where necessary to reach adjacent farms.

- **Infrastructure**

Infrastructure will be established on-site for the duration of the project life operation, preferably. The following infrastructure will be utilized on-site:

- Site Preparation and Pre-Construction
- Drilling and Blasting
- Loading and Hauling
- Ore Processing and Handling
- Waste and Tailings
- Management Support Infrastructure
- Environmental Management Activities
- Closure and Rehabilitation (long-term)

Power supply

The operational activities do not require the use of electricity, since the equipment and machinery to be used on-site are diesel-powered.

Water supply

The plant would receive processed and potable water from a variety of sources, including bulk municipal supplies or water tankers during times of high demand or drought, as well as allowed on-site groundwater extraction via boreholes. Staff members' drinkable water will be stored in

specifically labelled tanks with regular testing for microbiological contaminants and a backup supply. At a site, the water level will be established and maintained to monitor the daily demand for drilling, dust suppression, processing, home use, and rehabilitation. The storage equipment (lined reservoirs and modular tanks) will be adequately sized. The National Water Act 36 of 1998, along with related mining water rules, will govern groundwater abstraction and bulk water usage. The project will get the necessary water usage authorizations and follow the DWS mine water management policy.

To lessen the need for clean water, on-site water handling will prioritize stringent conservation and reuse. Runoff as well as process water will be collected in sedimentation ponds and decant systems, cleaned (settling, purification, disinfection), and reused for drilling, dust suppression, and equipment cleaning. Water is required for the previously mentioned mining activities, such as cooling machinery and preventing dust and fire explosions. Stormwater will be isolated from polluted water to detect leaks or contamination early on, and all storage and transfer facilities will have bunding, spill response strategies, metering, and monitoring programs in place. Progressive restoration will include restoring natural drainage and cleaning up any contaminated watercourses. Surface and groundwater resources will be safeguarded throughout the mine's life through EA compliance, regular reporting, and adaptable management strategies.

Waste management and disposal

The mine will execute a hierarchical waste management plan that focuses on avoidance, minimization, segregation, reuse, treatment, and safe disposal. All waste streams will be classified at the source as hazardous (fuels, oils, solvents, and contaminated PPE), process materials and tailings (if any processing occurs), inert building and demolition debris, mining waste (overburden and waste rock), and operational and domestic waste from site offices and camps. The classification will guide decisions about handling, storing, transporting, and final disposal, and it will be documented in a site-specific Waste Management Plan (WMP).

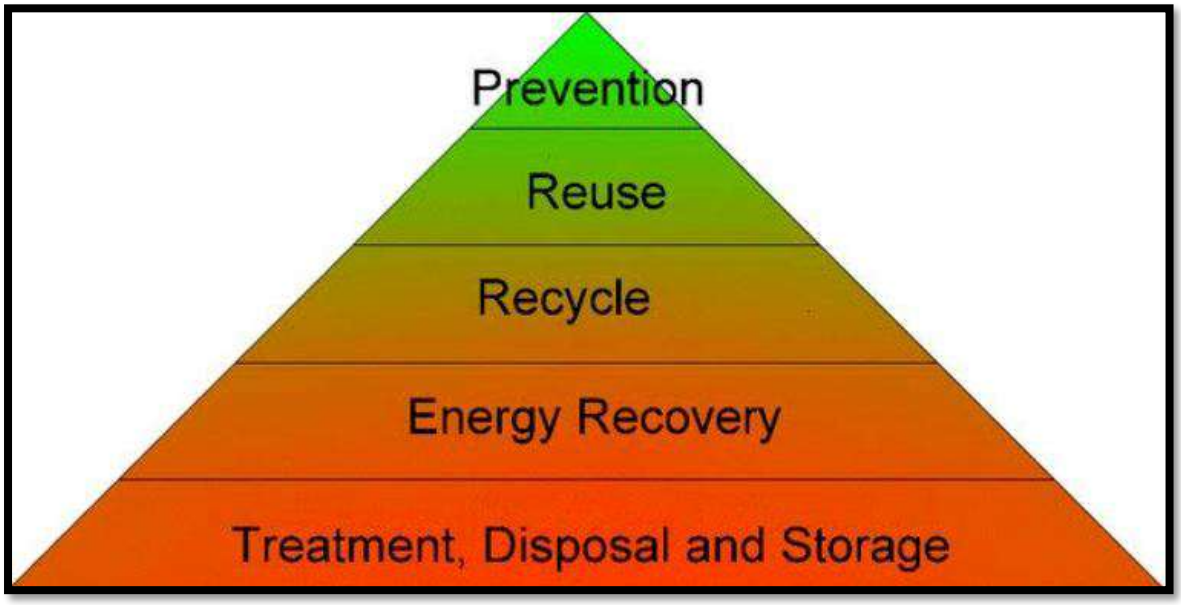


Figure 3: Demonstrates hierarchical waste management.

Segregation, storage, and on-site handling

- Segregation: To avoid cross-contamination and to make recycling and proper disposal easier, waste will be separated at the source using clearly labelled containers and defined storage spaces.
- Overburden and topsoil: To minimize the long-term impact, overburden and topsoil will be placed in specially designed landfills with erosion control and progressive rehabilitation sequencing, while topsoil will be scraped individually and stacked for progressive rehabilitation.
- Hazardous materials: Used oils and contaminated materials will be gathered in labelled barrels and evacuated by certified hazardous waste contractors; fuels, lubricants, and chemicals will be kept in bunded, impermeable areas with secondary containment, spill kits, and trained people.

2.4 Tailings, process residues, and erosion control

If tailings or fine residues are generated during on-site processing, they will be treated in tailings storage facilities (TSFs) or lined settling ponds equipped with seepage collection, controlled decant systems, and progressive closure processes. Sedimentation and runoff control structures will protect watercourses while also allowing for water recycling for dust suppression and operational purposes. Tailings management must correspond to the Global Institute Standard on Tailings Management (GISTM) objectives, which strive for minimal environmental impact. Effective design, monitoring, and contingency planning reduce seepage, dust formation, and downstream contamination.

2.4.1 Off-site disposal, recycling, and contractor use

Recyclable materials (metals, plastics, and paper) will be separated, sold, or provided to recycling contractors; non-hazardous general waste will be compacted and delivered to designated municipal or commercial disposal sites. Hazardous waste will only be accepted by licensed hazardous waste handlers who have comprehensive waste manifests and chain-of-custody papers. Every outside contractor's permission and compliance with national waste regulations will be examined.

2.4.2 Monitoring, reporting, and rehabilitation

Waste volumes, storage integrity, leak events, and off-site transfers will all be monitored; records will be kept for environmental reporting and regulatory inspections. To restore landforms and lessen long-term erosion and aesthetic effects, progressive restoration will employ recovered vegetation and stockpiled topsoil; closing plans will involve final trash collection, deactivation of temporary facilities, and confirmation that there is no contamination left. Through training, adaptive management, and audits, compliance with industry best practices and national laws will be upheld.

2.4.3 Operation Timeframe

The MR operation will run for thirty (30) years and may be extended for an additional thirty years, for a maximum of sixty years. In order to prevent seepage and guarantee long-term geotechnical integrity, TSFs must be built with engineered designers, drainage systems, and stable embankments; they must also incorporate water management structures, such as pollution control dams and decant systems; during operation, they must be continuously monitored, inspected, and prepared for emergencies to manage risks of contamination or failure; and following mine closure, they must be rehabilitated through the establishment of vegetation and soil covering. Integration into the surrounding environment, continuous monitoring of surface and groundwater, structural stability assessments, and legal compliance under the National Water Act and NEMA to guarantee that environmental and community safety requirements are fulfilled forever.

Table 6: Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (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)	REFERENCE WHERE APPLIED
The Constitution of the Republic of South Africa, 1996 Under Section 24 of the Constitution of the Republic of South Africa, 1996 (the Constitution) it is clearly stated that: Everyone has the right to a) an environment that is not harmful to their health or well-being; and b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) Prevent pollution and ecological degradation; (ii) Promote conservation; and (iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.	Vahlengwe Mining Advisory and Consulting is undertaking an EIA process to identify and determine the potential impacts associated with the proposed mining activities. Mitigation measures recommended will aim to ensure that the potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.
National Environmental Management Act, 1998 (Act No. 107 of 1998) and EIA Regulations (as amended in 2017) Section 24 (1)(a) and (b) of NEMA state that: The potential impact on the environment and socio-economic conditions of activities that require authorization or permission by law, and which may significantly affect the environment, must be	Activities associated with the proposed mining activities are identified as the Listed Activities in the Listing Notice 2, Activity No. 17 of the NEMA Regulations GN R984 (as amended).

considered, investigated, and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity. The EIA Regulation, 2014 was published under GN R 326 on 07 April 2017 (EIA Regulations) and came into effect on 07 April 2017. Together with the EIA Regulations, the Minister also published GN R 327 (Listing Notice No. 1), GN 325 (Listing Notice No. 2), and GN R 324 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended.	
Mineral and Petroleum Resource Development Act, 2002 (Act No. 28 of 2002) The Act makes provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and provide for matters connected therewith. Mineral and Petroleum Resource Development Act, 2002 (Act No. 28 of 2002): Mineral and Petroleum Resource Development Regulations GNR 527 of 2004; Regulation 11(1). The mining work programme must contain: - (a) the full particulars of the applicant; (b) a plan contemplated in regulation 2(2), showing the land and mining area to which the application relates; I a registered description of the land or area to which the application relates; (d) the details of the identified mineral deposit concerned with regard to the type of mineral or minerals to be mined, its locality, extent, depth, geological structure, mineral content and mineral distribution;	The mining right project is applied for in terms of Section 22 of the MPRDA, 2002 (Act No. 28 of 2002) and the planned activities are according to the scope of the MWP in terms of the Mineral and Petroleum Resource Development Act, 2002 (Act No. 28 of 2002): Mineral and Petroleum Resource Development Regulations GNR 527 of 2004.

I the details of the market for, the market's requirements and pricing in respect of the mineral concerned; (f) the details with regard to the applicable timeframes and scheduling of the various implementation phases of the proposed mining operation, and a technically justified estimate of the period required for the mining of the mineral deposit concerned; (g) a financing plan that must contain – (i) the details and costing of the mining technique, mining technology and production rates applicable to the proposed mining operation (ii) the details and costing of the technological process applicable to the extraction and preparation of the mineral or minerals to comply with market requirements (v) the details regarding other relevant costing, capital expenditure requirements, and expected revenue applicable to the proposed mining operation; (vi) a detailed cash flow forecast and valuation, excluding financing of the proposed mining operation, which forecast must clearly indicate how the applicable regulatory costs will be accommodated therein; (vii) the details regarding the applicant's resources or proposed mechanisms to finance the proposed mining operation, and details regarding the impact of such financing arrangements on the cash flow forecast; and (viii) provisions for the execution of the social and labour plan.	

National Environmental Management: Air Quality Act, 2004 (Act 39 Of 2004) The National Environmental Management: Air Quality Act, 2004 (No. 39 of 2004) (NEM: AQA) governs all aspects of air quality, including pollution prevention, national norms and standards, and the requirement for an Atmospheric Emissions Licence (AEL) for listed activities that emit pollutants into the atmosphere and have or may have a significant negative impact on the environment. Activities requiring an AEL are listed in GN No. 893 (22 November 2013), which was published in accordance with Section 21(1) ((b) of the NEM: AQA. According to Section 22 of NEM: AQA, no one may engage in a listed activity without an AEL.	The mining operation will not be conducting activities that may require the application for an AEL. Regulation 2 of NEMAQA: National Dust Control Regulations GN R827 (01 November 2013) indicates that the purpose of the Act is to prescribe general measures for the control of dust in all areas. Therefore, Arengo 297 will be required in terms of Regulation 6 and 7 of the Act to implement measures for controlling dust and conducting ambient air quality monitoring of PM10, respectively.
National Environmental Management: Waste Act, 2008 The National Environmental Management: Waste Act of 2008 (No. 59 of 2008) (NEM: WA) governs all aspects of waste management, with a focus on waste avoidance and minimization. NEM: WA developed a system for categorizing and licensing waste management activities. Listed waste management activities that exceed certain thresholds are subject to an impact assessment and licensing process. Activities in Category A necessitate a Basic Assessment, whereas activities in Category B necessitate a scoping and EIA process.	Arengo 297 has applied for an integrated waste management license for Activity 10 and Activity 11 of GNR 921. There will be activities that trigger a waste management license.

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) The NEM:BA governs the management and conservation of South Africa's biodiversity within the framework established by NEMA. This Act also governs the protection of species and ecosystems that require national protection, as well as the management of invasive and alien species. The following regulations have been promulgated in accordance with the NEM:BA and are also relevant: • Alien and Invasive Species Lists, 2014 published (GN R.599 in GG 37886 of 1 August 2014); •National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations	A Fauna and Flora Impact Assessment has been conducted as part of the EIA study assessment.
National Noise Control Regulations, R.154 of 1992 (the Noise Regulations) promulgated in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989) The National Noise-Control Regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCRs) form part of the Environmental Conservation Act and these Regulations apply to external noise. The NCRs differentiates between Disturbing Noise levels (which is objective and scientifically measurable which are generally compared to existing ambient noise level) and Noise Nuisance (which is a subjective measure and is defined as noise that "disturbs or impairs or may disturb or impair the convenience or peace of any person").	The EMPr includes measures to control and manage noise levels that should be implemented during mining activities.

Local Authorities use Controlled Areas to identify areas with high noise levels. Restrictions have been set out for development that occurs in these Controlled Areas. These regulations make provision for guidelines pertaining to noise control and measurements. The regulations make reference to the use of the South African National Standards 10103:2008 (SANS) guidelines for the Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication.	
The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is the main piece of legislation in South Africa that protects and regulates the management of heritage resources. The Act requires Heritage Resources Agencies, in this case the South African Heritage Resources Agency (SAHRA) and the Limpopo Heritage Resources Authority (LHRA), to be notified of any developments that may exceed certain minimum thresholds as soon as possible.	Due to the sensitivity, the Heritage Impact Assessment has formed part of the EIA study assessments.
National Water Act, 1998 (Act No.36 of 1998) The National Water Act (Act No. 36 of 1998) (NWA) is the primary regulatory legislation, controlling and managing the use of water resources as well as the pollution thereof in South Africa. The NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The NWA presents strategies to facilitate sound management of water resources, provides for the protection of water resources, and regulates use of water by means of Catchment Management Agencies, Water User	A cohesive water use license application and, where necessary, an application for an exemption to comply with some of the requirements under the GN704 has been submitted to the Department of Water and Sanitation (DWS) for their consideration. • Section 21(a): abstraction • Section 21(b) Storage of Water • Section 21(c): impeding/diverting flow

Associations, Advisory Committees, and International Water Management. The National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest. Further, an industry can only be entitled to use water if the use is permissible under the NWA. The enforcing authority on water users is the Department of Water and Sanitation (DWS).	• Section 21(g): disposal of waste impacting water resource • Section 21(e) discharge of Water containing Waste • Section 21(i): altering bed/banks/course/characteristics of watercourse • Section 21(j): dewatering if applicable.

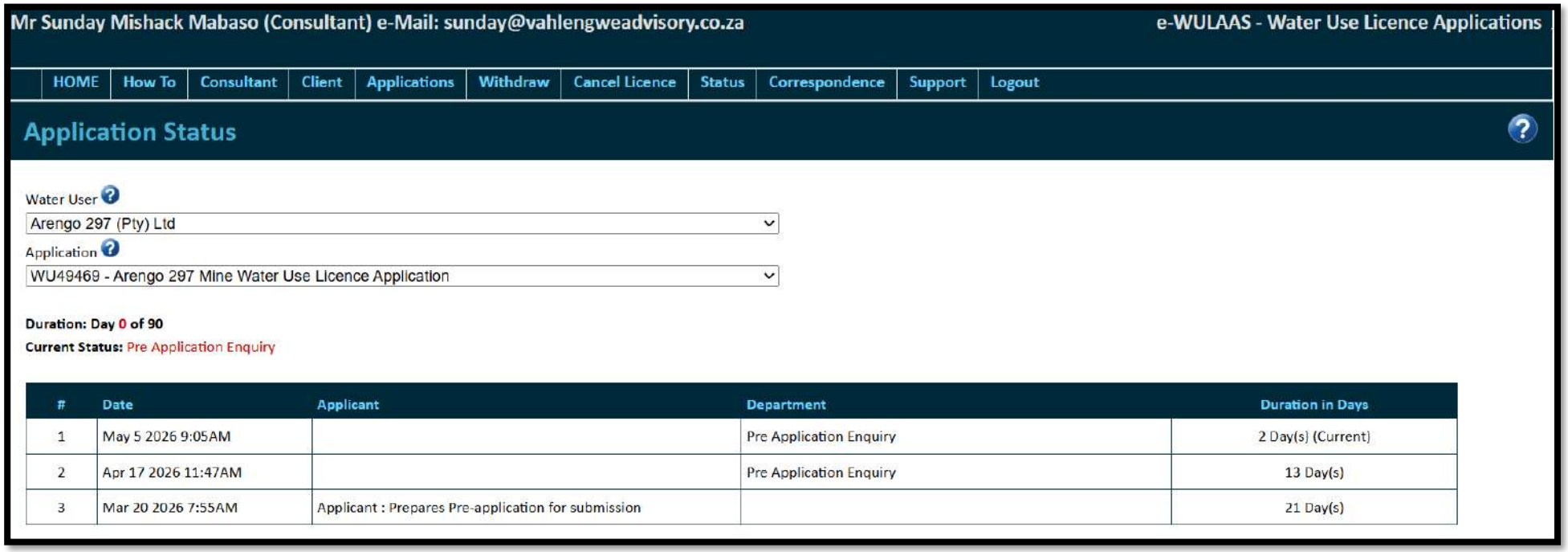


Figure 4: Proof of Submission for water use license

3 Need and desirability of the proposed activities.

(Motivate the need and desirability of the proposed development, including the need and desirability of the activity in the context of the preferred location).

- **Need**

Because these minerals support both daily living and industrial progress, mining them is crucial. While gold is still essential for financial reserves, technology, and medicinal uses, diamonds are prized for their usage in jewelry and cutting tools. In fuel cells, catalytic converters, and other cutting-edge technologies, platinum group metals are essential. Despite being poisonous, arsenic is utilized in alloys and semiconductors. Cobalt is essential for rechargeable batteries, and chrome is necessary for the creation of stainless steel. While mercury has few but specific industrial applications, copper is essential for electrical wiring and renewable energy systems. Iron ore continues to be the major source of steel produced worldwide, nickel fortifies alloys and is essential for batteries and stainless steel, silver is valued for electronics, solar panels, and money, and zinc is commonly used for forming die-casting and galvanized steel. These minerals work together to propel global economic development, infrastructure, innovation, and energy.

When deposits are economically recoverable, extracting local diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals can reduce reliance on imports, stabilize supply chains, and create substantial direct and indirect employment and revenue that justifies the development of a new mine.

All applicable minerals may be accommodated by opening an opencast technique, which is frequently used because it can provide faster ramp-up, greater recovery rates, and cheaper extraction costs than underground methods. This makes it appropriate for near-surface deposits and allows for rapid contributions to local economies. In order to balance the economic benefits, including jobs, infrastructure investment, and regional development, with responsible environmental and social mitigation, opencast projects necessitate careful planning (such as through a scoping process) to manage environmental impacts, land rehabilitation, water and dust control, and community engagement.

- **Desirability**

The proposed mining and bulk sampling development for minerals is considered desirable due to its potential to deliver substantial socio-economic and strategic benefits at both local and national levels.

The activity is expected to:

- Encourage the development of jobs through direct opportunities during the phases of exploration, bulk sampling, and operations, as well as indirect jobs in related sectors and services.
- Promote economic stimulation through infrastructure development, local procurement, and multiplier effects that improve neighbourhoods.
- Produce income through royalties, beneficiation projects in line with national mining policy, and contributions to local and regional tax bases.
- Promote strategic resource development by bolstering South Africa's position as a worldwide supplier of vital and valuable minerals, which will boost steel production, industrial expansion, and competitiveness in international commerce.
- In accordance with legal obligations and corporate social responsibility pledges, provide community benefits through social investment programs, skill transfer, and upliftment efforts.

The project is strategically significant from a resource standpoint, supporting long-term investment planning, industrial competitiveness, and the development of national infrastructure. In accordance with the MPRDA's sustainable development principles, controlled bulk sampling will supply crucial geological and metallurgical data, guaranteeing well-informed mine planning and efficient resource usage.

The activity's appeal is further reinforced by the location's appropriateness. The location is a suitable and sensible target for resource appraisal since it lies under recognized geological formations. Its close proximity to future transport corridors, service infrastructure, and current access routes increases operational viability while reducing the need for significant additional disruption. Crucially, there aren't many competing land uses in the region, which lowers the possibility of social displacement or unsuitable development pressures.

Moving on with the EIA process will make sure that environmental sensitivities are adequately examined, mitigation measures are established, and the project is handled in a manner that balances mineral development with the protection of ecological and socioeconomic systems.

4 Geological exploration undertaken on the proposed mining area

- **Drilling Program and Ore Body Assessment**

The process of drilling campaign was intended to characterize the lateral as well as vertical extent of the ore bodies, as well as to provide information about the grade of mineralization contained within

them. Drilling spacing and density were governed by the geometry and limited size of the deposits, which are typically tiny, tabular, or linear in character, with structural restrictions controlling their orientation and extent.

A succession of vertical and inclined boreholes drilled with percussion, reverse circulation (RC), and core drilling technologies. Figure 4 depicts the regional distribution of these drilling data, and Table 7 shows a re-typed overview of holes drilled by farm and target area. The collar coordinates are currently maintained in the older Clarke 1880 (Cape Datum) format and will need to be converted to WGS84 for use in modern databases and GIS platforms.

The geological logs from the reports were evaluated, and chip and core samples were meticulously logged using established protocols. Three-dimensional models were created, and ore volumes were computed. While more drilling in the main diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals. During the prospecting operation, the lab results fully confirmed the resources; preliminary modelling suggests a minimum of 50 million tonnes of ore minerals.

Table 7: List of Borehole Drilled.

	Co-ordinate system: Local Clarke 1880 or Cape Datum										
Farm	Target ID	Borehole ID	Drill method	X	Y	Z	Dip	Azimuth	EOH Depth (m)	Remarks	Remarks 2
Cornwall 313KQ	D	CL1L	Percussion	2712817.07	-40315.81	1196.706	-70	0	46	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL2L	Percussion	2712839.77	-40213.92	1209.721	-90	0	34	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL3L	Percussion	2712846.69	-40364.34	1198.906	-90	0	83	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL4L	Percussion	2712824.64	-40455.79	1189.554	-90	0	88	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL5L	Percussion	2712921.45	-40301.68	1202.761	-70	327	118	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL6L	Percussion	2712846.51	-39948.2	1291.682	-90	0	76	Abandoned in chert	Basal iron ore outcrop
Cornwall 313KQ	D	CL7L	Percussion	2712926.26	-40675.3	1177.72	-80	19	190	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL8D	Diamond core	2712893	-40390.7	1194.05	-60	20	100.17	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL9L	Percussion	2713351.85	-39282.076	1344.57	-90	0	118	Completed in dolomite	Collapse structure
Cornwall 313KQ	D	CL10L	Percussion	2713452.1	-39231.54	1358.45	-90	0	94	Completed in dolomite	Collapse structure
Cornwall 313KQ	D	CL11L	Percussion	2712518.2	-40304.47	1145.83	-80	0	31	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL15L	Percussion	2713375.03	-39152.935	1322.722	-90	0	58	Completed in dolomite	Collapse structure
Cornwall 313KQ	D	CL16L	Percussion	2713157.79	-39432.42	1369.49	-90	0	112	Completed in dolomite	Dolomite/BIF contact
Cornwall 313KQ	D	CL17L	Percussion	2713038.31	-39363.95	1391.83	-90	0	100	Completed in dolomite	Dolomite/BIF contact
Cornwall 313KQ	D	CL18L	Percussion	2712965.05	-39455.71	1398.73	-90	0	148	Completed in dolomite	Dolomite/BIF contact
Cornwall 313KQ	D	CL19L	Percussion	2712853.48	-39672.24	1344.14	-90	0	160	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ	D	CL20DB	Diamond core	2712825.46	-40313.6	1219.44	-70	345	51.69	Completed in dolomite	Basal iron ore outcrop
Cornwall 313KQ		CL21L		2713539.46	-38706.463	1237.685			15		Missing information
Cornwall 313KQ		CL22W		2712238.49	-38380.8	1181.586			148		Missing information
Cornwall 313KQ		CL23L		2712075.48	-38540.08	1171.345			4		Missing information
Cornwall 313KQ		CL27L		2712708.43	-40293.799	1170.533			40		Missing information
Cornwall 313KQ		CL28L		2712616.91	-40294.857	1155.072			22		Missing information
Leeuwbosch 129KQ	B	LH1L	Percussion	2707881.28	-40370.08	1152.64	-90	0	81.5	Completed in dolomite	
Leeuwbosch 129KQ	B	LH2W	Percussion	2707742.38	-40589.15	1149.28	-90	0	58	Waterhole -abandoned	
Leeuwbosch 129KQ	B	LH3L	Percussion	2708008.32	-40672.66	1180.96	-90	0	170	Completed in dolomite	
Leeuwbosch 129KQ	B	LH4L	Percussion	2708010.39	-40635.85	1181.2	-90	0	99	Completed in dolomite	
Leeuwbosch 129KQ	B	LH5L	Percussion	2707999.2	-40580.2	1175.93	-90	0	106	Completed in dolomite	
Leeuwbosch 129KQ	B	LH6L	Percussion	2707983.1	-40538.46	1175.25	-90	0	118	Completed in dolomite	
Leeuwbosch 129KQ	B	LH7L	Percussion	2707934.87	-40528.71	1170.94	-90	0	100	Completed in dolomite	
Leeuwbosch 129KQ	B	LH8L	Percussion	2708010.74	-40607.42	1183.1	-90	0	70	Completed in dolomite	
Leeuwbosch 129KQ	B	LH9L	Percussion	2708658.59	-40487.86	1104.68	-90	0	52	Completed in iron ore + dolomite	
Leeuwbosch 129KQ	B	LH10L	Percussion	2708673.81	-40506.96	1104.05	-90	0	52	Completed in dolomite	
Leeuwbosch 129KQ	B	LH11L	Percussion	2708689.27	-40526.44	1103.33	-90	0	52	Completed in dolomite	
Leeuwbosch 129KQ	B	LH12L	Percussion	2708648.24	-40536.874	1103.33	-90	0	50	Completed in iron ore + dolomite	
Leeuwbosch 129KQ	A	LH13L	Percussion	2706579.84	-41968.37	1131.51	-80	257	170	Completed in dolomite	
Leeuwbosch 129KQ	A	LH14L	Percussion	2706519.99	-41887.65	1128.5	-80	180	199	Completed in dolomite	
Leeuwbosch 129KQ	A	LH16L	Percussion	2706528.18	-42000.157	1120.91	-90	0	25	Abandoned - cavity	
Leeuwbosch 129KQ	A	LH17L	Percussion	2706608.66	-41871.55	1145.27	-90	0	108	Abandoned - cavity	
Leeuwbosch 129KQ	A	LH17LA	Percussion	2706608.66	-41871.55	1145	-90	0	199	Completed in dolomite	
Leeuwbosch 129KQ	B	LH19L	Percussion	2708007.86	-40693.68	1180.89	-90	0	52	Completed in dolomite	
Leeuwbosch 129KQ	B	LH20RC	RC	2707991.31	-40556.77	1176.21	-90	0	34	Completed in dolomite	
Leeuwbosch 129KQ	B	LH21D	Diamond core	2708364.94	-40748.94	1114.2	-90		95.24	Completed in chert	
Leeuwbosch 129KQ	B	LH22D	Diamond core	2707989.55	-40668.43	1184.6	-50	352	69.66	Completed in dolomite	
Leeuwbosch 129KQ	A	LH23L	Percussion	2706802.94	-42040.586	1098.543	-90	0	124	Completed in dolomite	
Leeuwbosch 129KQ		LH25L		2706570.66	-41902.31	1142.74			39.59		Missing information
Leeuwbosch 129KQ	A	LH25D	Diamond core	2706570.66	-41902.305	1142.74	-90	0	33.47	Abandoned - cavity	
Leeuwbosch 129KQ	A	LH25DA	Diamond core	2706570.66	-41902.31	1142.74	-90	0	158.52	Completed at 158.52 in dolomite	
Leeuwbosch 129KQ	A	LH25DA	Percussion	2706570.66	-41902.31	1142.74	-90	0	40	Pilot for diamond LH25DA	
Leeuwbosch 129KQ	A	LH26L	Percussion	2706258.1	-41254.294	1122.969	-90	0	99	Completed in dolomite	
Leeuwbosch 129KQ	A	LH27D	Diamond core	2706582.67	-41971.584	1137.153	-60	250	220.89	Completed in dolomite	
Leeuwbosch 129KQ	A	LH34L	Percussion	2706529.86	-41851.068	1138.114	-90	0	84	Completed in dolomite	
Leeuwbosch 129KQ	B	LH35D	Diamond core	2708004.24	-40679.8	1178.75	-60	350	116.42	Completed in dolomite	
Cornwall 313KQ	C	CL24D	Diamond core	2712124	-38051	1257.24	-60	298	140.15		
Cornwall 313KQ	E	CL30L	Percussion	2713086.7	-40785.6	1156.2	-90	0	166	Completed in dolomite	
Cornwall 313KQ	F	CL12L	Percussion	2711606	-41792	1070	-80	0	188	Abandoned - ground water	
Cornwall 313KQ	F	CL13L	Percussion	2711944	-41436	1087	-90	0	154	Abandoned - equipment failure	
Cornwall 313KQ	F	CL14L	Percussion	2712151	-41084	1087	-90	0	184	Completed in dolomite	
Cornwall 313KQ	F	CL25L	Percussion	2712349	-40564	1123	-90	0	142	Completed in dolomite	
Cornwall 313KQ	F	CL26L	Percussion				-90	0	109	Abandoned - equipment failure	No co-ords recorded
Cornwall 313KQ	F	CL26LA	Percussion	2712229	-40874	1097	-90	0	148	Completed in dolomite	
Vlakplaats 137KQ	G	VS1L	Percussion	2708033	-42191	1106	-90	0	76	Completed in dolomite	
Vlakplaats 137KQ	G	VS2L	Percussion	2708017	-42271	1091	-90	0	52	Completed in dolomite	
Vlakplaats 137KQ	G	VS3L	Percussion	2708302	-42389	1077	-90	0	28	Completed in dolomite	

- **Sampling Program and Analytical Results**

Two types of sampling were undertaken:

- Gathering samples from surface exposures, targeting hematite lenses, goethite zones, collapse structures, and ferruginous lenses.
- Drilling-derived sampling from percussion, chip, or core material.

There is no information on sample methodologies (such as the use of blanks or standards), nor is there a record of the analytical facility or QA/QC processes used at the time. The boreholes were sampled at different recorded intervals.

Drilled sample sites were logged, and the findings were shown to show spatial changes in iron concentration. For this review, the author retyped the analytical data from the original report into MS Excel spreadsheets. Figure 5 shows graphical representations of the grab and drill sample results. High-grade ore minerals are rocks that contain more than 60% Fe and less than 15% SiO_2 by weight, while low-grade ore contains between 55% and 66% Fe.

The grab samples averaged 56.09% Fe with an average of 10.70% SiO_2, ranging from 51% to 65% Fe. Notably, two samples from Cornwall Farm yielded 64% and 65% Fe, taken from an iron outcrop and a hematite lens zone. At Leeuwbosch, one sample from a silica-poor zone returned 63.3% Fe.

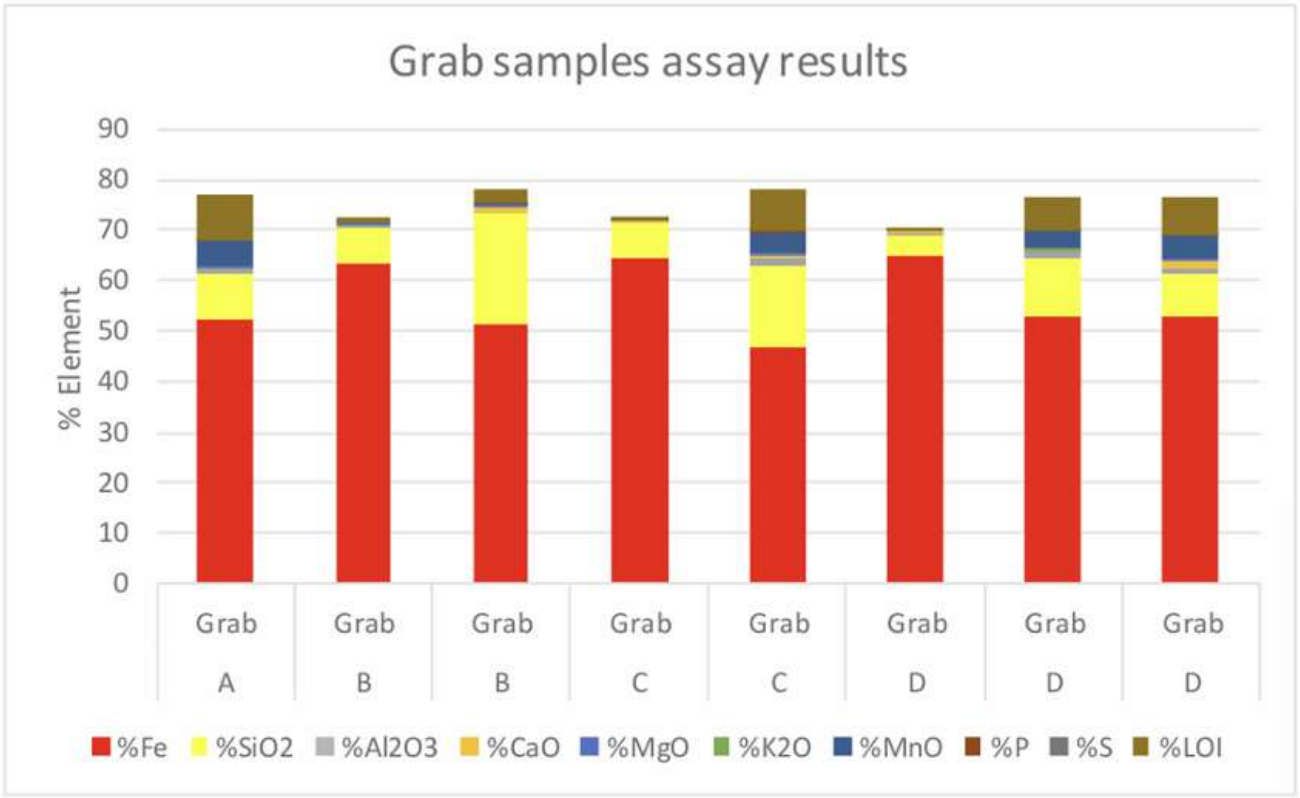


Figure 5: Mineral results from the laboratory during PR operation

- **Geological and Exploration Activities**

Exploration in the proposed mining area began with identifying target zones on the farms, followed by systematic drilling, sampling, and assaying (see Figure 6 for target locations).

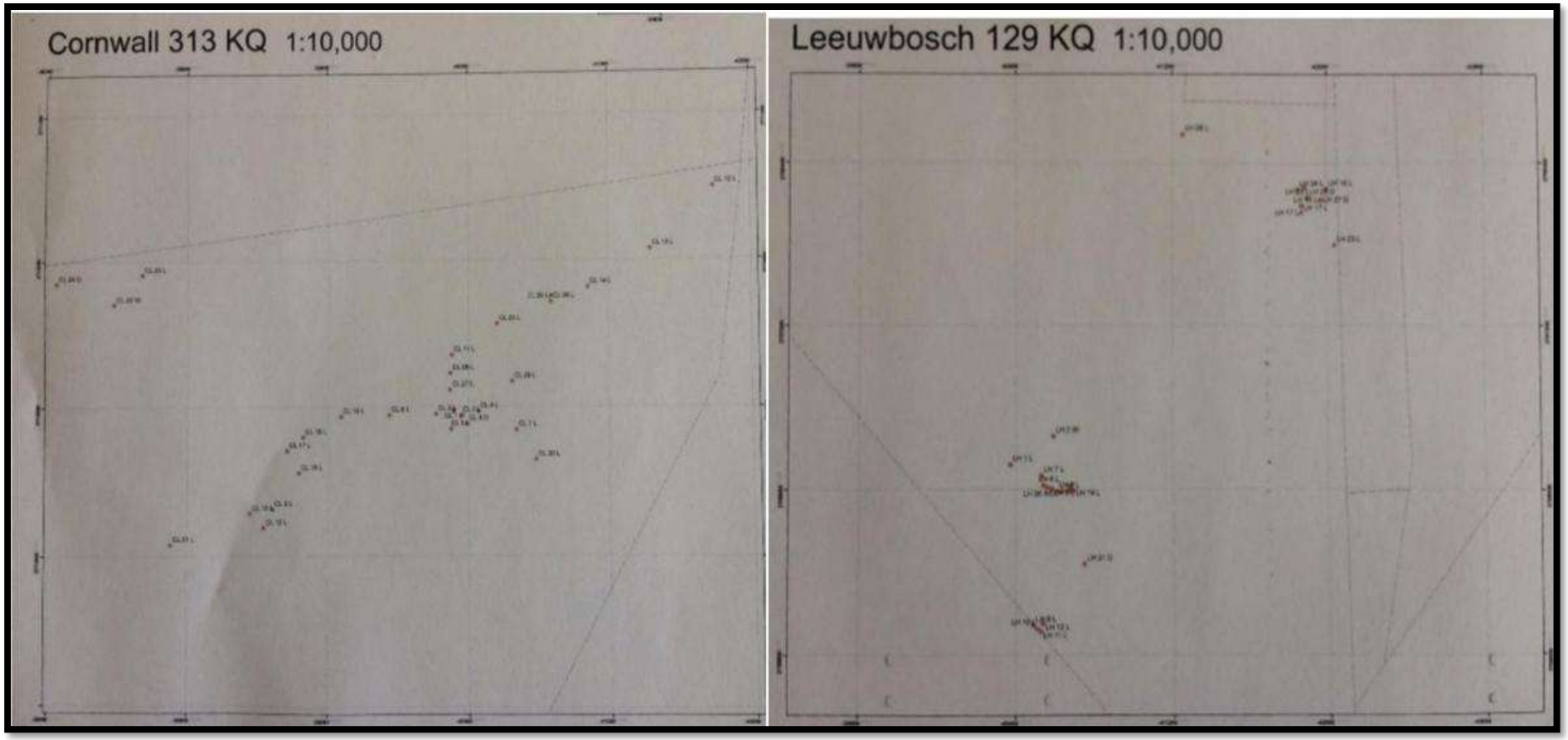


Figure 6: Location of the drilled boreholes

Arengo 297 (Pty) Ltd conducted mineral exploration on the Cornwall 313 KQ and Koedoevlei 128 KQ farms from 2011 to earlier years. Their approach entailed extensive mapping, drilling samples, and analysis. The following sections summarize previous findings and the author's assessment of the project's status.

Target TH20 – Leeuwbosch 129KQ

- **Target A:**
  - Outcropping mushroom-shaped goethitic gossan (130m x 140m).
  - Nine collected samples showed an average iron concentration of 52.47%.
  - Drilling revealed limited economic quantities of high-grade ore at deep.
  - Hematite scree is most likely generated by secondary supergene processes.

- **Target B:**

  - Microcrystalline hematite with quartz and calcite veins in silicified dolomite, including sulphide mineralization.
  - Mineralized zones are NW-SE aligned inside Malmani dolomite, with thickness ranging from 1-20 m and a nearly vertical dip.
  - Hematite replacement enriches surface caps, resulting in high-quality, hard ore.
  - Weathering produced spherical detrital ore within dolomite karsts.
  - Two grab samples revealed iron levels of 63.33% and 51.45%, albeit the particular sampling locations were not documented.

Target TH19 – Cornwall 313KQ

- **Target C:**

  - Linear tabular diamond (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore mineral bodies along NW–SE striking lineaments.
  - Associated with thick chert bands.

- **Target D:**

  - Jaspilite-bearing banded iron formation (BIF) at the base of the minerals.

- Overlies the Frisco Formation within a synclinal trough striking NE and plunging in the same direction.
- Outcrops form ridges with positive relief, though the relationship between chert and hematite is often unclear.

5 Motivation for the overall preferred site, activities, and technology alternative.

The recommended site was chosen primarily because of its advantageous geological qualities, particularly the proven presence of geological formations that make it a viable and resource-efficient location for large-scale collection and future mining operations. The site also benefits from limited incompatible land uses, manageable environmental sensitivities, and existing access routes, which reduce the requirement for major new infrastructure. These elements work together to reduce environmental disturbance, lower operational costs, and increase the feasibility of carrying out the proposed activities at this location.

The chosen activity is appropriate for the opencast method, followed by potential mining, since it enables reliable measurement of mineral quality and quantity, as well as beneficiation characteristics, all of which are required for right decision-making prior to large-scale extraction. The recommended technological alternative increases the project's desirability by utilising modern, low-emission, energy-efficient equipment and processes that minimize soil disturbance, dust generation, and water use during extraction and material processing.

6 Full description of the process followed to reach the proposed preferred alternatives within the site.

NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties and the consideration of alternatives to the initially proposed site layout.

6.1 Details of the development footprint alternatives considered.

With reference to the site plan provided as Appendix and the location of the individual activities on site, provide details of the alternatives considered with respect to:

6.2 The property on which or location where it is proposed to undertake the activity;

Although the mineral resource is location-specific and cannot be moved off-site, the EAP and specialist team assessed feasible internal layout and sequencing alternatives to reduce environmental harm. The preferred layout was selected because it avoids or minimises disturbance to high-sensitivity biodiversity areas, watercourses, heritage resources, burial sites, palaeontological sensitivity zones, higher agricultural-potential soils and neighbouring receptors.

6.3 The type of activity to be undertaken.

Run-of-mine (ROM) activities are expected to include pre-construction and site preparation, drilling and blasting, loading and hauling, ore processing and handling, waste and tailings, management support infrastructure, environmental management activities, closure and rehabilitation (long-term).

The proposed activity entails mining the ore minerals utilizing opencast methods (Figure 2). The mining method will involve excavating and removing an indefinite amount of material in order to process and confirm resource quality, grade variation, and metallurgical properties. This activity is critical in establishing the economic feasibility of future large-scale mining operations. The open-cast approach will be used during the bulk sampling process.

In addition to bulk sampling, which will initiate the opencast approach, the activity will include supporting operational components such as building temporary new access roads, deploying mobile equipment, implementing stormwater controls, and executing progressive rehabilitation of damaged regions. The activity is limited to the project footprint and is intended to minimize environmental disruption while providing vital technical data for mine design development. All activities will follow NEMA's managing the environment principles, the requirements of the EIA Regulations, and the MPRDA's mandate to guarantee the orderly, efficient, as well as sustainable exploitation of mineral resources.

6.4 The design or layout of the activity.

The layout plan is defined by the MR site's current position and the mitigation of the area in Figure 22.

6.5 Technology to Be Used in the Activity

Overview. The operation will use contemporary, established, and appropriate technologies to safely and efficiently extract minerals utilizing the opencast mining technique. The technologies chosen are focused on reducing the environmental imprint, conserving water and energy, regulating dust and noise emissions, and promoting progressive rehabilitation over the project's duration. Wherever possible, the technologies and equipment will be modular, movable, and easily relocated to minimise permanent surface damage and allow for speedy demobilisation and site restoration at the end of each phase of operation.

Opencast Extraction Technologies. The principal mining method will use hydraulic excavators, front-end loaders, articulated dump trucks, and dozers intended for selectively mining ore horizons. Controlled drilling and blasting can be used in competent rock zones, with electronic initiation systems to increase precision, eliminate fly rock, and minimise vibration impacts on the surrounding environment. Mechanical ripping will be used instead of blasting whenever possible to reduce emissions and noise. Machine navigation systems with GPS capability will provide correct bench development, enhanced mineral waste discrimination, and minimized unnecessary disruption of the surrounding environment.

Dust, Water, and Noise Management Technologies. Dust suppression will be accomplished with water carts equipped with adjustable nozzles, supplemented by chemical dust suppressants on haul routes as needed. Noise-reducing technology, real-time environmental monitors (dust, noise, and weather stations), and speed-controlled haul routes will all help to mitigate operational consequences. Drains, berms, silt traps, and lined sumps will absorb sediment-laden runoff for regulated reuse in dust suppression, thus reducing water use.

Materials Handling and Stockpile Management. Mobile crushing as well as screening devices can be used to size large volumes of materials for analysis. Stockpiles will be put on prepared, compacted pads, with stormwater trenches and sediment controls in place to minimize downstream impacts. Short-distance transfers will be made using front-end loaders and haul trucks, ensuring efficient material movement with minimum spillage and a danger of contamination

Rehabilitation and Environmental Protection Technologies. Progressive rehabilitation will be aided by soil management tools including tracked dozers for shaping as well as ripping compacted sections, mulching equipment, and hydroseeding units where vegetation coverage is necessary. Environmental monitoring will include GPS-enabled surveys, drone footage for tracking landscape alterations, and handheld devices for documenting biodiversity and management of heritage compliance.

Energy and Emissions Efficiency. The primary focus will be on using low-emission diesel equipment, hybrid-equipped machinery, and solar-powered systems for illumination, security, and minor on-site amenities. These solutions cut greenhouse gas emissions and lessen the dependency on diesel generators.

6.6 The operational aspects of the activity; and

The operation will use a staged extraction technique with gradual rehabilitation to ensure safety, sustainability, and regulatory compliance throughout the project's duration. However, any optional action required for a specific reason shall be carried out sustainably.

7 The Option of Not Implementing the Activity

The alternative of not implementing the proposed mineral mining and opencast technology would leave the site in its present form, with no changes to the existing environmental or socioeconomic conditions. In this case, opencast mining would not require any land clearance, resource extraction, or operating footprint. As a result, the natural ecosystem, which includes soils, vegetation, drainage patterns, biodiversity, heritage values, and the visual landscape, would not alter. This element also removes the requirement for infrastructure installation, material storage, vehicle movement, blasting, and other environmental regulations. While these avoided impacts may be useful in maintaining the status quo, the no-go option restricts chances for land use optimization and inhibits greater geological comprehension of the mineral resource.

This prevents the proliferation of environmental consequences while also limiting possible beneficial contributions to sustainable growth, responsible resource use, and community upliftment. Consequently, the no-go option is considered a baseline against which all choices must be judged; yet it is not favored.

8 Details of the Public Participation Process Followed

Describes the process of consulting interested and affected parties (I&Aps), which includes public gatherings and one-on-one discussions to ensure effective engagement. Whether or not they attended public meetings, the impacted parties must be specifically consulted. (Information provided to affected parties must include enough detail about the anticipated operation to allow them to assess the impact the operations will have on them or the usage of their land).

8.1 Public Participation Materials

Following statutory requirements and best practices, it is critical to create documentation that is easily available to all stakeholders who may be affected or interested in the project. The materials below have been created and given to all stakeholders, including interested and affected parties. The numerous PPP materials utilized in the EIA processes are presented as appendices to this report.

8.2 Newspaper advertisements:

A newspaper advertisement, informing all I&APs residing in the surrounding communities near the proposed area within the Waterberg District Municipality, was published in the Platinum Bushveld newspaper advert on the **30th of April 2025** and included the information about Arengo' intention to undertake mining right activities in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ.

I&APs were informed to register any comments or concerns that they might have regarding the proposed project by contacting the EAP via email through the provided comments request form or by requesting additional information via the telephone. The EAP details were included in the advert, Background Information Document (BID), and site notice. (attached as **Appendix 3A** for ease of reference).

8.3 Background Information Document (BID):

The BID (**Appendix 3B**) was distributed and provided important information regarding the following:

- Project description of the proposed MR area.
- The EIA and the PPP will be undertaken in support of the MR process and the relevant contact details.
- Details about how stakeholders could register as an Interested and Affected Party (I&AP) and be kept informed about the project developments; and
- The public review and comment period for the draft Environmental Impact Assessment (EIA).

8.4 I&APs Registration Form:

A registration form was distributed to the community attached to the BID for the registration of the I&APs (attached as **Appendix 3B** for ease of reference).

8.5 Site notice:

An 12x18-sized site notices informing I&APs about the project information as per the published newspaper advert, were developed, laminated, and erected at the boundary sites of the proposed site as required in terms of Section 24J of NEMA, read with Regulation 41 EIA Regulation. Notices were placed within the vicinity of the proposed project site at strategic locations where they are deemed to be visible to the community.

8.6 Public meeting:

Public and one on one engagement will be facilitating discussions on the Draft EIA, seeking comments, issues, concerns, and input from Interested and Affected Parties (I&APs). Public meeting will be held 22nd May 2026 and was accessible to everyone.

9 The environmental attributes associated with the alternatives.

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

9.1 Baseline Environment

9.1.1 Type of environment affected by the proposed activity.

(Its current geographical, physical, biological, socio-economic, and cultural character).

9.1.1.1 Regional Setting

Thabazimbi is located in the Waterberg District Municipality of Limpopo Province, some 260 kilometers northwest of Johannesburg. The region is distinguished by rugged hills as well as mountain ranges associated with the Transvaal Supergroup, particularly the Malmani Dolomite and the Penge Iron Formation, which host the region's well-known mineral deposits. The town is in a hot semi-arid (BSh) climate zone, with scant vegetation similar to the region's transitional savanna and bushveld biomes.

Thabazimbi is geologically part of the Thabazimbi–Murchison Lineament, a structurally complex fold and thrust belt involved with the tectonic history of the Neoarchaean-Mesoproterozoic Transvaal Basin. The Penge Formation, underlain by shales and the Frisco Formation Dolomites, has mineral bodies that are stratabound and average 18-25 m thick. These lithologies have undergone a number of deformation stages, including thrusting, folding, and later extensional faulting, all of which have had a substantial impact on mineral ore shape and distribution.

Thabazimbi is one of South Africa's historically significant mineral ore districts, with mining dating back to the early twentieth century. The local environment reflects both the natural geological context and decades of mining activity, while large-scale mining was discontinued around 2015.

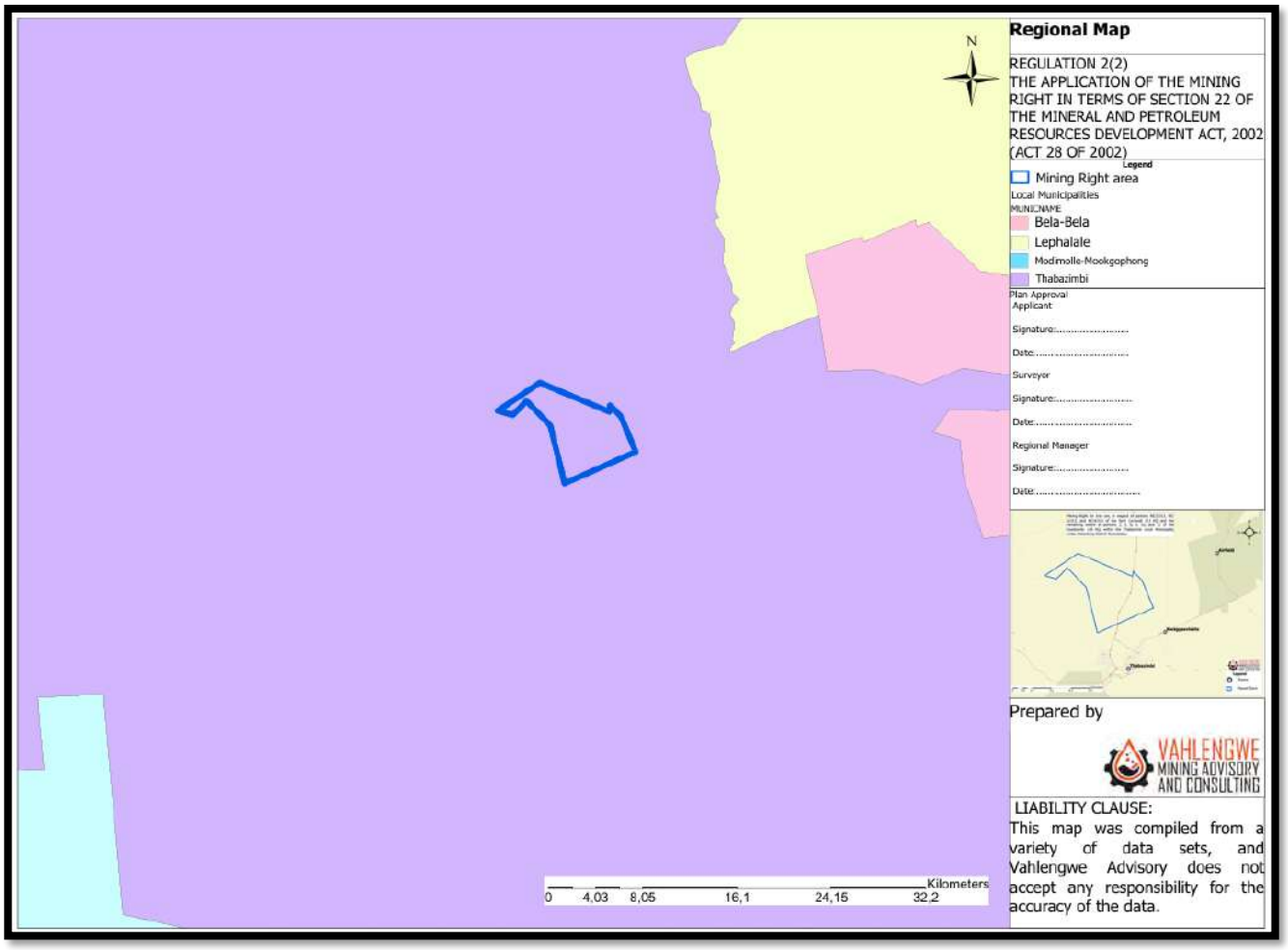


Figure 7: Municipal boundaries around the proposed MR

According to the site visit results, aged equipment and aggregate stockpiles show that parts of the Arengo 297 MR region were previously disturbed by past mining operations. This observation is important because it shows a definite history of mineral ore extraction in the region, which bolsters the argument in favour of mining rights. Previous mining activity is frequently seen by regulators as evidence that the area is appropriate for ongoing exploitation, which allays worries about competing for land uses and environmental sensitivity that usually occur with virgin land.

Furthermore, the existence of outdated mining infrastructure and stockpiles offers concrete proof of the potential and previous production of minerals. This supports the application's economic justification by demonstrating that the property has and probably will continue carrying out. The applicant's assertion that additional mining activities would be feasible, sustainable, and advantageous to the business and the overall economy is supported by such data. Additionally, it shows mining in an unproven location, the applicant is expanding on existing activities.

Lastly, by conforming to regulatory requirements that mining licenses should be awarded where there are proven activity and clear mineral value, these observations strengthen the application. The ongoing nature of use lowers uncertainty, bolsters applicant's proposal's legitimacy, and emphasizes the possibility of effective development given the current foundation. The disturbed regions of the Arengo 297 MR area will be essentially legal and pragmatic assistance, strengthening and motivating the mining right appeal.

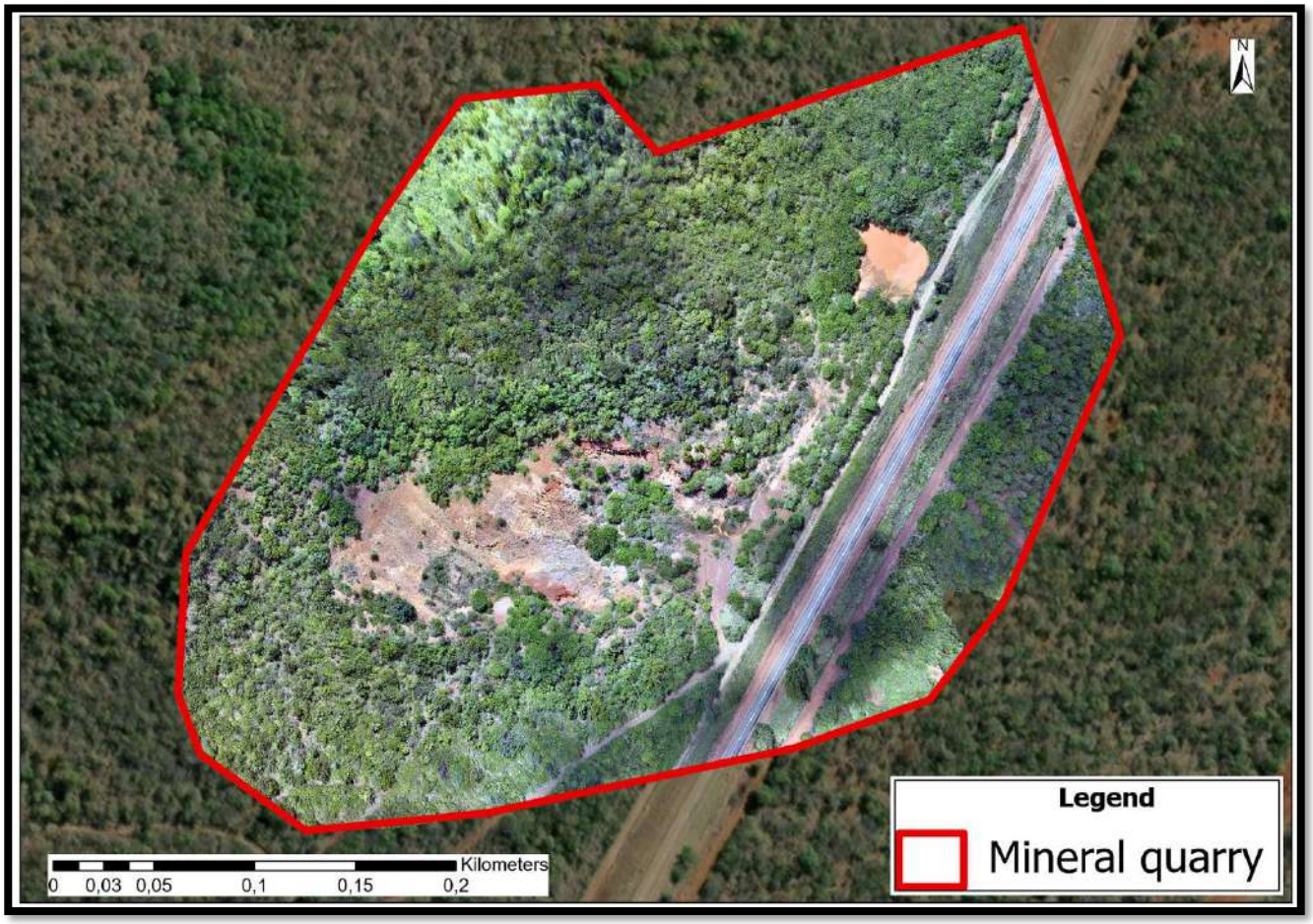


Figure 8: Demonstrates one of the mining quarries within the MR area

Parts of the Arengo 297 MR region were found to have organically recovered over time, with extensive flora and trees now dominating the ground, in addition to the signs of previous mining operations. The environment's ability to bounce back from past disruptions is demonstrated by this natural rehabilitation. By demonstrating that future processes can be handled responsibly as well as that there is a chance for successful land restoration when mining operations are over, the presence of flourishing vegetation supports the mining right applications. It emphasizes striking a balance amongst environmental stewardship as well as resource extraction, demonstrating the applicant's dedication to promoting sustainable development.

9.1.1.2 Climate

Thabazimbi, Limpopo, has a semi-arid climate, with scorching summers and moderate, dry winters. The climate map you uploaded shows a clear breakdown of temperature and rainfall trends each month, illustrating the region's seasonal rhythm.

Thabazimbi is hot and receives the majority of its rainfall between November and March. The average maximum temperature is around 29-30 °C, while the low is between 18-20 °C. Rainfall is highest in January (about 110 mm), followed by December and February. This period is characterized by thunderstorms and humidity, making it a wet season.

In contrast, winter months (May to August) are dry and chilly. Maximum temperatures drop to 22-24 °C, with minimums reaching as low as 6 °C in June and July. Rainfall is limited, typically below 10 mm per month, resulting in clear days and freezing nights. The transitional months, April, September, and October, have moderate weather. April sees a decrease in rainfall and temperatures, while September and October bring warmer weather and the start of the rainy season. Thabazimbi's climate is characterized by hot, rainy summers and chilly, dry winters, with annual precipitation concentrated in a few months. This trend makes the location favorable for outdoor activities in the winter, whereas summer necessitates preparedness for heat and storms.

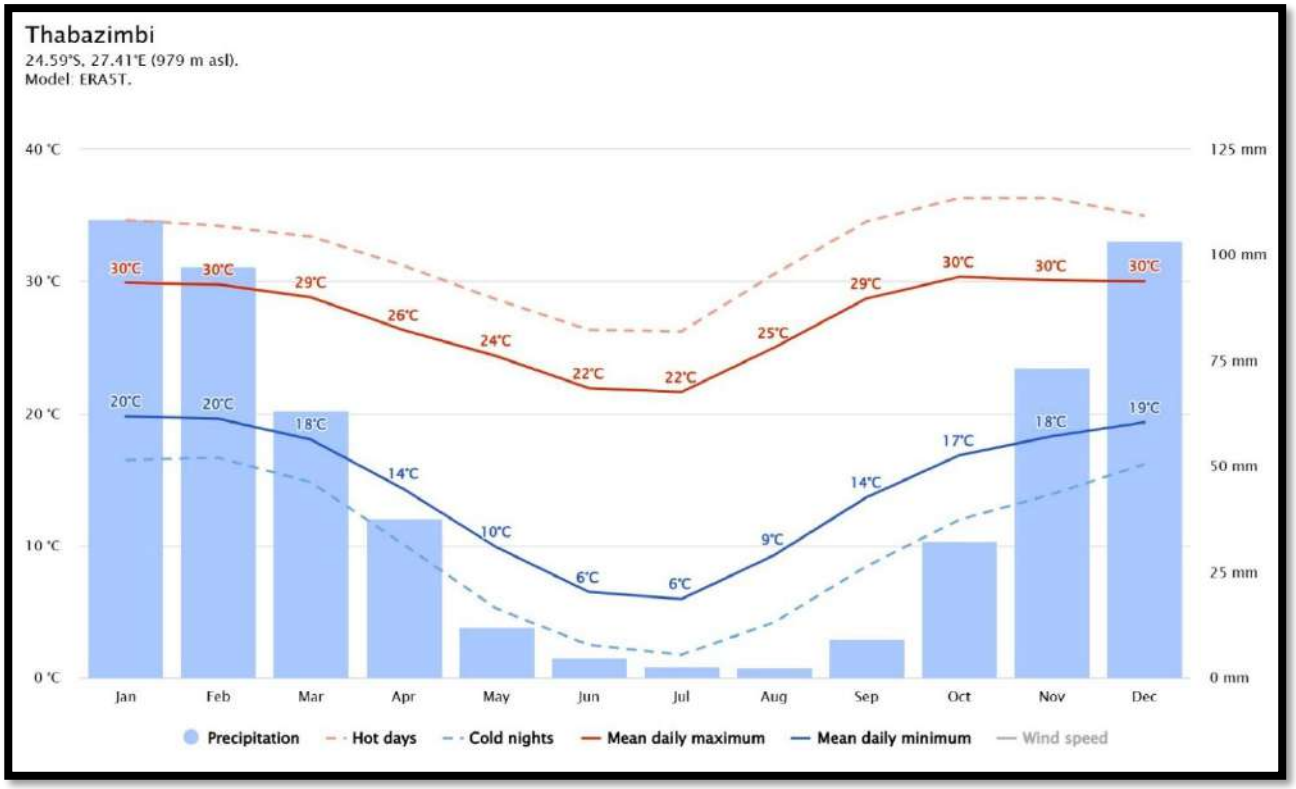


Figure 9: Climatic conditions of Thabazimbi in Limpopo (https://meteoblue.com)

9.1.1.3 Wind Direction

Thabazimbi's predominant wind patterns are determined by its position in Limpopo and seasonal climate fluctuations. During the majority of the year, the region gets southerly to southeasterly winds, with rains and thunderstorms becoming more regular in the summer. These winds frequently bring rainfall from the south and east, adding to the seasonal rains between November and March. Winter winds are often lighter and more varied, with occasional northerly or westerly flows reflecting the dry and stable air conditions.

Wind speeds are normally modest, ranging from 10 to 20 km/h, while gusts can be stronger during storm occurrences. Local weather, vegetation patterns, and dust dispersion from mining activities in the area are all heavily influenced by the mix of seasonal rainfall and the prevailing wind direction.

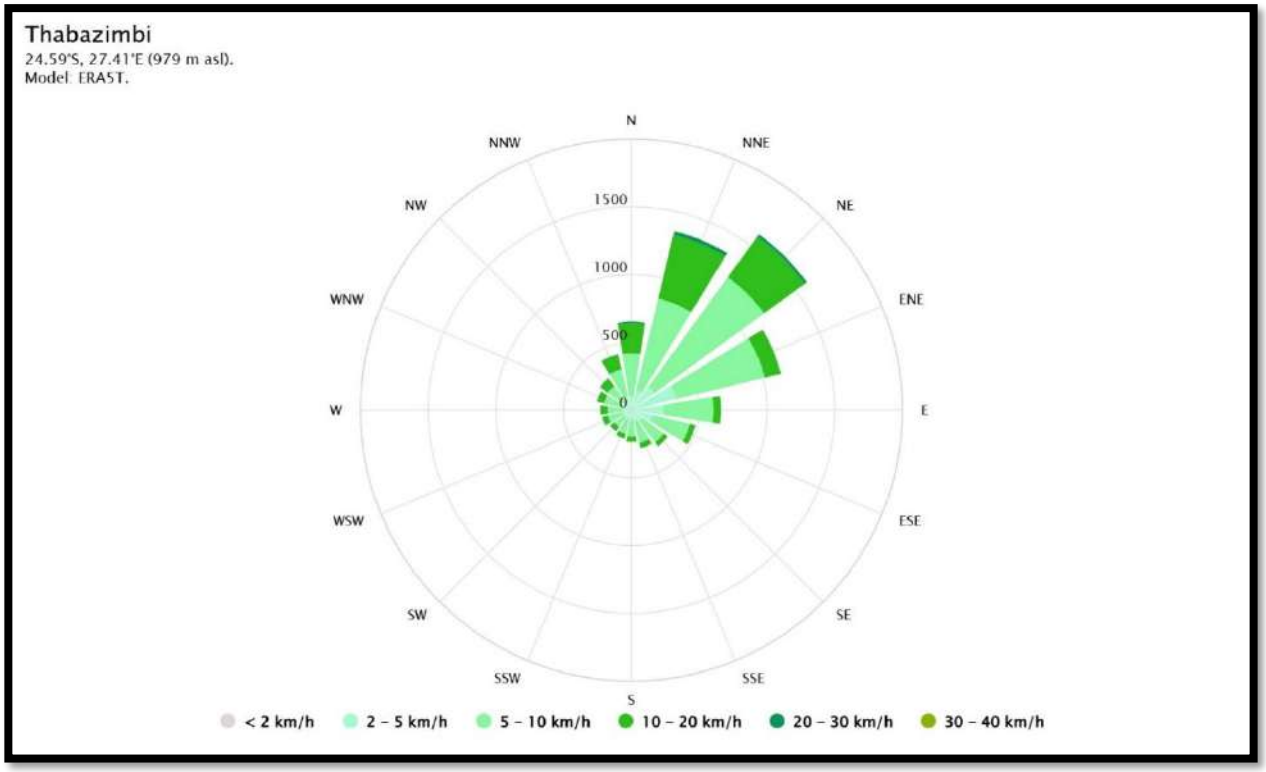


Figure 10: Wind Rose for Thabazimbi in Limpopo (https://www.meteoblue.com)

9.1.1.4 Topography

Thabazimbi's geography and surrounding region in Limpopo are determined by its geological basis and placement at the base of the Waterberg mountain range. The region is distinguished by harsh terrain, with notable hills and ridges generated by iron-rich banded formations. These high features contrast with the surrounding plains, resulting in a diverse landscape that influences habitation and land use. The Waterberg mountains form a spectacular background, with steep slopes and valleys channeling seasonal streams and rivers.

In addition to mountainous topography, dolomitic locations contribute to karst landscapes that include caves, sinkholes, and uneven ground surfaces. Thabazimbi's terrain is remarkable due to its blend of towering hills, undulating plains, and karst features. This complex topography not only supports mining activities, but also shapes ecological zones, with savanna vegetation dominating the plains and more diverse habitats found in the mountains and dolomitic places. The interaction of geology and terrain has resulted in a region that is both economically significant and environmentally distinctive. Thabazimbi's elevation ranges from around 1,397 to 1,623 meters. The average elevation on the location where the mining right activities were carried out is: 1,077 meters, as shown in the figure 11. https://en-za.topographic-map.com/map-3thgp/Thabazimbi/

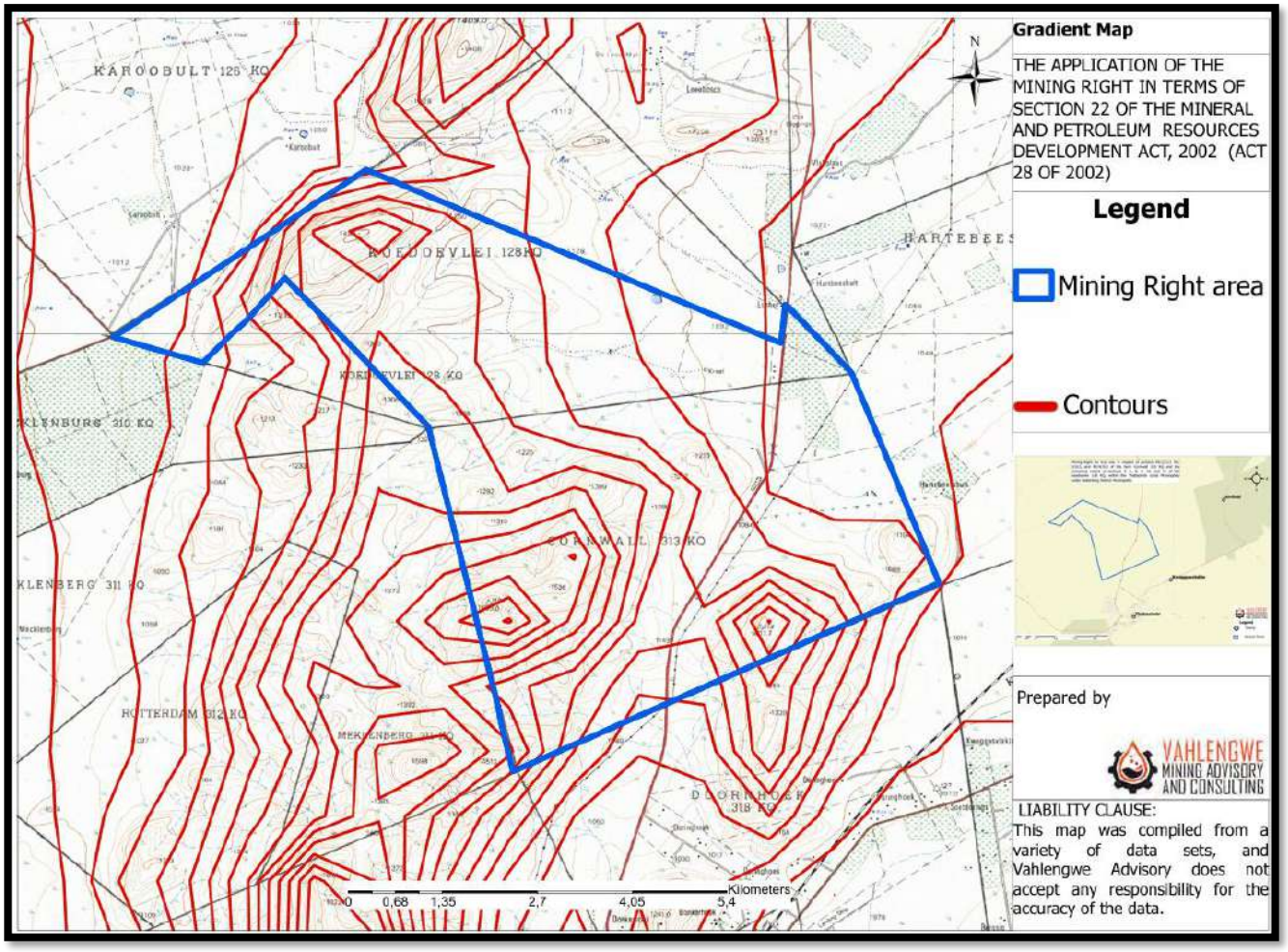


Figure 11: Topographical map of Thabazimbi

9.1.1.5 Regional Geology

Thabazimbi's regional geology is characterized by mineral-rich rocks and the greater influence of the Bushveld Igneous Complex in Figure 12. The area is widely known for its hematite-bearing deposits, which have been mined intensively for decades. The ore bodies are structurally regulated, with folds and faults forming localized enrichment zones. Geology also includes dolomitic rocks, which are prone to karstification, resulting in caves and unique speleothems that reveal former environmental conditions.

Thabazimbi's geology is important not only economically, but also scientifically. The minerals deposits demonstrate the complicated interplay between sedimentary processes and later tectonic deformation, whereas the dolomite landscapes show the interaction of geology and hydrology. Thabazimbi is a unique geological region that combines mineral wealth, complex structures, and natural heritage.

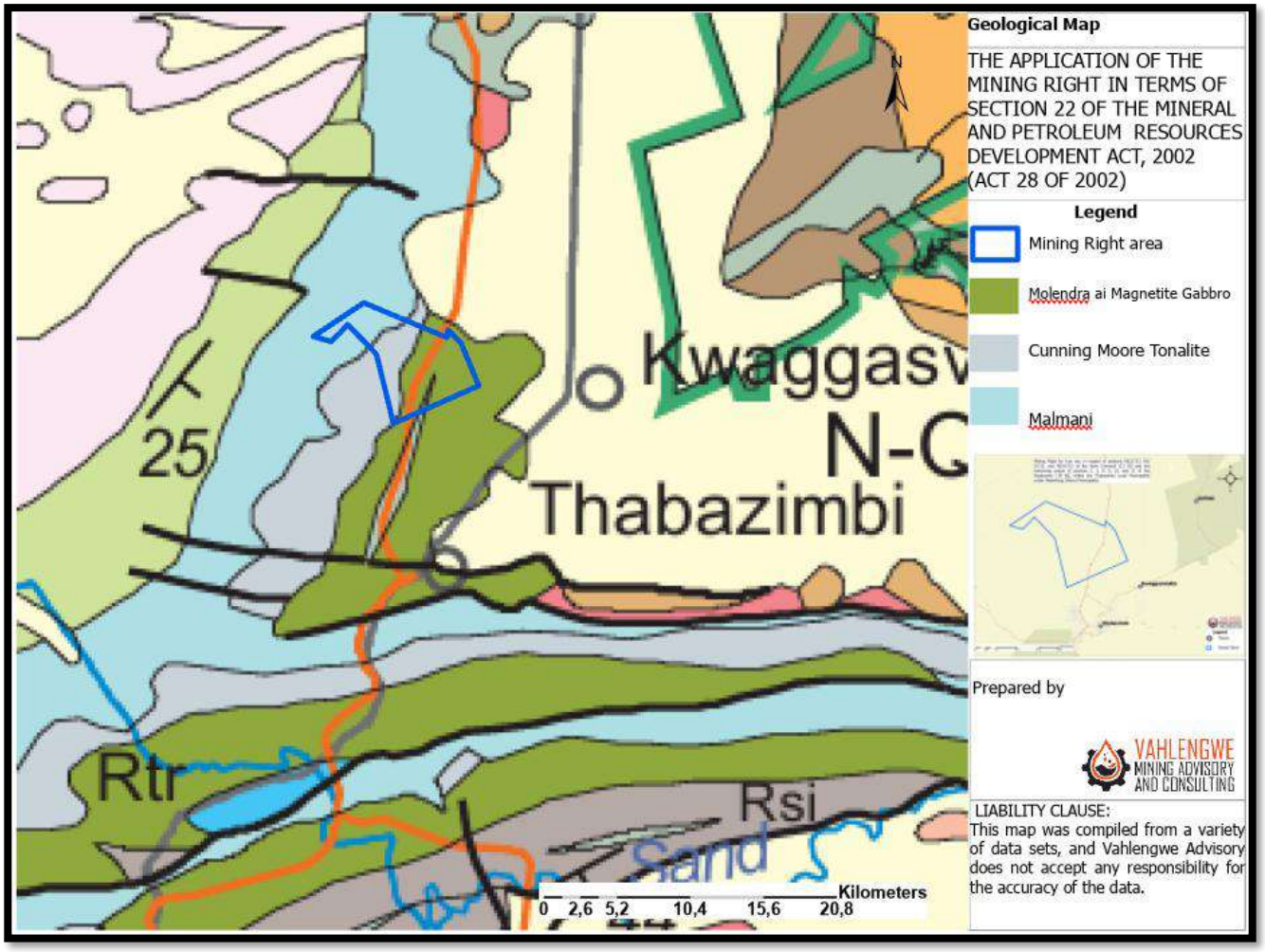


Figure 12: Geological Map of the Thabazimbi area

- **Hydrology**

The water cycle of Thabazimbi is inextricably tied to its geology and terrain, notably the dolomitic rocks that dominate portions of the region. These rocks are prone to karstification, which creates subsurface drainage systems, caverns, and sinkholes. As a result, groundwater plays a crucial part in the region's hydrology, with aquifers stored in dolomitic stratum serving as a vital water source for both communities and ecosystems. Surface water is less abundant, with seasonal rivers and streams running primarily during the summer rainy season.

Rainfall is heaviest between November as well as March, nourishing ephemeral streams and refilling groundwater supplies. During the dry winter months, most surface water features recede, leaving groundwater as the principal source of supply. Water management is crucial due to seasonal variations, particularly in mining, agriculture, and conservation. The combination of geology and hydrology also has an impact on biodiversity, as karst systems provide unique habitats and water-dependent

ecosystems. Thus, Figure 13 displayed all sorts of wetlands, but the most recent satellite imagery offers additional false maps demonstrating the dramatic alteration of environmental changes.

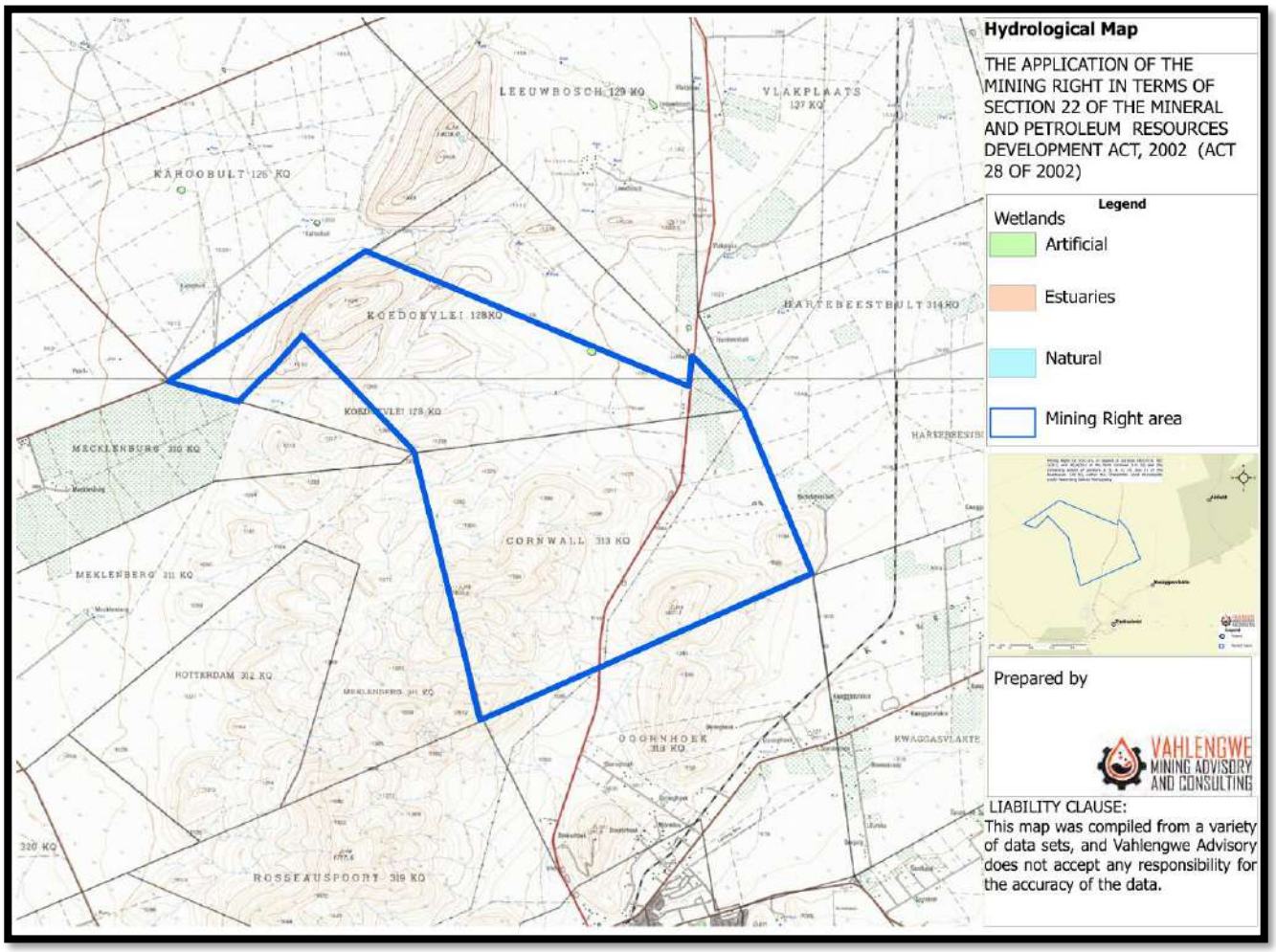


Figure 13: Hydrological Map shows different types of wetlands within or around the MR area

Biodiversity:

- **Biomes**

South Africa is well-known for its abundant biodiversity, and Limpopo Province, where Thabazimbi is located, is no exception. The region is part of the Savanna Biome, South Africa's largest biome, which is characterized by grassland and scattered trees. This biome supports a diverse diversity of animals, including huge herbivores and predators, making it biologically significant and important for conservation efforts. Savanna is also important for agricultural and animal grazing, but these activities must be properly controlled to avoid overgrazing and habitat destruction.

In addition to the Savanna, regions of Limpopo have Grassland Biome elements at higher altitudes, as

well as Forest Biome portions along riverine channels. These biomes help to maintain biological diversity by supporting unique plant species and offering important ecosystem services including water management, soil fertility, and carbon storage. The richness of Limpopo's biomes supports tourism (particularly game reserves and national parks), rural livelihoods, and plays an important role in preserving ecological equilibrium.

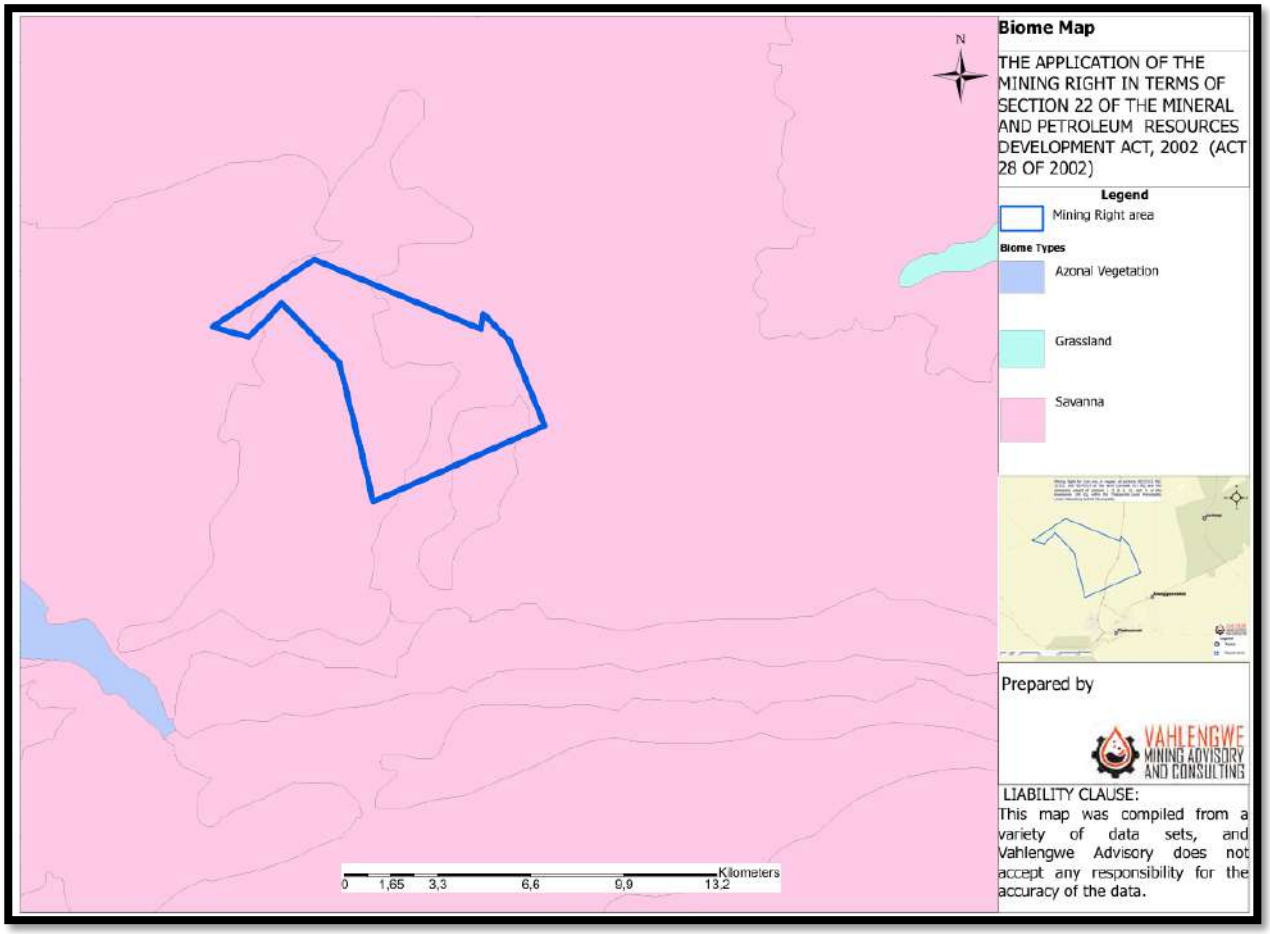


Figure 14: Biomes show different types of biomes within or around the MR area

- **Bioregions**

South Africa is divided into several bioregions, which are ecological units defined by climate, geology, vegetation, and species composition. These bioregions help guide conservation planning and biodiversity management under frameworks such as the National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004).

Thabazimbi is located in Limpopo Province and is predominantly part of South Africa's largest bioregion, the Savanna. This bioregion is distinguished by a mosaic of forested grasslands, bushveld, and scattered trees, which supports a broad range of species, including antelope, elephants, and carnivores. Within Limpopo, the Savanna Bioregion is further separated into Bushveld biological

zones, including the Waterberg Bushveld, which is very important to Thabazimbi. The Waterberg region is noted for its rocky topography, abundant biodiversity, and conservation value, with various protected areas and private game reserves.

Other neighbouring bioregions include Grassland Bioregion areas at higher elevations and Forest Bioregion elements along river corridors. These smaller bioregions add to ecological diversity by providing habitats for particular plant and animal species. Limpopo's bioregions collectively support ecosystem services like as water control, soil fertility, carbon sequestration, and tourism opportunities, making them critical to both environmental sustainability as well as socioeconomic growth.

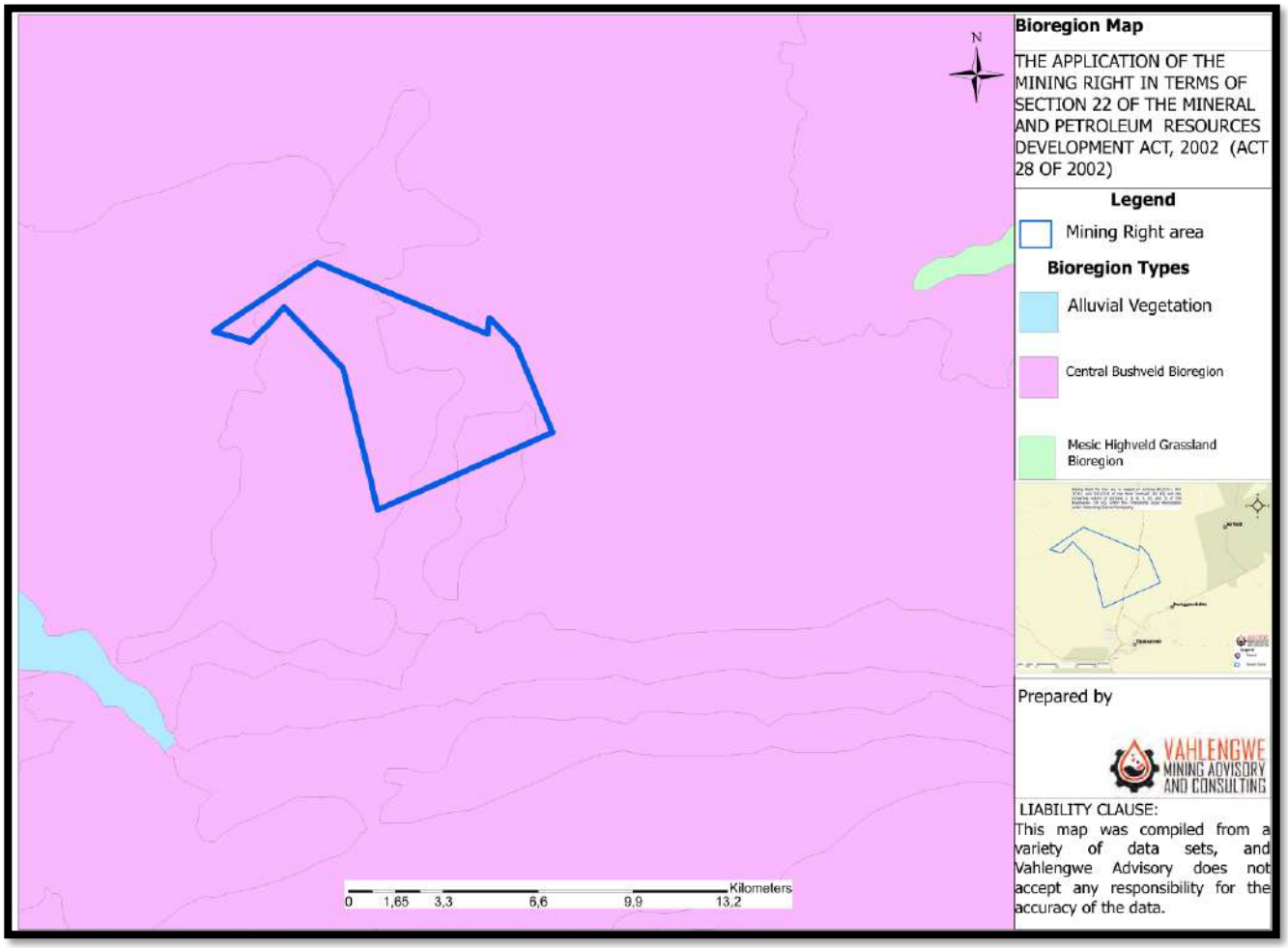


Figure 15: Different types of Bioregions within or around the MR area

- **Vegetation Map**

Thabazimbi's vegetation is largely from the Savanna Biome, specifically the Bushveld vegetation type, which is distinguished by a mix of grasses, shrubs, and scattered trees such as Acacia, Combretum, and Terminalia species. This vegetation supports both wildlife and livestock grazing, making it ecologically

and economically significant. The Waterberg region, where Thabazimbi is located, is known for its rocky topography and diverse vegetation, which ranges from open grasslands to deep bushveld thickets.

The South African National Biodiversity Institute (SANBI) Vegetation Map divides Limpopo's vegetation into smaller ecological groupings. In Thabazimbi, these include:

- Waterberg Mountain Bushveld – dominated by woody species and rocky outcrops.
- Mixed Bushveld – a mosaic of grassland and woodland, supporting high biodiversity.
- Riverine Forests and Thickets – found along rivers and drainage lines, providing critical habitats for specialized plant and animal species.

This vegetation map is critical for environmental impact assessments (EIAs) and land-use planning because it directs conservation efforts, identifies sensitive ecosystems, and educates sustainable mining and farming operations.

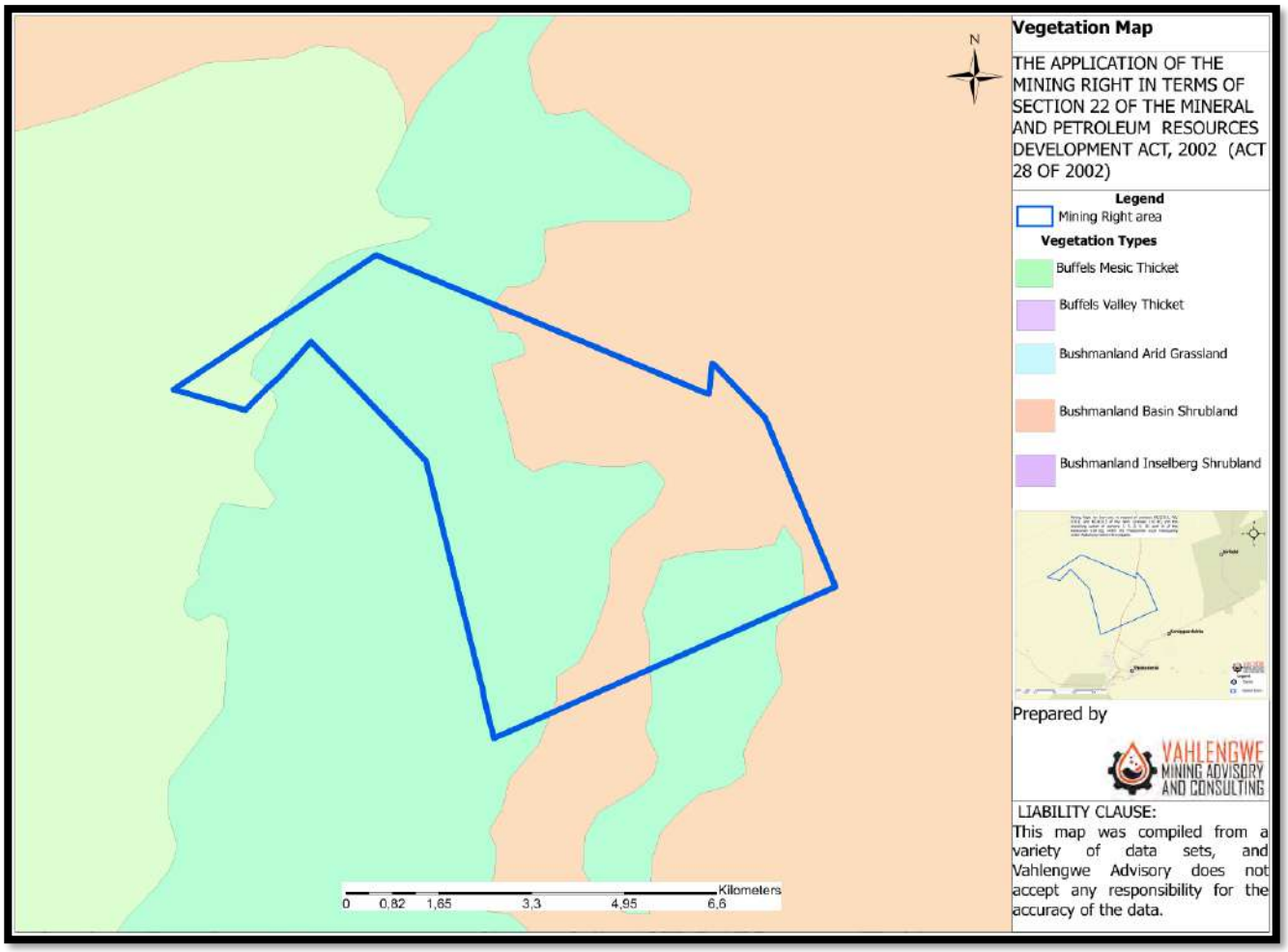


Figure 16: Vegetation Map shows different types of floras within or around the MR area

- **Conservation Plan**

To guarantee sustainable land use, a Conservation Plan for Thabazimbi must consider biodiversity priorities, socioeconomic realities, and legal frameworks. The Critical Biodiversity Areas (CBA) Map you provided is essential to this procedure since it indicates ecologically significant zones such as CBA1, CBA2, Ecological Support Areas (ESA1 & ESA2), Protected Areas (PA), and Other Natural Areas (ONA). These categories help guide decision-making by indicating areas where development should be avoided, natural processes should be preserved, and rehabilitation may be required. For example, CBA1 regions are irreplaceable habitats that must be preserved, but ESA zones promote broader ecological functioning and connectivity.

The conservation plan should therefore prioritize:

• Protect CBAs and PAs by preventing mining and infrastructure development in these areas.

• Establish buffer zones and natural corridors to connect fragile habitats, particularly riverine systems and the Waterberg Bushveld.

• Balancing sustainable resource use in ONA and ESA areas with biodiversity protection, including mining, agriculture, and tourism.

• Rehabilitation measures for disturbed sites, including controlling invasive species, stabilizing soil, and restoring indigenous vegetation.

• Engage stakeholders to integrate conservation goals with community development, benefiting local livelihoods through eco-tourism, conservation agriculture, and biodiversity stewardship programs.

The MR for the mineral's extraction utilizing open pit technologies, CBA2 (Comparative Baseline Assessment 2), must be completed by establishing an extensive baseline of environmental, social, and economic circumstances before any ground disturbance occurs. This comprises extensive geological, hydrological, and biological surveys to document the state of the environment prior to mining, as well as socioeconomic profile of communities that are likely to be affected. The comparative aspect requires that open pit mining's impacts be balanced against alternative land uses or development scenarios, allowing regulators and stakeholders to determine relative risks and benefits. For open pit mineral extraction, special attention must be paid to land clearing, soil erosion, groundwater depletion, and biodiversity loss, with mitigating methods clearly defined to demonstrate compliance with NEMA and MPRDA criteria.

Under ESA1 (Ecological Support Areas 1), the MR process must combine environmental and social risk assessment with active stakeholder participation. Dust emissions, noise, visual intrusion, and large-scale habitat disruption are all difficulties associated with open pit mining that must be evaluated in terms of direct, indirect, and cumulative effects. ESA1 mandates the proponent to not only identify

these risks but also suggest adaptive management strategies within the EMPr to ensure compliance with sustainable development principles. The MR application must indicate significant consultation with affected communities, address socioeconomic concerns such as displacement or livelihood disturbance, and commit to continuous monitoring during the mine's life. ESA1 ensures that open pit mineral extraction is carried out transparently, responsibly, and in accordance with statutory frameworks. In practical, this plan should be integrated into the EMPr and consistent with the National Environmental Management Act (NEMA) and the Mining and Biodiversity Guidelines (2013). Thabazimbi can strike a balance between mining development and long-term environmental sustainability by combining ecological mapping with socioeconomic planning.

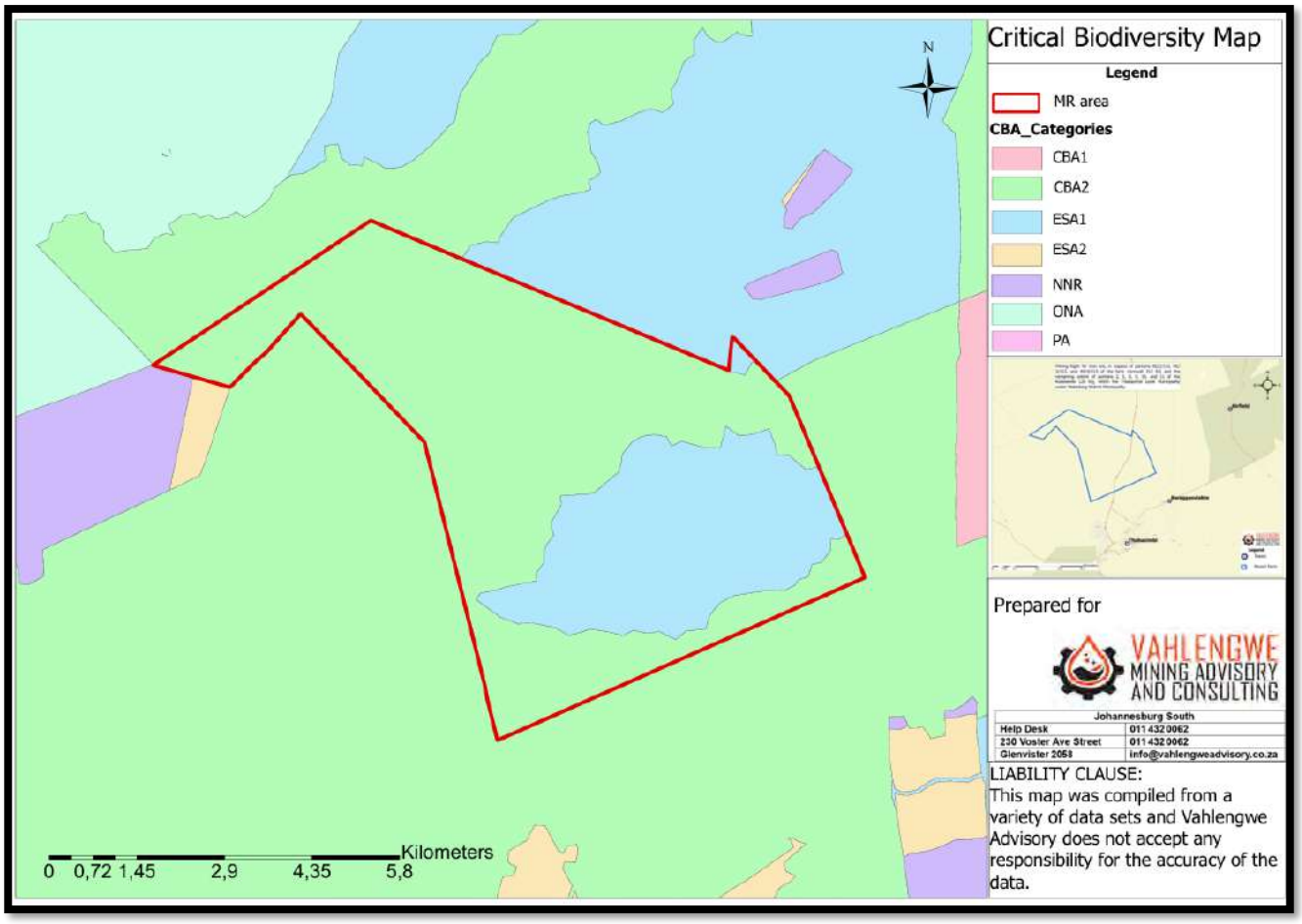


Figure 17: Sensitive areas within and around the proposed site

In this case, when mining starts operating within CBA2 and ESA1 sensitivities, must be conducted in phases, securely controlled, and concurrent rehabilitation and examining the executed mitigation in the area. The importance on reducing ecological damage and confirming long-term environmental sustainability.

9.1.2 Socio-Economic Status

Thabazimbi in Limpopo now has a mixed socioeconomic status: while mining and agriculture remain key to the economy, high unemployment, service delivery issues, and inequality continue to impede long-term growth. The municipality's Integrated Development Plan emphasizes both potential for expansion and ongoing structural concerns.

9.1.3 Socio-Economic Strengths and Opportunities

Thabazimbi's economy has historically been based on mining for specific minerals and commercial agriculture, both of which create employment and contribute significantly to local GDP. The neighborhood has a reasonably high formal residence rate (69%) and access to electricity for more than 76% of families, indicating development in infrastructure provision. The average household income is reported to be around R7,154 per month, with a GDP per capita of R507,088, indicating that resource-based companies provide significant value for the region. Literacy rates are increasing, with an adult literacy rate of 66.2%, and the municipality has invested in education and healthcare facilities to promote long-term human development. These variables point to the possibility for socioeconomic improvement if resource earnings are efficiently managed and applied in community development.

9.1.4 Persistent Challenges and Inequalities

Despite its capabilities, Thabazimbi faces high unemployment (11.8%), a dependency ratio of 34.2%, and severe income disparity. Service delivery is nevertheless uneven: only 12.8% of households have waste removal services, and fewer than 10% have piped water in their houses, showing infrastructure deficiencies. Female-headed families account for 20.1%, which is frequently associated with increased vulnerability to poverty. Crime rates, which include drug-related offenses and domestic burglary, exacerbate societal instability. The municipality's Integrated Development Plan (2021-2026) recognizes these problems, highlighting the importance of natural resource sustainability, enhanced governance, and diversification beyond mining. Without addressing inequality, service delivery backlogs, and governance flaws, Thabazimbi's socioeconomic potential risks being eroded by structural poverty and poor resilience.

Thabazimbi's socioeconomic situation demonstrates both promise and vulnerability: resource richness and infrastructure improvements coexist with unemployment, inequality, and service delivery gaps. Diversifying the economy, enhancing governance, and ensuring that mining earnings result in broad-based community benefits are all necessary for long-term growth.

9.1.5 Demographics and Population Statistics

According to the 2022 census figures, the Ekurhuleni Metropolitan Municipality has a population of around 3,463,070 people. The majority of citizens are black African, accounting for 85.3% of the population. White people account up 10.3%, while Coloured people make up 2.5%. Indian/Asian communities account for 1.8%, with the remaining 0.2% falling under the category of 'Other'.

Table 8: Population profile of Thabazimbi Local Municipality (Source: Stats SA 2022 Census)

Name	Frequency	%
BLACK AFRICAN	3 463 070	85,3%
COLOURED	102 003	2,5%
INDIAN/ASIAN	72 422	1,8%
WHITE	416 886	10,3%
OTHER	7 509	0,2%

Age distribution depicted by figure 18 shows the dominating gender, which is female gender in this area. The project operation will balance the women empowerment in the mining industry.

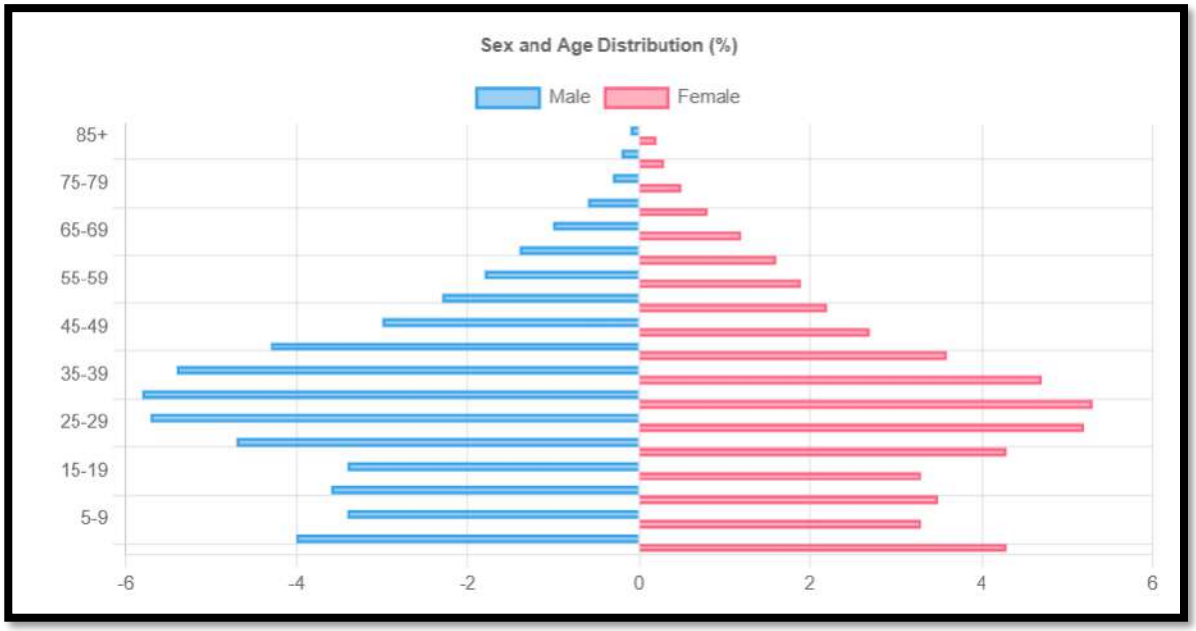


Figure 18: Sex and Age Distribution of the Thabazimbi Municipality (Source: Stats SA 2022 Census)

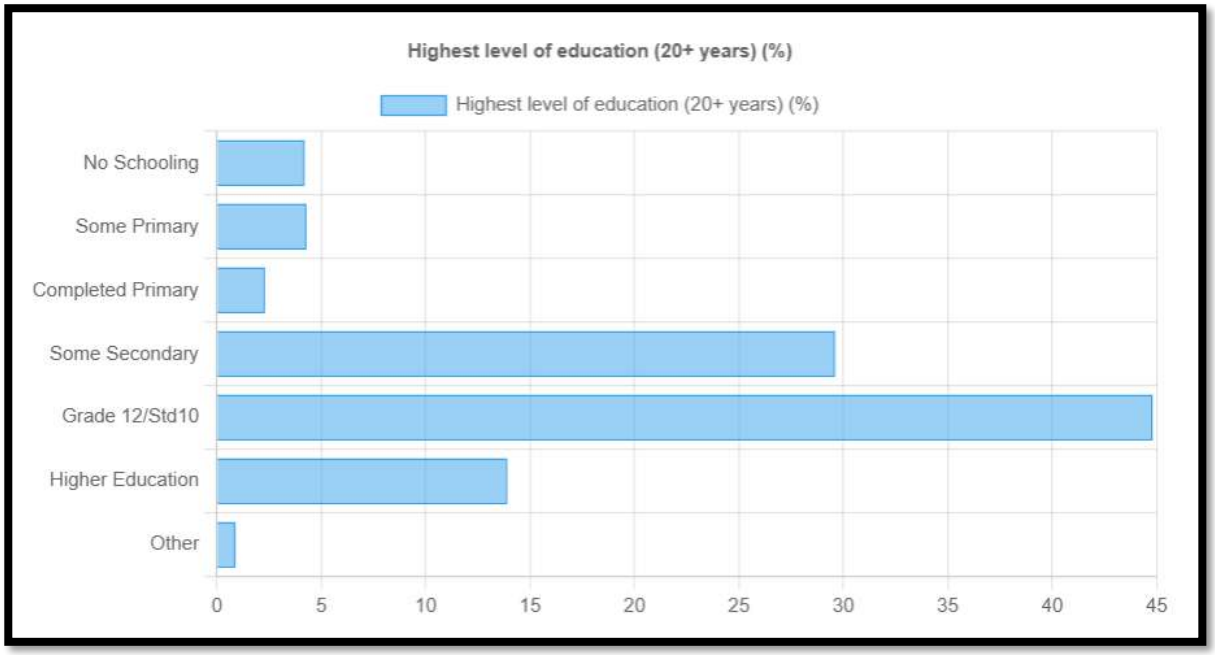


Figure 19: Education level at the Thabazimbi Municipality (Source: Stats SA 2022 Census)

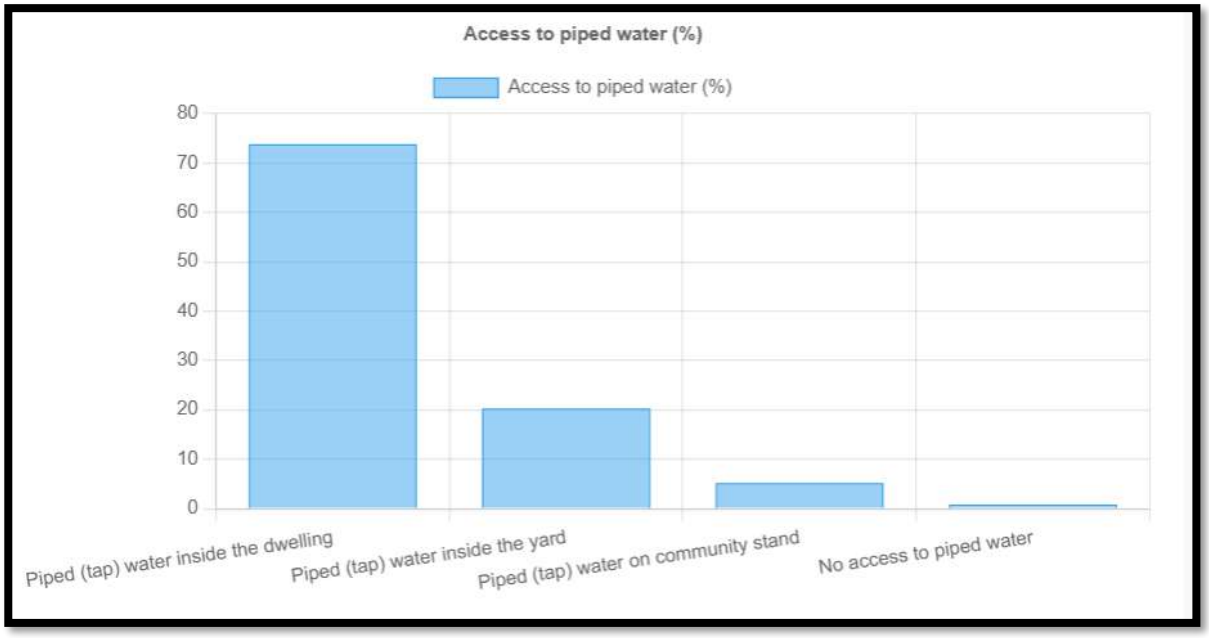


Figure 20: Sources of Water at the Thabazimbi Municipality (Source: Stats SA 2022 Census)

10 Description of the Environmental land uses

(Show all environmental and current land use features)

The applicant seeks to begin mining rights for the region to a suitable standard so that the property can be reserved for other socioeconomic development activities in the area after mining. The proposed area's surroundings include a variety of land uses.

10.1 Natural Vegetation and Mountainous Terrain (Dominant Land Use)

The polygon's western and southern regions are mostly made up of unaltered natural vegetation covering rocky, steep terrain. These regions display:

Ridgelines and rocky hills. Bushveld or dense natural shrubland vegetation. Very little infrastructure is apparent. Absence of cultivation or constructed habitats. This indicates land that is mostly utilized for grazing, conservation, or left as open space.

10.2 Extensive Bushveld / Natural Grassland Areas

Large areas of semi-arid bushveld and grassland can be seen in the center and northern regions; these areas are probably used for:

Considering the natural vegetation cover, extensive livestock grazing. Low intensity rural land uses Potential game farming, which is prevalent in the area. Irrigated or intensive agricultural agriculture is not evident.

10.3 Scattered Agricultural Plots Adjacent to the Polygon (Sparse Within)

There are visible agricultural fields beyond the polygon, especially in the northeast, but there is very little agricultural activity inside the perimeter. There is no extensive farming in the interior land, which is primarily still wild.

10.4 Transport Infrastructure (Bordering the Polygon)

The polygon's eastern edge is traversed by the R510 national route. The road affects accessibility and possible growth demands even if it is not inside the polygon. Inside the polygon, there are no visible internal road networks or constructed infrastructure.

10.5 Rural Settlement Influence (Outside Polygon)

Small-scale habitation and separated property parcels are located to the northeast of the polygon, but they do not extend into the polygon itself. There aren't many homes or town groups visible inside the polygon. The MR area's land cover and land usage are shown in Figure 21.

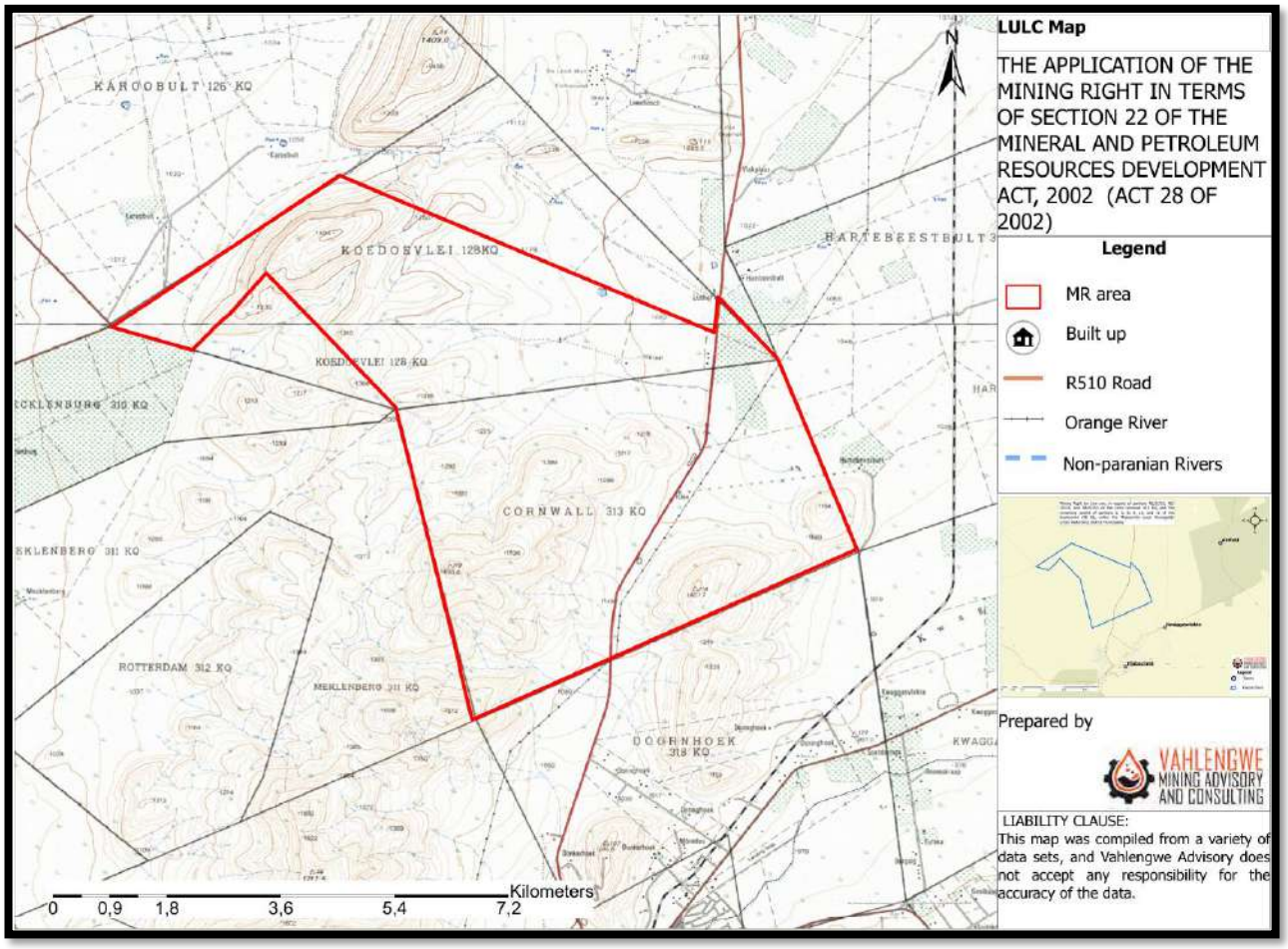


Figure 21: Land Use and Land Cover map shows the terrain features on the proposed MR landscape

11 Description of specific environmental features and infrastructure on the site.

The western and southern regions of the site are characterized by rough hilly terrain, which gives way to gently rolling bushveld plains in the center and north. Rocky outcrops, steep slopes, and shallow valley depressions are examples of natural landforms that define the environment generally and have an impact on flora and drainage patterns. The geography helps create a habitat that is visually natural and mostly unaltered.

Natural bushveld makes up the majority of the site's vegetation, with sections of open grassland in flatter regions, mixed shrubland, and sporadic woods. In addition to supporting ecological diversity, these environments offer livestock and wildlife the opportunity to graze. There are runoff channels and seasonal drainage lines, but there are no significant rivers or man-made water systems inside the boundaries, suggesting a mostly undamaged natural hydrological system.

The polygon has no official infrastructure, and there is little evidence of human interference. There are no obvious development sites, buildings, power lines, or internal roads visible. Small rural communities are located outside the site to the northeast, and the R510 road that runs along the eastern boundary is the only significant infrastructure in the area. In general, the region is still mostly undeveloped and natural.

12 A Impacts and risks identified, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which these impacts.

Table 9: During the site establishment phase, the following project activities will take place on site:

Project Phase	Associated Activities	Potential Impacts
Construction Phase	Site clearance (for infrastructure);	Visual Air Quality/Dust Noise Topography Vegetation Animal Life Land use and soil capability Surface water Quality Groundwater Quality Socio-economic
	Establishment of infrastructure (temporary site offices and portable ablution facilities).	
	Removal of surface vegetation clearance.	
Operational Phase (Extraction of the mining)	To access the mine for the valuable material.	
	Surface mining within the project area	
	Mine Waste Management (handling overburden and other waste materials).	

	Excavation, Monitoring, and Reporting.	Health and safety
Decommissioning and final rehabilitation	Final rehabilitation of the overall area.	

Significant positive, negative, and cumulative effects on the environment are linked to different stages of mining-related activities, including site establishment, mining operation, and concurrent restoration. The following discusses the possible effects for each environmental characteristic or aspect:

- **Visual**

Visual disturbance due to the material stockpile and movement of vehicles and equipment.

Visual Impact		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighbouring, Local, Regional, International)	Neighbouring	Neighbouring
Duration (Short term, Medium term, Long term, Permanent)	Long term	Parmant
Magnitude (Major, Moderate, Minor)	Major	Minor
Probability (Definite, Probable, Likely, Unlikely)	Definite	Definite
Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Implementation of the operating time schedule management measures. • Rehabilitation and restoration • Reforestation and afforestation • Maintenance and upkeep		

- **Dust**

Dust may be generated during the operational process on-site.

AIR QUALITY/DUST IMPACT		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighbouring, Local, Regional, International)	Neighbouring	Region
Duration (Short term, Medium term, Long term, Permanent)	Long-term	Short-term
Magnitude (Major, Moderate, Minor)	Major	Minor
Probability (Definite, Probable, Likely, Unlikely)	Definite	Likely
Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Emission Controls: Use of low-sulfur fuels, catalytic converters on vehicles, and improved blasting techniques. • Dust control measures: apply dust suppression should be implemented to reduce the impact of dust generation during the construction phase.		

- **Topography**

The removal of the Fe Ore material will result in a disturbance of the original topography of the area.

GRADIENT IMPACT		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighboring, Local, Regional, International)	Site	Site
Duration (Short term, Medium term, Long term, Permanent)	Permanent	Long-term
Magnitude (Major, Moderate, Minor)	Major	Moderate +
Probability (Definite, Probable, Likely, Unlikely)	Definite	Probable

Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Operation sites must be robustly constructed nor built to control the movement of personnel and vehicles, especially activities in steep slope should be stable to prevent risks. • Reforestation erosion control measures, such as the runoff berms, must be implemented to reduce flow velocity should be implemented around the operation areas.		

• **Heritage Resources**

IMPACTS ON HERITAGE RESOURCES		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighboring, Local, Regional, International)	Site	Site
Duration (Short term, Medium term, Long term, Permanent)	Permanent	Permanent
Magnitude (Major, Moderate, Minor)	Moderate +	Moderate +
Probability (Definite, Probable, Likely, Unlikely)	Likely	Likely
Significance Rating (Negligible, Low, Moderate, High)	Low	Low
Reversibility: (Reversible or Irreversible)	No	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • The company must survey the area before the activity starts. • Relevant authorities will be notified should the heritage resources be discovered. • Area must be clearly demarcated to control the movement of personnel.		

The screening tool report, heritage is categorised under Low sensitivity, indicating a high chance of absence graves. The Phase I Cultural-Heritage Impact Assessment study for the proposed mining right application did not reveal any significant archaeological material within the footprint of the proposed development. The study noted that the area proposed for development has been heavily disturbed by previous land use activities. The study also noted that buildings and structures do exist within the study

area, the structures were noted to be younger than sixty years. The study therefore does not trigger Section 34 of the NHRA Act of 1999. The study identified two burial sites TBS01 and TBS02 on the GPS coordinates 24°30'56.81"S, 27°24'37.58"E and 24°32'6.40"S, 27°23'39.40"E. The study therefore triggers Section 36 of the NHRA Act of 1999. It is also important to note that the possibility of chance finds is ever present and during the mining phase the developer is urged to be careful and heedful of that.

Recommendations

Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of this heritage report, there are no significant cultural heritage resources barriers to the proposed development project. The Heritage Impact Assessment identified two burial sites, TBS01 and TBS02. These sites will be treated as no-go areas. A minimum 100 m buffer will be maintained around each burial site unless otherwise authorised by SAHRA/LHRA. No mining, blasting, haul roads, pipelines, stockpiles or infrastructure may enter these buffer zones without the required heritage approval and consultation with affected families or communities.

Noise

Noise may be generated from the operation.

NOISE IMPACTS		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighboring, Local, Regional, International)	Site	Site
Duration (Short term, Medium term, Long term, Permanent)	Short term	Short term
Magnitude (Major, Moderate, Minor)	Major	Minor
Probability (Definite, Probable, Likely, Unlikely)	Definite	Likely
Significance Rating (Negligible, Low, Moderate, High)	High	Negligible
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Schedule restrictions: Limit noisy activities during sensitive hours. • Noise monitoring: Regularly monitor noise levels.		

- **Traffic**

Project activities will generate very limited additional traffic. Vehicles and trucks will access the site via existing roads.

TRAFFIC IMPACTS		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negetive	Positive
Extent (Site, Neighbouring, Local, Regional, International)	Site	Site
Duration (Short term, Medium term, Long term, Permanent)	Short term	Short term
Magnitude (Major, Moderate, Minor)	Minor	Minor
Probability (Definite, Probable, Likely, Unlikely)	Likely	Likely
Significance Rating (Negligible, Low, Moderate, High)	Negligible	Negligible
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Implement the traffic control and management measures.		

- **Flora and Fauna**

The removal of the vegetation, which could result in soil erosion and topsoil loss, is made possible by the concomitant site establishment activities to access the MR area. However, since the land is already disturbed, this is not expected to have a major effect.

IMPACTS ON FLORA AND FAUNA		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighboring, Local, Regional, International)	Site	Site
Duration (Short term, medium term, long term, Permanent)	Long term	Medium term
Magnitude (Major, Moderate, Minor)	Major	Moderate

Probability (Definite, Probable, Likely, Unlikely)	Definate	Probable
Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Limit vegetation clearing to minimize habitat destruction. • Develop plans to manage and maintain habitats.		

- **Soils and Land Capability**

The soil and land capability of the area will be disturbed by mining right activities. A change in soil capability will consequently affect the end land use if not properly mitigated. Temporary storage of hazardous products may cause soil pollution through hydrocarbon spillages.

IMPACTS ON SOILS AND LAND CAPABILITY		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Negative
Extent (Site, Neighbouring, Local, Regional, International)	Site	Site
Duration (Short term, Medium term, Long term, Permanent)	Long term	Long term
Magnitude (Major, Moderate, Minor)	Major	Moderate +
Probability (Definite, Probable, Likely, Unlikely)	Likely	Likely
Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Proper management and clean-up of the hydrocarbon spills to minimize soil contamination. • Implementation of proper management measures when removing the general waste to ensure that the soil quality is sustained for other alternative land uses. • Run on/run-off control by implementing measures to prevent stormwater contamination.		

Since the area is currently acceptable for all socioeconomic land uses, mining activity will alter the stability of the soil. Therefore, as the project aims to clean and rehabilitate the region to a state that will be suitable for the other land uses, the planned activity has a possible beneficial impact on the land uses and land capacity.

- **Surface and Groundwater resources**

The mining operations may not lessen the present effect on the water resource because there is a water resource nearby the project area.

IMPACTS ON SURFACE WATER RESOURCES		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighbouring, Local, Regional, International)	Regional	Regional
Duration (Short term, Medium term, Long term, Permanent)	Long term	Permanent
Magnitude (Major, Moderate, Minor)	Major	Moderate
Probability (Definite, Probable, Likely, Unlikely)	Definite	Probable
Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Implementation of hydrocarbons spillage management and clean-up to minimize soil contamination that could also lead to surface water pollution. • Implementation of temporary erosion control measures, such as the runoff berms, to reduce flow velocity. • Clearance of vegetation must be limited as far as possible.		

- **GROUNDWATER RESOURCES**

During wet seasons, seepage from mining operations contaminates groundwater, and the spread of hydrocarbons will be tracked and stopped. To restore the stability and restoration of the land, rehabilitation operations will be taken into consideration. In post-mining operations, it is anticipated that the general groundwater quality will stay pure.

IMPACTS ON GROUNDWATER RESOURCES		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Negative

Extent (Site, Neighboring, Local, Regional, International)	Regional	Regional
Duration (Short term, Medium term, Long term, Permanent)	Long term	Permanent
Magnitude (Major, Moderate, Minor)	Major	Moderate +
Probability (Definite, Probable, Likely, Unlikely)	Definite	Probable
Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	

Mitigation Measures:

- Groundwater monitoring should be implemented throughout the lifecycle of the project to track water levels and quality.
- Monitoring data should be analysed regularly by a qualified hydrogeologist to detect any emerging risks early.
- Boreholes drilled should be monitored to monitor groundwater conditions. These can serve as scavenger wells, if necessary, to prevent contaminant plume migration.
- If scavenger wells are activated, new monitoring boreholes should be drilled 30 meters downstream using the same design specifications.
- General waste management practices must ensure segregation, secure storage, and proper disposal of general, scrap, and hazardous waste. Disposal must be conducted at appropriately licensed facilities with disposal certificates retained.
- 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.
- Rehabilitation must be ongoing and progressive, with all disturbed areas reshaped, topsoiled, and seeded to restore ecological.
- Protection of natural surface water systems is essential. No discharge or seepage of contaminated water should enter these systems.
- Re-use of abstracted water from scavenger wells is encouraged, aligning with the waste management hierarchy and reducing reliance on external water resources.

- **SOCIO-ECONOMIC IMPACTS**

Although it would be limited in scope and duration, this project activity would have a favorable impact on employment as well as the socioeconomic regime. Opportunities for employment will be found both directly within a project and indirectly through the purchase of local products and services. Therefore, the possible job opportunities will enhance livelihoods and reduce poverty in the residing community.

SOCIO-ECONOMIC IMPACTS		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Positive	Positive
Extent (Site, neighbouring, Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term, Permanent)	Long term	Long term
Magnitude (Major, Moderate, Minor)	Moderate +	Moderate +
Probability (Definite, Probable, Likely, Unlikely)	Probable	Probable
Significance Rating (Negligible, Low, Moderate, High)	Medium	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • The creation of employment, business opportunities and training. • Skills transfer and enhancement to workers. • Improved economic development.		

Additionally, the project has detrimental socioeconomic effects on the host town, as there may be a surge of individuals coming to the project site in search of work. The community might have high expectations for the project's ability to create jobs, and if those expectations are not fulfilled. Conflict amongst members of the host community and employees from outside the host community may result from this.

- **Safety**

The proposed project will have safety and security benefits for the adjacent communities from the mining area.

SAFETY IMPACTS

	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighboring, Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term, Permanent)	Long term	Short term
Magnitude (Major, Moderate, Minor)	Minor	Moderate
Probability (Definite, Probable, Likely, Unlikely)	Likely	Probable
Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Mitigation Measures: • Institutionalize Safety Protocols • Community and Stakeholder Engagement • Design for Safety • Policy and Regulatory Support • Emergency Preparedness		

- **Health**

The proposed project is linked to the production of dust that comprises toxic compounds and fine particulate matter, which could cause respiratory illnesses in the workers. Mining operations may have a detrimental effect on the nearby towns, particularly during wind seasons.

IMPACTS ON HEALTH		
	Impact rating without mitigation	**Impact rating with mitigation**
Impact Status: (positive or negative)	Negative	Positive
Extent (Site, Neighboring, Local, Regional, International)	Regional	Regional
Duration (Short term, Medium term, Long term, Permanent)	Long term	Short term
Magnitude (Major, Moderate, Minor)	Minor	Moderate
Probability (Definite, Probable, Likely, Unlikely)	Definite	Probable

Significance Rating (Negligible, Low, Moderate, High)	High	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Impact Status: (positive or negative)	Negative	
Mitigation Measures: • Provision of appropriate PPE for workers to prevent and minimize impacts on their health. • Dust suppression techniques should be used to limit the amount of dust created. • Implementation of dust fallout monitoring. • Make provision of the complaints register at an accessible point on site for the community. • Regular medical check-ups for workers.		

14 Rehabilitation and Closure Phase

The last phase of the mine's lifecycle is the rehabilitation of mining operations to extract the suggested ore minerals. This stage is crucial for guaranteeing the site's safe closure, mitigating the effects on the environment, and rehabilitating the mined area for potential future economic use. Fuel and lubricants are examples of hazardous items that are securely removed and disposed of in compliance with environmental rules.

Land rehabilitation is an essential part of this stage. The topsoil that was often stockpiled during the initial site preparation is restored, and the landscape is recontoured to its natural or predetermined topography. To avoid erosion and restore ecological function, natural vegetation is reintroduced, especially native grasses and shrubs. Sometimes the land is stabilized by the installation of erosion control devices like gabions or silt barriers.

To make sure the site stays stable and doesn't endanger other ecosystems, environmental monitoring should continue both during and after closure. This include evaluating the effectiveness of vegetation regrowth, monitoring the water quality in adjacent streams or aquifers, and examining the air quality for any remaining dust. These initiatives aid in ensuring the sustainability of rehabilitation strategies.

Another crucial step in the closure process is stakeholder engagement. The Department of Mineral and Petroleum Resources (DMPR) must receive comprehensive closure reports from mining companies attesting to their adherence to the authorized EMPr. To discuss rehabilitation results and resolve community concerns, public discussions will be held. Companies must also demonstrate that they have the funds necessary to pay for closure expenses and any ongoing care needs.

The DMPR may certify the site as closed if all requirements have been met. If all environmental and social obligations have been fulfilled, the mining right holder may subsequently request a closure certificate and be released from future liability. This last stage completes the mining operation's responsible lifetime by guaranteeing that the land may be safely repurposed or returned to nature.

15 Methodology used in determining and ranking the nature, significance, consequences, extent, duration, and probability of potential environmental impacts and risks:

(Describe how the significance, probability, and duration of the aforesaid identified impacts were identified through the consultation process was used to decide the extent to which the initial site layout needs revision).

Criteria to Consider when Determining the Severity of Impacts:

The ranking of impacts/determination of significance is estimated using two criteria, namely Consequence and Probability. These are considered the contributing factors/criteria listed in the legislation. The definitions of each are provided below.

Significance of the impact is an indication of the importance of the impact in terms of both the physical extent and the time scale. It indicates the level of mitigation required. The significance of an impact resulting from an aspect is expressed as a combination of the following:

- **Nature of impact:** An indication of the extent of the damage (negative impacts) or benefit (positive impacts) the impact inflicts on natural, cultural, and/or social functions (environment).
- **Extent of impact:** A spatial indication of the area impacted (i.e., how far from activity the impact is realised).
- **Duration of impact:** A temporal indication of the how long the effects of the impact will persist, assuming the activity creating the impact ceases. For example, the impact of noise is short lived (impact ceases when activity ceases) whereas the impact of removing topsoil exists for a much longer period.
- **Magnitude/Severity** of an impact determines to what extent will the environment be destroyed or is functions be altered by the activity.

Table 10: Environmental impact assessment criteria

Extent of Impact:		
Site	The impacted area will only extend as far as the activity being conducted, e.g., the activity footprint.	1
Neighbouring	Impact occurs within a 5km radius of the site.	2
Local	Impact occurs within a 20km radius of the site.	3
Regional	Impact occurs within a 100km radius of the site.	4
National	Impact occurs within South Africa.	5
Duration of Impact:		

Short-term	The impact will either disappear with mitigation or will be mitigated through the natural processes in shorter time span.	2
Medium-term	The impact will last up to the end of the project phases, where after it will be negated. The impact will cease within 5 years if the activity is stopped.	3
Long-term	The impact will last for the entire operational phase and after the operational life of the operation but will be mitigated by direct human action or by natural processes thereafter.	4
Permanent	Intervention will not occur in such a way or in such a time span. that the impact can be considered transient.	5
Probability of the Occurrence of the impact:		
Unlikely	The possibility of the impact materializing is exceptionally low either. because of design or historic experience.	1
Likely	The possibility of the impact materializing will occur to the extent that provision must be made thereof.	2
Probable	There is a distinct possibility that the impact will occur.	4
Definite	The impact will occur regardless of any prevention measures.	5
Magnitude of the impacts:		
Minor	The impact alters the affected environment in such a way that the natural processes are not affected.	2
Moderate	The affected environment is altered; however, the functions and processes continue in a modified way.	6
Major	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.	8
Significance of the impact: Sum (Duration, Extent, Magnitude) x Probability		
Negligible	The impact is non-existent or unsubstantial, is of no or little importance to any stakeholder, and can be ignored.	< 20
Low	The impact is limited in extent, with low to medium intensity, and whatever the probability of the occurrence may be, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.	< 40
Moderate	The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.	< 60
High	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation	> 60

The proposed mining rights operations will take place for thirty years and have negligible effects. The likelihood of the effects will be ascertained, the majority of these actions may be managed, and the effects can be lessened or prevented. By looking at other similar activities, the likelihood was ascertained. The project activities' layout does not need to be changed because the adverse impacts of planned activities can be managed, prevented, or reduced. Project operations during the operating phase differ from those during the building phase in terms of their goals and activities, as well as their effects on environmental characteristics. During the phase of rehabilitation, the following tasks must be completed on-site:

- Mined-out portions are stabilized to stop erosion and recontoured to resemble the natural terrain as part of progressive rehabilitation.
- Next comes topsoil replacement, which uses previously placed dirt to encourage the growth of new vegetation. To support biodiversity as well as ecological resilience, native plant species, especially those appropriate for the region's grassland biome, are restored.
- To control surface water runoff and stop sedimentation in adjacent water bodies, drainage systems are put in place or renovated. When haul roads, stockpiles, and temporary facilities are no longer required, they are demolished, and the land is restored.
- Any contaminated sites are cleaned up in accordance with environmental regulations, and waste items are either removed or handled.
- In order to remove risks, lessen aesthetic impact, and get the site ready for restoration or future use in accordance with environmental rules, abandoned infrastructure must be dismantled and safely disposed of during the rehabilitation phase.
- In order to make sure that restoration objectives are fulfilled over time, monitoring programs are started to assess vegetation progress, water quality, as well as soil stability.

The rates of how mining affects the environment in the absence of appropriate mitigation are determined in Table 8. The impact without mitigations is shown by the highest ratings, while the extent of the different mining rights operations is shown by the lower ratings.

Table 11: Impacts and risks identified

Environmental Aspects	Potential Impacts	Rating Before Mitigation				Significance (Pre-mitigation)	Management and mitigation measures	Rating after mitigation				Significance (Post-mitigation)
		E	I	D	P			E	I	D	P	
Soils and Land Capability	-Soil contamination due to the hydrocarbons -Soil compaction due to the operating equipment. -Degraded land due.	1	4	3	4	32	-Bioremediation of contaminated soil. -Remediated sites and re-establishment of species of ecological importance.	1	3	2	3	18
Topography	-The alteration of the topography from its natural state by mining right activities.	1	4	3	4	32	-Improved land capability for other uses. -Improved soil properties and the potential for the host communities to benefit from shared land management responsibilities	1	3	3	3	21

Vegetation	-Loss of biodiversity -Loss of Habitat Alien species invasion	1	3	3	4	28	-Removal of vegetation must be undertaken in a phased approach to limit the number of plain areas at a time. -Implementing the alien invasive vegetation management plan.	1	1	3	3	15
Animal life	-Loss of animal life and disruption to animal activities. -Loss of habitat -Animal migration	2	2	3	4	28	-Re-establishment of new migration corridors and access to nesting and refuge areas. -Replaced animal habitat.	1	2	3	3	18
Surface Water	Contaminating local surface water resources	3	4	3	4	40	-To apply plumes to protect against water pollution	3	1	3	3	21

							-Restored natural surface water drainage.					
Ground water	Groundwater contamination due to toxic elements from possible seepage of hydrocarbons from the operation.	4	4	4	2	24	Improved groundwater quality post the decommission operations, as the source of contamination will be removed	1	1	3	2	10
Air Quality/ Dust	Dust generation by vehicle movement during the operational phase.	4	2	2	4	32	No further generation of dust post the decommissioning activities	4	2	2	1	8
Noise	Noise nuisance will be created by vehicle movement and during the excavation, loading, and haulage of materials	2	3	3	4	32	-No further noise generation post the decommissioning activities	2	2	2	3	15
Cultural Heritage	Impacts on cultural and heritage resources, if any exist.	1	1	1	1	3	Not applicable	1	1	1	1	3
Visual	-The operation activities may change the visual	1	2	3	2	12	Improved environmental aesthetic after	1	2	2	2	8

	character of the property through mining right activities. -There will be a visual nuisance of the operating equipment and vehicles.						rehabilitating the mined land.					
Socio-economic	-Influx of job seekers. -Over-expectations on job creation, which may lead to violent marches. -Conflict between the host community members and the employed personnel from areas outside the host community.	4	3	2	3	27	The creation of employment and business opportunities and training. -Skills transfer and enhancement to workers. -Improved economic development.	4	1	1	2	12
Safety	-Occupational injuries. -Equipment theft and property vandalism.	2	2	3	3	36	Removal of the safety threats posed by the mining right activities.	1	1	1	3	9

Health	Health impact due to dust inhalation	3	1	2	3	18	Reforestation and Afforestation	1	2	2	3	15
Waste Generation	-Waste nuisance and littering -Generation of hazardous waste due to hydrocarbon storage	1	3	2	3	18	Decommissioning and removal of the waste	1	2	1	2	8
Traffic impacts	-Traffic due to moving vehicles and transportation trucks in and out of the site.	3	3	2	2	16	Erecting road signs within the site.	1	1	2	2	8

16 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.

(Provide a discussion in terms of the advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

The project's possible dangers, crucial management techniques, and control methods have all been brought to light by the effects assessment. It is thought that by carrying out a carefully thought-out and efficient decommissioning as well as rehabilitation of the mined regions, there are chances to significantly improve and increase the existing and ongoing consequences. The following table describes the project's linked positive and negative impacts:

Table 12: Summary of positive and negative impacts of the proposed activity.

Impact	Pre-Mitigation	Operation	Decommission	Post-Decommission	Pre-Mitigation	Operation	Decommission	Post-Decommission
Positive (+)	Medium	-Employment opportunities	-More jobs	-Less jobs	Medium	-Improved health and safety for the locals -Improved topography	-Availability of land use. -Improved groundwater quality. -Improved health safety of the locals. -Improved soil quality.	-Improved soils and land capability -Land reservation for other land uses -Vegetation regeneration - Improved biodiversity and ecological processes -Improvised visibility and environmental beauty -Improved soils and land capability -Improved water quality on surface and groundwater resources -Disturbance to the surface water drainage system

Positive (+)	Low	-Job security and skills development.	-Job opportunities and skills development. -Improved soils and land capability. -Land reservation for other land uses.		Low	-Improvised visibility and environmental beauty. -Improved soils and land capability. -Employment opportunities and socio-economic empowerment	-Improved surface water drainage and water quality. -Improved health and safety.	
Negative (-)	Medium	-Visual nuisance to moving equipment and vehicles.	-Visual nuisance to moving equipment and vehicles.	-Job insecurities	Low		-Alien vegetation species invasion. -Soil erosion.	-Habitat disturbance. -Vegetation disturbances due to vegetation.

16.1 Motivation where no alternative sites were considered.

Since the suggested location specifically satisfies all operational, environmental, as well as logistical requirements, no other site was taken into consideration for this project. The location is located in an area set aside for such development and has the particular geological resources required for the approved activity. Its decision is further supported by the fact that it is close to existing infrastructure and requires little further land modification. There is no workable substitute that provides the same degree of appropriateness, effectiveness, and adherence to planning frameworks in light of these factors.

17 Statement motivating the alternative development location within the overall site.

(Provide a statement motivating the final site layout that is proposed)

Land use compatibility, operational efficiency, and environmental sensitivity were taken into consideration when choosing the site layout. The planned construction footprint minimizes environmental impact because it is located inside environmentally sensitive areas, such as seasonal drainage lines and patches of native flora. Additionally, it minimizes the need for significant new construction and related disruptions by integrating with current infrastructure, such as utility connections and access roads. The site maintains secure distances from residential areas and historical sites while providing ideal topographical characteristics for drainage and stability. The intended activities are shown in this arrangement, which also guarantees EMPr compliance, facilitates cost-effective execution, and encourages sustainable land usage within the larger site context.

Ore mineral extraction will be done in stages due to the size of the Mining Right (MR) region. The goal of this stepwise strategy is to respect the broader environmental and social sensitivities of an area, accommodate nearby farmsteads, and diligently regulate current activities. Mining can proceed while causing the least amount of disturbance, permitting agricultural use to continue when feasible, and guaranteeing that relocation, compensation, and rehabilitation measures are carried out in a methodical and responsible way by sequencing activities.

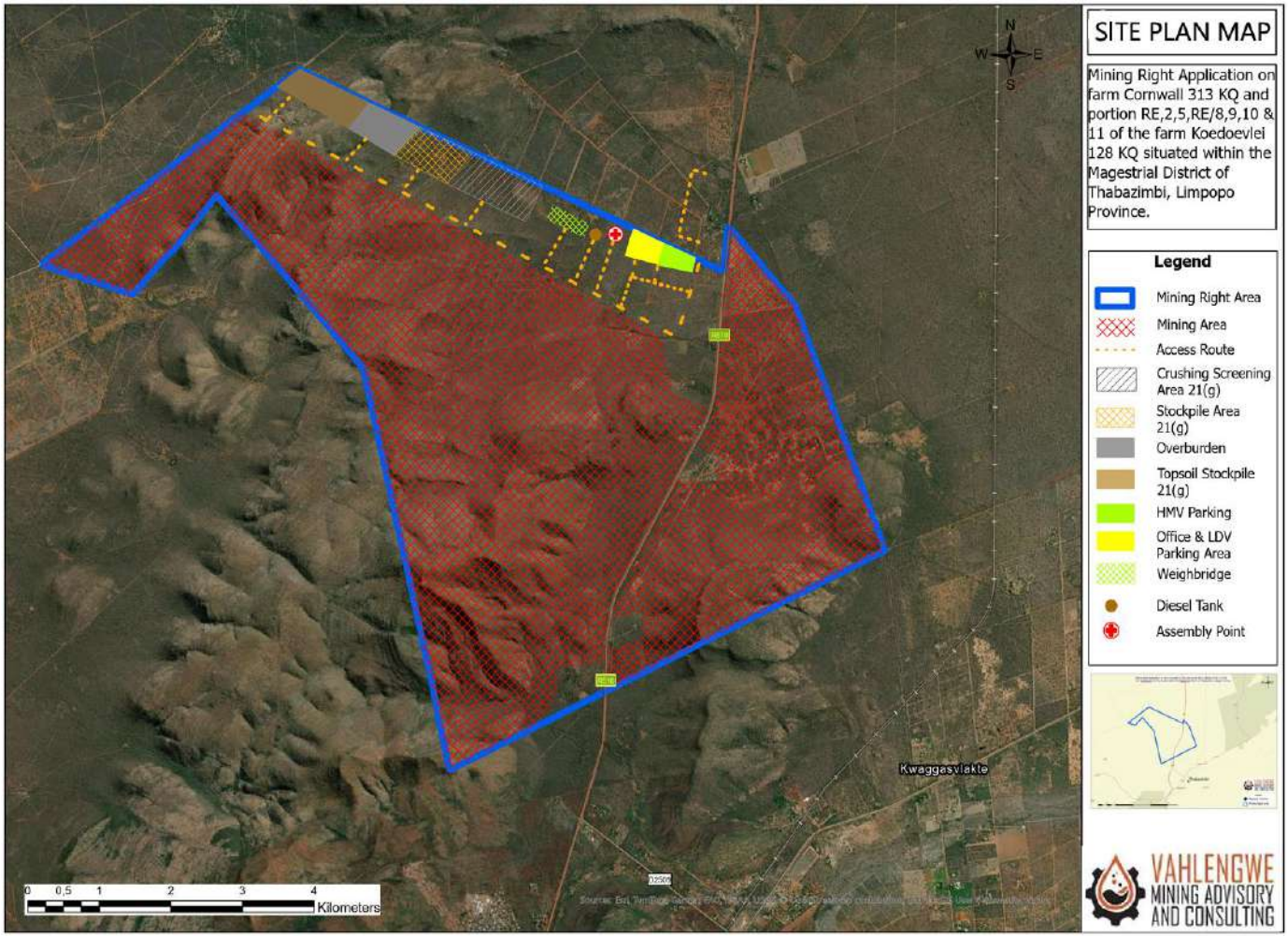


Figure 22: Site plan showing the proposed equipment and facilities on-site

18 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. (Including (i) a description of all environmental issues and risks that are identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures).

The draft EIR Phase's goal is to look into the possible environmental effects of the project's actions, both good and bad. To determine how important an impact might be to the receiving environment, the possible effects are measured. The EIR process's goals were to:

- ✓ Make sure the decision-making process takes into account the project's possible biophysical and socioeconomic effects.
- ✓ Make sure that the project's activities don't significantly harm the environment by offering mitigation and management strategies that will prevent or lessen those effects.

- ✓ Ensure that I&APs are informed about the planned project and the public involvement process.
- ✓ Make sure I&APs have a chance to voice their concerns, and offer a procedure that will help authorities make an educated choice, particularly with regard to their duty to consider social and environmental factors.

The proposed project's overall impact on the activities to be carried out was evaluated using the EIR procedure. In order to make a wise decision about the consideration and execution of the mitigation measures of the impacts caused by the planned activity, an assessment was carried out to ascertain the sensitivity of the proposed region. Two criteria—consequence and significance—were used to rank the risks. Impacts were rated as a potential risk, an uncertain risk, or a significant risk based on the significance criterion.

Table 13: Significant Risks Rating System

Rating	Significant Risks	Description
3	Potential	• The extent is national to international, • The duration is long term to permanent, • The magnitude will be high and above the acceptable standard, • Requires extensive intervention to mitigate the impacts.
2	Uncertain	• The extent is local to regional, • The duration is medium to long term, • The magnitude is above the acceptable standard, and • The environmental impacts are uncertain and may require some interventions to limit the impacts in future.
1	Insignificant	• The extent is site specific, • The duration is temporary, • The magnitude is within the acceptable standard, and • The environmental is ecologically and physically stable and no further interventions will be required in future.

Given the nature of the expected project life, the chance of recurrence has been categorized within the context of appropriate time periods and frequency. The likelihood and severity levels for the many repercussions that make up the risk rating determination are listed in the following table:

Table 14: Severity of the consequence rating system

Rating	Severity	Description
5	Critical	• Risks significantly exceed the risk acceptance threshold and necessitate comprehensive control measures as well as additional urgent and immediate attention to the identification and implementation of risk-reduction measures.
4	Major	• Risks that likely to exceed the risk acceptance threshold, and while proactive control measures have been planned or implemented, a very close monitoring regime and additional actions to reduce risk are required.
3	Significance	• Risks that are effectively positioned on the risk acceptance threshold, these risks are likely to necessitate active monitoring.
2	Moderate	• Risks with relatively low likelihood and low to mid-level consequence scenarios.
1	Minor	• Risks unlikely to rare events with minor consequences and in essence, relate to situations around very low probabilities of relatively minor impacts occurring.

Table 15: Likelihood of the consequence rating system

Rating	Likelihood	Definitions
5	Almost certain	The event is expected to occur in most circumstances (The event is likely to occur once per year).
4	Likely	The event will probably occur in most circumstances (The event is likely to occur once every 1 – 2 years).
3	Possible	The event might occur at some time (The event is likely to occur once every 2 – 5 years).
2	Unlikely	The event could occur at some time (The event is likely to occur once every 5 – 10 years).

1	Rare	The event may occur only in exceptional circumstances (The event is unlikely to occur in any 10-year period).

Risks were therefore classified in different ratings in terms of the severity of consequence and the likelihood of consequence as described below.

Table 16: Description of risk classifications

Risk rating	Description
Extreme	These are unacceptable risks that are primarily critical in nature in terms of the extent and long-term environmental harm, permanent sacred site damage, fatality, and massive economic impacts that are effectively regarded as a possibility to almost certain to occur.
High	Typically refer to significant to critical consequences, such as significant environmental or heritage damage, as well as significant safety, social, or economic consequences that are likely to cut across the possible to almost portion of likelihood ratings.
Medium	As the classification suggests, medium-level risks encompass a range of risk combinations ranging from relatively low consequence / high likelihood to mid-level consequence / low likelihood scenarios across environmental, social, and economic domains.
Low	These risks are below the risk acceptance threshold, and although they may require additional monitoring in certain cases are not considered to require active management.
Very Low	Impacts risks that are below the risk acceptance threshold and would at the most require additional monitoring and, in many cases, would not require active management.

Risk Analysis Matrix

In order to achieve the project rehabilitation objectives and goals, which are connected to an operation that is socially and environmentally responsible, the risk controls are linked to the degree of risk and the chance for risk reduction. These specifications are included in the standards for impact assessments and regulatory duties. The risk levels for the different consequence and likelihood combinations are summarized in the table below, along with the qualitative risk matrix that was employed.

Likelihood of Consequence	Severity of Consequence				
	Critical (5)	Major (4)	Significant (3)	Moderate (2)	Minor (1)
Almost Certain (5)	Extreme	Extreme	High	High	Medium
Likely (4)	Extreme	High	High	Medium	Medium
Possible (3)	Extreme	High	Medium	Medium	Low
Unlikely (2)	High	Medium	Medium	Low	Very Low
Rare (1)	Medium	Medium	Low	Low	Very Low

Figure 23: Risk Analysis Matrix

The impact assessment focused on the activities of the project since they will have the potential to impact the biophysical and social environment of the proposed area. The impact assessment is furthermore separated into three (3) distinct phases, namely: pre-construction, construction and rehabilitation phase.

Table 17: Mining operation phases for the proposed mining right.

Preconstruction	**Construction**	**Decommissioning**	**Rehabilitation**
Vegetation clearance for the establishment of infrastructure: ➢ Temporary site office ➢ Portable ablution facility ➢ Bunded area for diesel tank storage ➢ Parking bay ➢ Security offices ➢ Construction of roads on site.	Extraction of material: ➢ Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore minerals On-site processing plant minerals Demarcating a waste sorting area. Waste removal and handling from different points within the project sites.	Temporary offices and ablution facilities will be traded in to the manufacturers. Bunded area will be demolished and aggregate will be disposed to a registered landfill site.	➢ Rehabilitation of roads. ➢ Rehabilitation of open pits: ➢ Reprofiling pits. ➢ Topsoil profiling.

Criteria

Very Low= VL
Low= L
Medium= M
High= H
Extreme= E

Table 18: Identified and assessed the impacts and risks the activity will impose on the preferred site

ASPECT	IMPACT	MITIGATION MEASURES	C	L	R
Vegetation	Disturbed site and species of ecological importance.	Rehabilitate the disturbed soil and vegetation in a phased approach.	Pre-mitigation		
	Disturbed vegetation cover.		4	5	E
	Loss of indigenous vegetation and biodiversity.		Post-mitigation		
	Invasion of the alien vegetation species.	Implementation of the alien invasive species management plan.	1	3	L
Animal Life	Disrupted the animal life and activities due to the existence of the mining right activities.	Conduct environmental awareness and training about the animal life to workers and visitors.	Pre-mitigation		
	Disruption of animal life due to the ongoing operations.	Restrictions on the killing of animals on-site.	5	4	E
	Displaced animal habitat.	Cautious implementation of the mining operation waste management measure.	Post-mitigation		
			2	3	M
Soils and Land Capability	Soil erosion, loss of soil nutrients, and changes in soil properties.	Temporary erosion control measures. Implementation of the Bioremediation	Pre-mitigation		
	Soil compaction.	Regular road maintenance.	4	5	E

	Soil contamination due to oil spillages.	Vehicle movement should be restricted to designated areas and access roads.	Post-mitigation		
	Land is incapable because of mining operation.	A cleanup of any hydrocarbon spills.	1	1	L
Surface water	Exposed toxic elements may react with rainwater.	Remedy the effects of alteration to natural drainage lines.	Pre-mitigation		
	•Disrupted natural drainage and runoff.	Implementing the hydrocarbon spillage management plan.	5	5	E
	•Sedimentation and siltation of water courses.	Implement the erosion control measures.	Post-mitigation		
	Degradation of surface water quality.	Management measures and removal of the source of toxic elements.	2	3	M
Groundwater	Degradation of groundwater quality due to contamination by the seepage of toxic elements from the mining operation, like hydrocarbons from the oil spills.	Remediate using commercially available emergency cleanup kits.	Pre-mitigation		
		Regular maintenance and servicing of equipment.	3	4	E
		Management measures and removal of the source of toxic elements	Post-mitigation		
			2	3	M
Noise	•Increase in ambient noise levels during the operational phase;	Limiting the site establishment activities working hours to daylight hours (07h00 to 17h00) and not undertaking such activities at all on Sundays and public holidays.	Pre-mitigation		
		No operation will be undertaken on Sundays (only maintenance) and public holidays.	2	1	VL
		Implement noise monitoring.	Post-mitigation		
		Ensure noise emissions are minimised by regularly servicing all vehicles and placing silencers on their engines.	1	1	VL

Air Quality/Dust	Possible dust generation because of vehicle movements during the operations. Health impacts on animals and people.	Implementation of dust control measures such as dust suppression and dust fall-out monitoring.	Pre-mitigation		
		Enforcing the speed limits to reduce dust created by moving vehicles;	3	4	H
			Post-mitigation		
			2	1	L
Visual	Visual disturbance due to site operations.	Use of barricade fence covers where possible to minimise the visual impact.	Pre-mitigation		
	Dust generation.	Implementation of the dust management measures.	5	3	H
	Disrupted environmental aesthetic due to the presence of the mining operation.		Post-mitigation		
			3	2	M
Socio-economic	Employment opportunities.	Establish targets for employment and training. development initiatives. Effective implementation of training and skills	Pre-mitigation		
	Knowledge and skills transfer Empowerment of the local businesses.	Prioritizing the sourcing of available skills from the host community.	3	3	M
			Post-mitigation		
			1	1	VL
		Transparency with the community members about the availability of employment opportunities. Community engagement.			
Cultural and Heritage Resources	There are no known important heritage resources on the site.	Conduct an identification of all possible sites of archaeological value. Reporting of any heritage resources encountered to the relevant authorities.	Pre-mitigation		
			1	1	VL

		Identified sites must be demarcated as no-go areas.	Post-mitigation		
			1	1	VL
Waste	Generation of various types of waste.	Classification and separation of the waste.	Pre-mitigation		
	Environmental pollution, including soil and water resources contamination.	Prohibition of uncontrolled disposal of waste on site.	4	4	H
			Post-mitigation		
			3	3	M
Safety	Occupational Health and Safety injuries.	Ensure that there is controlled access to the site. All project infrastructure should be placed in a secure area. Operational sites must be demarcated.	Pre-mitigation		
		Consult with the local police branch to establish standard operating procedures for the control and/or removal of loiterers.	4	3	H
		Safety signs and barricades must be placed around the operation site.	Post-mitigation		
			2	2	L
Health	The dust potentially contains hazardous substances and particulate matter, which can be inhaled, causing respiratory diseases.	Make available, maintain, and effectively implement a grievance/complaint register.	Pre-mitigation		
		Provision of appropriate personal protective equipment (PPE).	4	4	E
		Placing of safety signs around the operation area.			
		Induction should be conducted for all employees or subcontractors entering the site to ensure awareness of the developed health and safety plan;			
		Daily inspections and observations of on-site activities shall be conducted;	Post-mitigation		

		All incidents to be reported, recorded, investigated, and mitigated.	1	1	VL
		Provided adequate first aid services on site; and			
		Promote ongoing health and safety awareness campaigns.			
Traffic	Addition of traffic to the existing local traffic	Management and maintenance of the sections of existing road surfaces that have been impacted by the vehicle movement.	Pre-mitigation		
	Impacts on the surface quality of the road impacted resulting from vehicle movement	Existing road surfaces must be utilised and maintained within baseline levels.	3	2	M
			Post-mitigation		
			1	1	VL
Topography	Mining activities occur for the extraction of the aggregates may alter the man-made topography to its natural state.	Temporary erosion control measures, such as the runoff berms, must be implemented to reduce flow velocity should be implemented around the operation areas.			

Table 19: Summary of the PPP followed.

Activity	Details
Distribution of the BID and the I&AP registration form	A Background Information Document (BID), including an I&AP registration form, will be distributed to various stakeholders, including the I&APs, via email on 8th of May 2026.
Placing of a newspaper advertisement	A newspaper advertisement was published in the Citizens on 30th April 2026.
Putting up site notices	Site notices were placed around the site.
Announcement of Draft EIR	An electronic copy could be accessed and downloaded from the www.vahlengweadvisory.co.za website.
Public Participation Meeting	An public meeting consultation with the Interested and Affected parties was conducted on 22nd of May 2026 to discuss the draft Environmental Impact Report.
Announcement of Environmental Impact Report	The draft report will be made available through the Vahlengwe Mining and Advisory Consulting website (www.vahlengweadvisory.co.za).

Table 20: Assessment of the potentially significant impact and risk.

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
-Vegetation clearance to access the mining right activities. -Waste removal from within the project sites.	-Disturbed sites and species of ecological importance. -Disturbed vegetation cover. -Disturbed sites and species of ecological importance. -Loss of indigenous vegetation and biodiversity. -Invasion of the alien vegetation species.	Vegetation (flora)	Operational and decommissioning	Low (-)	-Removal of vegetation in a phased approach. -Implementation of the alien invasive vegetation species management plan.	Medium(+)
	-Disrupted the animal life and activities due to the	Animal life (fauna)	Operational and decommissioning	Medium (-)	-Conduct environmental awareness and training about animal life on site.	Low (+)

	existence of the mining right activities. -Disruption of animal life due to the ongoing operations. -Displaced animal habitat.				-Restrictions on the killing of animals on-site. -Cautious implementation of the waste management measure.	
	-Soil erosion, loss of soil nutrients, and changes in soil properties. -Soil compaction. -Soil contamination due to oil spillages. -Land incapable of other uses due to the existence of the mine material.	Soil and land capability	Operational and decommissioning	Medium (-)	-Temporary erosion control measures. -Vehicle movement should be restricted to designated areas and access roads. -A cleanup of any hydrocarbon spills. -Implementation of the Bioremediation.	Medium (+)

					-Fuel storage areas on concrete and bunded surfaces.	
-Waste handling (Stockpiling, haulage, and transportation).	-Exposed toxic elements may react with rainwater. -Disrupted natural drainage and runoff.	Surface water resources	Operational and Decommissioning	Low (-)	-Implementation of temporary erosion control measures. -Management measures and removal of the source of toxic elements.	Low (+)
	-Increase in ambient noise levels during the project activities.	Noise pollution	Operational and Decommissioning	Negligible	-Limiting the site activities working hours to daylight hours (07h00 to 17h00) and not undertaking such activities at all on Sundays and public holidays.	Negligible

					-No operation will be performed on Sundays (only maintenance) and public holidays. -Implement noise monitoring. -Ensure noise emissions are minimised by regularly servicing all vehicles and placing silencers on their engines.	
-Material will be taken on-site and transported to the processing plant site for the crushing and screening process.	-Mining operation will alter the topography from its own natural state.	Topography	Operational and Decommissioning	Low (-)	-Temporary erosion control measures, such as the runoff berms, must be implemented to reduce flow velocity around the operation areas.	Negligible

					-Conducting concurrent rehabilitation in all disturbed areas.	
	Possible dust generation in some areas during the operational phase -Detrimental effects on plants. -Health impacts on animals and people.	Air Quality/Dust generation	Operational and Decommissioning	Negligible	-Implementation of dust control measures such as dust suppression and dust fall-out monitoring. -Enforcing the speed limits to reduce dust created by moving vehicles	Negligible
	-Visual disturbance due to site operations. -Dust generation. -Disrupted environmental aesthetic due to the presence of the mining operation.	Visual and Environmental Aesthetics	Operational and Decommissioning	Medium (-)	-Use of barricade fence covers where possible to minimise the visual impact. -Implementation of the dust management measures	Medium (+)

					-Removal of the hazardous waste material.	
	-Degradation of groundwater quality due to contamination by the seepage of toxic elements from the mining operation and hydrocarbons from the oil spills.	Groundwater quality	Operational and Decommissioning	Low (-)	-Remediate using commercially available emergency cleanup kits. -Regular maintenance and servicing of equipment. -Management measures and removal of the source of toxic elements.	Low (+)
	-Sedimentation and siltation of water courses -Alteration of natural drainage patterns -Contamination of water resources	Surface water quality	Operational and Decommissioning	Low (-)	-Remedy the possible effects of alteration to natural drainage lines. -Implementing the hydrocarbon spillage management plan,	Low (+)

	-Degradation of surface water quality				-Implement the erosion control measures. -Management measures and removal of the source of toxic elements.	
	-Occupational safety and health for injuries	Safety	Operational and Decommissioning	Low (-)	-Ensure that there is controlled access to the site. -Consult with the local police branch to establish standard operating procedures for the control. -Safety signs and barricades must be placed around the operation site.	Low (+)

					-All project infrastructure should be placed in a secure area. -Operational sites must be demarcated.	
-Waste handling (transportation and stockpiling).	-The dust potentially contains hazardous substances and particulate matter, which can be inhaled, causing respiratory diseases.	Health	Operational and Decommissioning	Low (-)	-Removal of vegetation in a phased approach. -Make available, maintain, and effectively implement a grievance/complaint register. -Provision of appropriate personal protective equipment (PPE). -Placing of safety signs around the operation area.	Low (+)

					-Induction should be conducted for all employees or subcontractors entering the site to ensure awareness of the developed health and safety plan. -Daily inspections and observations of on-site activities shall be conducted. -All incidents to be reported, recorded, investigated, and mitigated. -Safety signs to be provided in areas	

					considered as high-risk areas. -Provided adequate first aid services on site; and -Promote ongoing health and safety awareness campaigns.	
	-Employment opportunities. -Knowledge and skills transfer. -Empowerment of the local businesses.	Socio-economic	Operational, and Decommissioning	Low (+)	-Establish targets for employment and training. -Effective implementation of training and skills development initiatives. -Prioritizing the sourcing of available skills from the host community.	Negligible +

					-Transparency with the community members about the availability of employment opportunities. Community engagement. -Ensure that goods and services are procured from within the local area as far as possible.	
-Waste handling, Decommissioning and rehabilitating the infrastructure overall area.	-Degradation of culturally significant heritage resources.	Heritage resources	Operational and Decommissioning	Negligible	-Conduct an identification of all possible sites of archaeological value. -Identified sites must be clearly demarcated as no-go areas.	Negligible

	- Addition of traffic to the existing local traffic. -Impacts on the surface quality of the road impacted resulting from vehicle movement	Traffic	Operational and Decommissioning	Negligible	-Vehicles and trucks will access the site via existing roads. -Existing road surfaces must be utilised and maintained within baseline levels.	Negligible
	-Soil contamination -Contamination of water resources -Impacts on human health	Waste generation	Operational, and Decommissioning	Negligible	-Promoting the reduction, re-use, or recycle of waste where prevention is not possible; -Disposal of waste to local waste disposal sites; -Littering should be strictly prohibited; and	Negligible

					-Implement a waste classification and separation system.	

19 Assessment of each identified potentially significant impact and risk

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties.)

The Department of Forestry, Fisheries, and the Environment (DFFE) accessible via the internet Environmental Screening Tool produced a Screening Report for an Environmental Authorization (Appendix). The environmental sensitivities at the location where the planned activities are to be carried out were summarized as follows. As a result, all related activities, including decommissioning and rehabilitation, were carried out in a location free of sensitivities.

Table 21: Environmental Sensitivity of the proposed area

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

Screening tool has been developed to illustrate the sensitivity of ecosystem diversity of the proposed area. This aids to determine the specialist studies based on very high sensitivity and high sensitivity because they depend on the type of critical biodiversity category.

19.1 Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr; Based on the assessment and, where applicable, the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development of inclusion in the Environmental Management Programme EMPr, as well as for inclusion as conditions of Authorisation.

The EMPr aims to identify, mitigate, and manage all environmental impacts and damage related to mining operations in a way that supports sustainability, legal compliance, and community well-being. The following impact management goals and results are suggested for inclusion in the EMPr and as requirements for authorization based on the environmental assessment and expert recommendations:

- **Reduce land degradation and encourage rehabilitation:** To restore ecological natural function and land capability, make sure disturbed areas are gradually restored by recontouring, topsoil replacement, and revegetation with native species.

- **Preserve biodiversity and sensitive habitats:** Establish buffer zones and monitoring programs to protect ecological integrity, and refrain from disturbing regions with endangered flora and animals, especially Egoli Granite Grassland patches.
- **Control the quality of surface and groundwater** by preventing pollution through appropriate waste management, erosion control, and stormwater management systems. Regular water quality monitoring is necessary to guarantee adherence to environmental regulations.
- **Ensure air quality and noise management:** Reduce noise impacts by scheduling operations during daytime hours and maintaining equipment, along with limit dust emissions using wet suppression as well as speed control on haul routes.
- **Promote health and safety:** To reduce the hazards connected to mining operations, put in place safety measures for employees and the local community, such as fencing, signage, and emergency response plans.
- **Control traffic and access:** Maintain safe access routes for community and operational use while controlling vehicle flow to lessen traffic and road deterioration.
- **Handle garbage responsibly:** Avoid unlawful dumping and make sure that all waste is recycled, processed, or disposed of at facilities that are licensed, with thorough documentation and frequent audits.
- **Maintain aesthetic and visual quality:** Reduce visible intrusion and maximize post-mining land use possibilities by designing site layout and rehabilitation to harmonize with the surrounding landscape.
- **Preserve cultural and historical treasures** by conducting archaeological evaluations before disturbing the earth and putting preservation measures in place.
- Promote socioeconomic development by making the most of local employment and procurement opportunities, communicating openly with stakeholders, and making sure the project enhances the community.

20 Aspects for inclusion as conditions of Authorization.

(Any aspects which must be made conditions of the Environmental Authorization)

It is the opinion of the EAP that the following conditions should form part of the Authorization:

- Maintain a buffer of 100m from sensitive areas.
- Maintain a minimum 500m (preferably 1000m) buffer from any infrastructure.

- Landowners and land occupiers should be engaged (reconsulted) at least 1 month before any site activities are undertaken.
- Comply with the principles of NEMA.
- Conduct waste management activities sustainably to protect the natural environmental resources.
- Implement concurrent rehabilitation to minimize the impact of the project activities and the period required to complete the rehabilitation process.

21 Description of any assumptions, uncertainties, and gaps in knowledge.

(Which relate to the assessment and mitigation measures proposed)

Essentially, a number of assumptions have been made regarding the evaluated project consequences and the mitigation strategies that go along with them. If suitable mitigation measures are put in place, it is anticipated that the surrounding waterbodies will continue to be environmentally stable and unaffected by mining operations. Additionally, the project is predicated on the region's continued need for sand and gravel as well as complete adherence to regulatory requirements and environmental laws.

Some artifacts, though, are yet unknown. It is unclear how mining near waterbodies may affect hydrology over the long run, especially in severe weather. The biological reaction of regional biodiversity to habitat disturbance and operating noise is likewise unclear. Additionally, a thorough assessment of the project's overall environmental impact in conjunction with other adjacent developments has not been conducted.

These include a lack of comprehensive long-term monitoring protocols for biodiversity as well as water quality, a lack of site-specific baseline data on ecological and hydrological conditions, and insufficient stakeholder engagement, which may ignore community concerns about resource access and land use.

22 Reasoned opinion as to whether the proposed activity should or should not be authorized.

22.1 Reasons why the activity should or should not be authorized.

In order to preserve the environment and minimize the project's effects, the applicant is dedicated to carrying out the mining operations in a sustainable manner and adhering to the relevant environmental laws. Consequently, the candidate will make sure that:

As long as the suggested mitigation is put into practice, the project's activities have remarkably little environmental impact.

The effects of the project's actions can be appropriately avoided, reduced, or managed with the right care and attention.
The effects of the project activities can be undone by carrying out the proper rehabilitation operations; and
The area will be decommissioned and rehabilitated to improve its ecological potential and make it more suitable for other land uses.

22.2 Period for which Environmental Authorization is required.

For a maximum of thirty years and subject to a thirty-year renewal, authorization is needed for mining right activities.

22.3 Undertaking

Verify that the undertaking needed to fulfill this section's requirements is included at the conclusion of the Environmental Management Programme Report (EMPr) and applies to both the Environmental Impact Report.
The undertaking is given at the conclusion of the EMPr.

22.4 Financial Provision

(State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.)

R 453 905,00

22.5 Explain how the aforesaid amount was derived.

22.5.1 Confirm that this amount can be provided for from operating expenditure.

(Confirm that the amount is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report, or MR operation Work Programme, as the case may be).

The calculation includes annual rehabilitation, final closure, decommissioning, post-closure monitoring, water management, biodiversity rehabilitation, soil replacement, alien invasive control, infrastructure removal, pollution remediation and latent/residual environmental risks. The amount is provided for in the Mining Work Programme and financial model and will be reviewed annually.

22.6 Specific Information required by the Competent Authority.

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 EMPr must include the following: -

- **Mitigation Measures**
  - Actions to prevent, lessen, or correct major environmental effects.

- Unambiguous promises to restore and rehabilitate impacted areas.

- **Monitoring & Reporting**
  - Environmental impact monitoring systems for construction, operation, decommissioning, and restoration.
  - Consistent reporting procedures to stakeholders and authorities.
- **Roles & Responsibilities**
  - Identification of those in charge of putting mitigation strategies into action.
  - Explicit responsibility frameworks for adhering to environmental regulations.
- **Financial & Technical Provisions**
  - A financial resource demonstration for the EMPr's implementation.
  - The ability to perform environmental management tasks technically
- **Public Participation**
  - Taking into account issues expressed by stakeholders during consultation.
  - Procedures for continued interaction with impacted communities.
- **Auditing & Enforcement**
  - Protocols for independent compliance audits.
  - If non-compliance is found, corrective measures will be taken.
- **Closure & Rehabilitation Plans**
  - Decommissioning activity plans.
  - Long-term land as well as ecosystem rehabilitation techniques.

22.7 Impact on the socio-economic conditions of any directly affected person.

(Provide the results of the Investigation, assessment, and evaluation of the impact of the mining right of any directly affected person, including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, and attach the investigation report as an Appendix).

The consultation's goal is to educate the I&APs and provide them with enough time to voice any possible issues. A public participation process was initiated with the intention of consulting with the I&APs, including the landowners and the nearby communities. The final EIR and EMPr that are submitted to the DMPR for decision-making will include a CRR.

22.8 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

(Provide the results of Investigation, assessment, and evaluation of the impact of waste rehabilitation on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) except the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

According to the specialist report results, there are no known Heritage Resources identified on site, which aligns with the screening tool. The Phase I Cultural-Heritage Impact Assessment study for the proposed mining right did not reveal any significant Archaeological material within the footprint of the proposed development. An Environmental Screening Tool was used to determine the necessity to conduct heritage studies, and it appeared to have low sensitivity. However, field assessment was conducted for acquiring empirical research for validation. The report indicates a

low sensitivity on the Archaeological and Cultural Heritage Theme; the area is extremely disturbed by anthropogenic activities around the MR area. Mitigation measures are proposed in case there could be any heritage resources are encountered during the mining right activities. For instance, no project activities will be conducted within 50m of any identified heritage site during the MR activities and rehabilitation of the disturbed land.

23 Other matters required in terms of sections 24(4) (a) and (b) of the Act.

(The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as an Appendix).

In accordance with Section 24(4)(b)(i) of the National Environmental Management Act (NEMA), the Environmental Assessment Practitioner (EAP) managing this application confirms that a thorough investigation into potential alternative sites and development layouts was undertaken. Based on this investigation, it was determined that no reasonable or feasible alternatives exist for the proposed activity.

The chosen location is in an area set aside for this kind of development and has the particular geological resources needed for the MR. It is the most practical and economically feasible location due to its close proximity to existing infrastructure, such as utilities, support services, and access roads. Additionally, the suggested strategy ensures minimal ecological disturbance by avoiding the development of sensitive environmental features and aligning with the approved EMPr. The EAP determines that the suggested location and design are the only practical choices for the anticipated activity in light of these considerations.

CHAPTER 2: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

24 Environmental Management Programme

In accordance with the National Environmental Management Act (NEMA) and related Environmental Impact Assessment (EIA) Regulations, mining operations are planned to minimize environmental disturbance in a sustainable manner. This EMPr, which is a crucial component of the environmental authorization process, describes the management strategies needed to stop, lessen, and track possible environmental effects over the course of the project. It demonstrates the applicant's dedication to environmental stewardship, sustainable resource use, and adherence to relevant laws.

Every part of mining operations must be rehabilitated for future land uses, and environmental management is an essential part of this process. Effective erosion management strategies, buffer zones around bodies of water, and gradual rehabilitation of mined sites are all required of MR holders. Monitoring procedures are set up to measure effects on nearby ecosystems, and water consumption is managed to avoid pollution and over-extraction. In order to safeguard miners and prevent operations from endangering neighbouring communities, the mining right also necessitates strict adherence to health and safety regulations under the Mine Health and Safety Act. In terms of extraction, environmental stewardship, and regulatory framework compliance, the working approach functions responsibly overall.

24.1 Details of the EAP

(Confirm that the requirement for the provision of the details and expertise of the EAP is already included in PART A, section 2 herein as required).

This has already been covered. Refer to Chapter 1 of this document.

24.2 Description of the Aspects of the Activity

(Confirm that the requirement to describe the aspects of the activity that are covered by the environmental management programme is already included in PART A, section (5) herein as required).

This has already been covered. Refer to Chapter 1 of this document.

24.3 Composite Map

(Provide a map **(Attached as an Appendix**) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers)

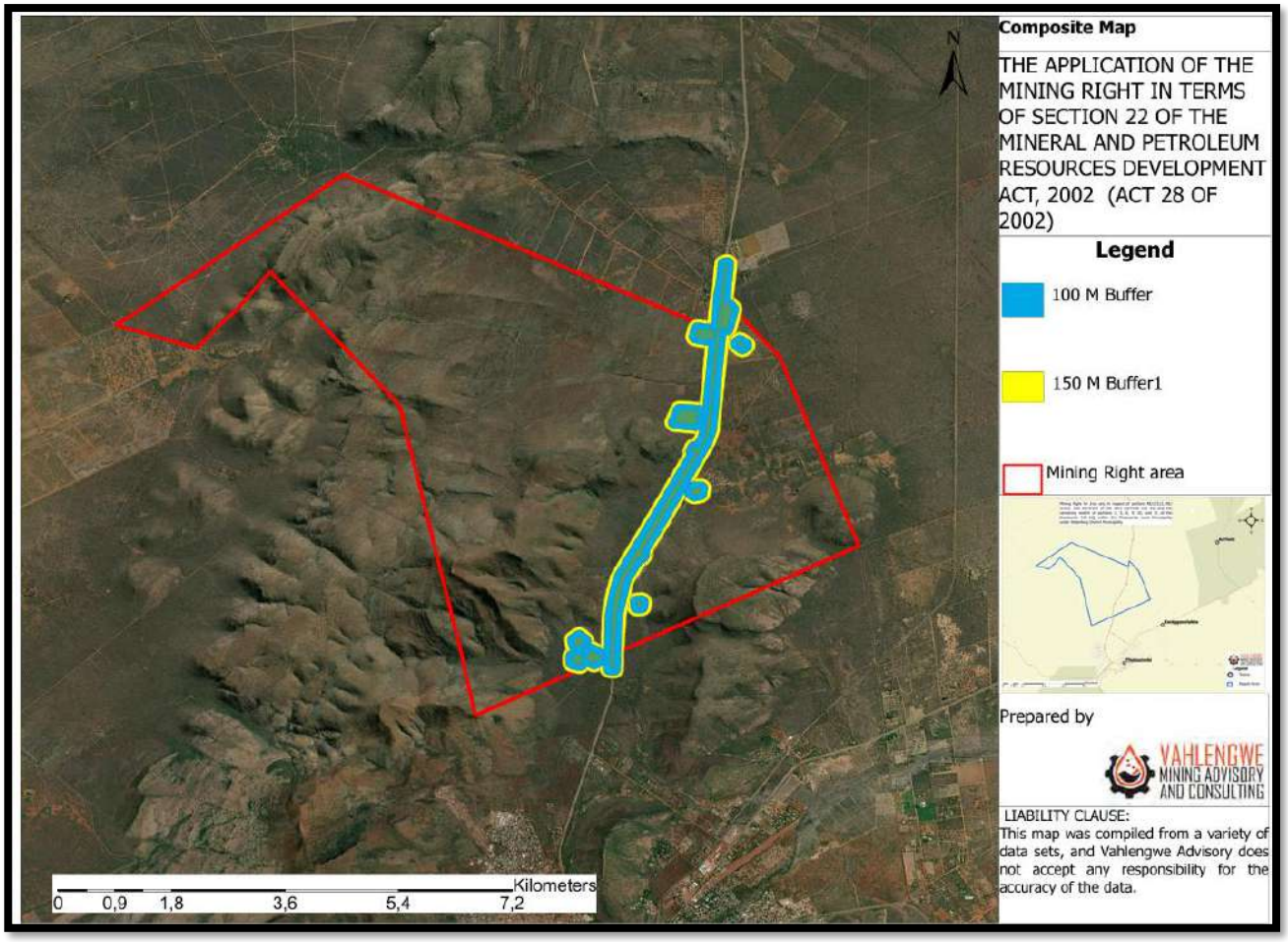


Figure 24: Composite map depicting buffer zones demarcated around water courses

The environment depends on water bodies. In order to stop the deterioration of environmental amenities, it is crucial to maintain a clean environment. The distance from watercourses is maintained through the use of buffers (Figure 24). The mining operation will guarantee that water quality is unaffected by upholding a 100–150-meter buffer zone. Rainfall is also the cause of the water buildup that has been seen on top of the waste management licensing area. Nevertheless, these bodies of water were not present during the field visit, suggesting that they are seasonal.

24.4 Impacts to be mitigated in their respective phases.

Measures to rehabilitate the environment affected by the undertaking of any listed activity.

Table 22: Describe how negative impacts can be mitigation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site Clearance	• Construction • Operation	2.5 Ha, short-term and localized	• Minimise the site hindrance of the vegetation as much as possible. • Any larger fauna species discovered before and during vegetation clearance should be allowed to relocate away from the machinery that will be used for construction and MR activities. • Sensitive areas should be demarcated and treated as No-Go areas. • Methods for minimizing potential harm to fauna species should be used during vegetation clearance. To maximize the potential for mobile species to move to adjacent areas, clearing must be gradual and slow, beginning from the interior of the site and continuing outwards towards the boundary. • Indigenous vegetation, even secondary communities, should not be fragmented under any circumstances or further disturbed. • To avoid the spread of exotic or invasive species or the unlawful	NEMA MPRDA NEMBA NEMAQA Dust regulations NWA	Throughout the MR operation

			collection of plants, no plant species, whether indigenous or exotic, shall be brought into or taken from the proposed project area. • Implement alien species management. • Implementing mitigation measures to prevent and manage hydrocarbon spills. • Conducting water quality and quantity monitoring.		
Site Access	• Construction • Operation	Short-term and localized	• When on site, the Applicant and/or contractors must take into consideration not to interfere with current land uses and practices. • All site employees and visitors must be taken through a site induction, which includes basic environmental awareness as well as site-specific environmental requirements such as site sensitivities and appropriate protocols/procedures. Wherever possible, the Contractor's Environmental Officer should present or facilitate this induction.	NEMA OHS and MHSA	Throughout the mining right operation
Establishment of the site infrastructure	• Operation	2.5 Ha, short-term and localized	• Vehicles and machinery must use existing access routes as far as possible to prevent unnecessary construction of new routes. • Ensure proper and adequate drainage. • Dust suppression should be undertaken when required to reduce the usage of water. Dust suppression strategies should be in accordance with applicable standards for PM_{10} and $PM_{2.5}$. • Ensure that MR operations are in accordance with occupational health and safety regulations.	NEMA MPRDA NEMBA NEMAQA Dust regulations NWA	Throughout the mining right operation

			• All sites must be protected, with security access control and warning signs to ensure no person or animal can access these sites. • Noise must be kept to an absolute minimum during all the MR operation phases to minimize the impact of the development on the fauna that lives on the site. • Permanent structures should not be permitted on the site. Buildings should preferably be prefabricated or constructed from reusable/recyclable materials. • Contractors working on the project should have spill kits available to ensure that any fuel or oil spills are cleaned up and disposed of properly.		
Storage of hazardous substances	• Construction • Operational	Short-term and localized	• To prevent pollution of the environment or harm to humans or animals, all hazardous substances such as fuel, grease, oil, brake fluid, and hydraulic fluid must be handled, stored, and disposed of safely and responsibly. Appropriate spillage prevention measures must be implemented. • If there are any major spills of hazardous materials, they must be reported in accordance with Section 30 of the NEMA. • All chemicals and toxicants used in the construction must be stored away from sensitive areas and in a bunded area.	NWA NEMWA NEMA	Throughout the MR operation
Waste management	• Construction • Operation	Short-term and	• Waste generated on-site must be classified and separated using the color-coding method in wheelie bins.	NEMWA	Throughout the MR operation

		localised	• Waste management must be prioritized, and all waste must be properly collected and disposed of. • Recyclable waste must not be stored on site for extended periods to prevent the risk of environmental pollution. • To prevent rodents and pests from entering the site, it is recommended that all waste be removed weekly. • A Waste Management System must be put in place, with adequate waste storage in the form of covered containers, waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. On-site waste disposal will be prohibited.		
Storage of construction vehicle	• Construction • Operation	Short-term and localised	• Any equipment that may leak and is not required to be transported regularly must be placed on watertight drip trays to catch any possible pollutant spills. The drip trays must be large enough to accommodate the equipment. • Drip trays must be cleaned regularly and must not overflow. All spilled hazardous substances must be collected and disposed of at a properly licensed facility. • Soil compacting must be avoided as much as possible, and the use of heavy machinery must be restricted in areas of the intended MR operation sites.	NWA	Throughout the MR operation

			• Storage spaces must be located outside of the buffer zones.		
Transportation/ access to and from open pits.	• Construction • Operation	short-term and localized	• All MR operations and access must make use of the existing roads as far as possible. • Under no circumstances may the contractor damage any existing structures where the MR operation activities are to be undertaken. • On-site vehicles must be restricted to approved access routes and locations on the site to reduce excessive environmental disturbance to the soil and vegetation on site. • Damage to public roads caused by MR operation activities must be repaired in consultation with the appropriate municipal authorities.	NEMA NEMBA NEMAQA NWA Dust Regulations	Throughout the MR operation
Waste removal	Decommissioning	Short-term and localised	• Excess chemicals must be removed from the site and, if possible, recycled (for example, oil and other hydrocarbon waste products). Any waste materials or chemicals that cannot be recycled must be disposed of at a waste facility that is registered and licensed.	NEMWA	Throughout the MR operation
Surface infrastructure removal	Decommissioning	Short-term and localised	• All infrastructure, equipment, and other items erected during MR operation activities shall be removed from the site. • Soil compaction should be avoided as much as possible. Heavy machinery use must be prohibited in areas outside of the proposed MR operation sites to reduce soil compaction.	• MPRDA • Rehabilitation Plan	Throughout the MR operation and rehabilitation
Rehabilitation	Rehabilitation	All disturbed	• Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented	• NEMA • OHS and	The entire MR area

		areas	or disturbed further. • Clearing of vegetation should be minimized and avoided where possible. • Maintain small patches of natural vegetation within the MR operation site to accelerate restoration and succession of cleared patches. • Areas that are denuded during MR operation need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species. • All structure footprints to be rehabilitated and landscaped concurrently as the MR operation activities progress, are complete. • Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type. • Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. • Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	MHSA • MPRDA Rehabilitation Plan	

24.5 Impact Management Actions and Outcomes

Table 23: Impact management actions

Activity	Potential impact	Aspects affected	Phase	Mitigation type	Standard to be achieved
Site Clearance	• Dust generation • Invasion by alien species • Impact on Flora and Fauna	• Air Quality • Surface Water • Groundwater • Transportation • Visual receptor	• Construction • Operation	• Speed limit enforcement and vehicle maintenance. • Dust suppression. • Alien Invasive Management Plan	• NEMA • NEMBA • CARA • Threatened or Protected Species (TOPS) regulations • NEMAQA • Dust regulations • NWA • NHRA
Storage of hazardous substances	• Spillage of oils and fuels to pollute the soil.	• Surface water • Groundwater • Soil	• Construction • Operation	• Clean up using bioremediation.	• NEMA • NEMBA • NWA
Waste management	• Generation and disposal of waste	• Pollution	• Construction • Operation	• Sorting the waste according to the marked wheelie bins	• NEMA • NEMWA

Rehabilitation	• Restore the land to its own condition • Disturbance to wildlife and communities in the close vicinity	• Topography • Land use • Soil disturbance • Ecology	• Rehabilitation	• Control through the implementation of EMPR mitigation measures	• MPRDA by the Rehabilitation Plan

24.6 Management action of the EMPr

The implementation of this EMPr is guided by the following principles and actions:

- **Roles and Responsibilities**
  - Designated to supervise adherence and execution of mitigating strategies.
  - Educate all staff members on emergency response protocols, site-specific hazards, and environmental awareness.
- **Mitigation Measures**
  - Soil and Land Management: Maintain topsoil for rehabilitation, limit clearing to specific regions, and implement erosion control measures after reprofiling the open pits.
  - Water Management: Use stormwater diversion systems, bunded fuel storage, and spill response procedures to prevent contamination.
  - Air Quality and Dust Control: Use methods like water spraying on stockpiles and haul highways to reduce dust.
  - Garbage Management: Prohibit unlawful dumping and separate, store, and dispose of garbage at facilities with a license.
  - Biodiversity Protection: When required, establish buffer zones and refrain from disturbing the surrounding plants.
- **Monitoring and Reporting**
  - Maintain compliance records and conduct routine site inspections.
  - Assess on important environmental factors (such as dust levels and water quality) and notify the appropriate authority of any findings.

- **Rehabilitation and Closure**
  - During procedures, use progressive rehabilitation.
  - Reshape, reprofiling, re-soil, and re-vegetate disturbed parts with native species.
  - To guarantee long-term land stability, submit a closure plan that complies with legal standards.
- **Emergency Preparedness**
  - For heritage resources, create 100m buffer and implement a Chance Find Procedure.
  - Keep emergency response plans and spill kits on hand in case of chemical or hydrocarbon disasters.

24.7 Manner in which risks will be dealt with to avoid pollution or degradation.

The following are the general steps to prevent or address any pollution or environmental degradation caused by the planned mining rights activities:

- Site Containment and Erosion Control: To stop sediment runoff into adjacent water bodies, all disturbed areas will be properly marked off and stabilized using erosion control techniques such vegetation buffers, silt fences, and berms.
- Stormwater Management: To manage stormwater and lower the chance of contaminating surface and groundwater resources, appropriate drainage systems, such as diversion channels and sediment traps, will be put in place.
- Dust and Air Quality Control: To preserve air quality and lower particle emissions, dust suppression methods such routinely watering haul roads, restricting vehicle speeds, and covering stockpiles will be employed.
- Noise management: Operational activities will be planned during daylight hours to minimize disturbance to nearby communities and wildlife, and equipment will be maintained to reduce noise emissions.
- Waste Handling and Disposal: To avoid unlawful dumping and contamination, all waste produced, including hazardous and general trash, will be sorted, stored, and disposed of at facilities with a license in compliance with environmental standards.
- Rehabilitation and Revegetation: To restore ecological function and land capability, concurrent rehabilitation will be carried out throughout the mine's lifetime. This will include recontouring, replace topsoil, and grow native flora.
- Water Quality Monitoring: To identify any indications of contamination early and take swift corrective action, surface and groundwater will be regularly monitored.

- Safety and Access Control: To prevent employees and the general public from being exposed to dangerous locations, safety precautions like fence, signage, and restricted access zones will be implemented.
- Heritage Protection: Archaeological rules will be followed to safeguard any recognized heritage resources.

During onsite MR operations, it is crucial to implement comprehensive procedures to regulate or address any causes of pollution or environmental deterioration.

25 Environmental Awareness Plan and Training

A comprehensive EMPr include training and environmental awareness. The training's main goal is to make sure that all site employees are aware of their responsibilities and requirements regarding the pertinent permits, authorizations, mining right, approved EMPR, and environmental protection.

Both the contractor and the applicant must guarantee that all pertinent staff members are qualified to do their jobs in an ecologically responsible and compliant manner and that they are able to adhere to the applicable environmental regulations. To gain staff buy-in, each employee must participate in:

- Determining the pertinent risks.
- Being aware of the types of dangers (sign showing kind of danger).
- Creating risk controls (signs) to minimise injuries; and
- The applicant is responsible for making sure that sufficient environmental training occurs. An environmental awareness induction presentation will be provided to every employee.

Presentations must be given in the employees' native tongue wherever feasible. Attendance records must be kept, and all training must be formally documented. The following should, at the very least, be covered in the environmental training:

- The possible or actual effects of their work actions on the environment.
- Adherence to the suggested mitigating strategies for vulnerable locations.
- Their duties and responsibilities in ensuring adherence to the applicant's environmental management systems' standards, including emergency preparedness and response requirements, as well as the environmental policy as well as equipment.
- In order to notify contractors and site personnel about the existence of Red/Orange reflectors list species, their identification, conservation status and significance, biology, habitat requirements, and management requirements of the Environmental Authorization and within

the EMPr, discussions on sensitive environmental receptors within the project area are necessary; and

- It is necessary to identify all operational risks and develop proactive measures to reduce them. Therefore, in order to prevent pollution and/or environmental degradation, the applicant must advise the employees of any environmental hazards that may arise from their activity and how these risks must be managed.

In case new staff is brought in (including contract labour), the contractor/applicant shall keep a signed register of attendance for proof and record of adequate environmental induction training.

25.1 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

Before starting site visits, an orientation session for all on-site staff should promote environmental awareness. Additionally, employees should be made aware of environmental issues related to their jobs at the workplace. Courses must be taught by appropriately qualified instructors in a language and medium that they can comprehend. The following will be covered in the environmental awareness training program:

- OHS (Occupational Health and Safety) induction

Prior to site access, environmental awareness training will be conducted in "Toolbox talk" sessions with a focus on the following particular aspects:

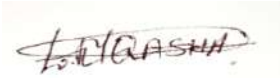
- A recognized garbage company collects and disposes of rubbish.
- Environmentally sensitive receptors.
- Red/Orange list species identification, preservation status and significance, biology, habitat needs, and EMPr and environmental authorization management criteria.

25 Undertakings

The EAP herewith confirms;

- the correctness of the information provided in the reports.
- the inclusion of comments and inputs from stakeholders and I&APs.
- the inclusion of inputs and recommendations from the specialist reports, where relevant; and
- 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 Candidate Environmental Assessment Practitioner:



Company: Vahlengwe Mining Advisory and Consulting

Date: 07 May 2026

Signature of the Professional Environmental Assessment Practitioner:

Company: Vahlengwe Mining Advisory and Consulting

Date: 07 May 2026

Appendix 1:

CV of the EAPs

SUNDAY MISHACK MABASO

12 Thaxted Ave Mulbarton 2190 · Tel ; 011 432 0062 Cel: 074 569 7312 & 082 461 4251
Email - sunday@vahlengweadvisory.co.za · LinkedIn Profile - Sunday Mabaso ·X @SundayMabaso

BIOGRAPHY

Mr. Sunday Mabaso is the founder and CEO of Vahlengwe Mining Advisory and Consulting established in April 2021 to provide a broad range of services in the mining industry ranging from application of mineral rights, environmental and waste management, water use licensing, community engagements to compliance monitoring in terms of the MPRDA, MHSA, NEMA, NWA amongst other legislation governing the mining industry. He's got over 30 years mining experience including 20 years (2000 – 2021) with the Department of Mineral Resources and Energy (DMRE) where he served his last seven years as Regional Manager (3 years in Northern Cape and 4 years in Gauteng) before his resignation to advance his career in business. His areas of expertise include Environmental Management, Mining Legislation, Mine Economics, and Social and Labour Plans and community engagements. He contributed to various strategic committees, task teams in the South African Mining industry including "Mining Phakisa" in 2015, the development of the "South Africa's Exploration Implementation Plan" published by Minister of Mineral Resources and Energy in 2022.

He started his mining career in 1994 where he proceeded to attain a National Diploma in Mine Surveying and a National Higher Diploma in Mineral Resource Management from Technikon Witwatersrand in 1999 and 2000 respectively, a Graduate Diploma (GDE) in Mining Engineering from University of Witwatersrand in 2009 and a Master of Business Administration (MBA) from Milpark Business School in 2021. Sunday also completed a Post Graduate Certificate in Climate Change and Energy Law from University of the Witwatersrand in 2021, a Certificate in Energy Efficiency and Sustainability from the University of Cape Town (UCT) in 2022 and Certificate in Mine Closure and Land Rehabilitation from University of Pretoria (UP) in 2022.

Sunday is a registered member of the Institute of Directors of South Africa (IoDSA), the Southern Institute of Mining and Metallurgy (SAIMM) and is an Environmental Assessment Practitioner registered with EAPASA, also a member of the International Association of Impact Assessment South Africa (IAIAsa). A committee member of the Environmental, Social and Governance (SAMESG) working group of the SAMCODES Standard Committee (SSC) responsible for developing the South African Mineral Reporting Codes. He has authored opinion and journal articles about South African mining legislation with interests focused on social and

environmental impacts on mine communities affected by mining operations, past and present. Some of his articles are published in academic journals and books internationally.

ACADEMIC JOURNAL PUBLICATIONS

Mabaso SM. (2025) The impact of gold mine closures and future planning for sustainable development in the Witwatersrand Goldfields: Mine Closure Conference 2025, 19-20 February 2025, The Southern Institute of Mining and Metallurgy: ISBN 9781-1-7764673-8-9

Mabaso, SM. (2023) Legacy Gold Mine Sites & Dumps in the Witwatersrand: Challenges and Required Action. Natural Resources, 14, 65-77. https://doi.org/10.4236/nr.2023.145005

Mabaso, SM. (2023). Social and Environmental Challenges caused by Legacy Gold Mining in Johannesburg: Government's Action Plan. eBook: ISBN: 978-81-19491-53-7. DOI: 10.9734/bpi/npgees/v9/10672F

Ramontja, T. and Mabaso, S. 2022. Evolution of South Africa's Mining Regulatory Framework as it Relates to the Empowerment and Participation of Mining Communities. https://doi.org/10.1007/978-3-031-07048-8_6

PROFESSIONAL AFFILIATIONS

- The Southern Institute of Mining and Metallurgy (SAIMM) No 709244
- EAPASA: Environmental Assessment Practitioner (EAP) No 2022/4485
- International Association of Impact Assessment South Africa (IAIAsa) No 7442
- Institute of Directors in South Africa (M.Inst.D, 69334063)
- Land Rehabilitation Society of Southern Africa (LaRSSA)
- International Society for Development and Sustainability (ISDS)

COMMITTEES

- South African Mineral Reporting Codes (SAMCODES) Standards Committee, 2016 to 2021
- SAMCODES-ESG Subcommittee – 2021 to date

EXPERIENCE

01 MAY 2021 – DATE

FOUNDER AND PRINCIPAL CONSULTANT: VAHLENGWE MINING ADVISORY AND CONSULTING

CORE SERVICES

- MPRDA and NEMA
- Mining Charter
- Environmental, Social and Governance - ESG
- Mine Closure and Rehabilitation
- Waste Management
- Community engagements
- Compliance Inspections

- Assistance to junior and small-scale miners

01 AUGUST 2014 – 30 APRIL 2021

REGIONAL MANAGER, DEPARTMENT OF MINERAL RESOURCES AND ENERGY

(NORTHERN CAPE –AUGUST 2014 TO APRIL 2017 AND GAUTENG – MAY 2017 TO APRIL 2021)

- Effective implementation and administration of the MPRDA
- Implementation and administration of Environmental Management policies and regulations in terms of NEMA and NEM: Waste Act
- Implementation and administration of Social and Labour Plans in terms of MPRDA
- Evaluation of Mining and Prospecting Work Programs and monitoring compliance
- Management of Land Use in mining areas to promote development and coexistence.
- Management of community development through implementation of the Mining Charter
- Promoting participation of Historically Disadvantaged South Africans in the mining economy and the value chain
- Management of relations and conflict resolutions between mining communities and mining companies
- Management of Financial and Administrative systems and procedures in the Regional Office
- Provide support and advisory to the Deputy Director General in the department

01 APRIL 2007 – 31 JULY 2014

DEPUTY DIRECTOR: MINE ECONOMICS, DEPARTMENT OF MINERAL RESOURCES

- Evaluating Mining/Prospecting Work programs for mineral rights applications and monitoring sustainability of mining operations in line with the MPRDA objectives.
- Conduct mine asset valuations for tax purposes and transfer of mining operations.
- Monitor compliance through inspections and issuing of compliance directives.
- Assisting junior coal miners to access export markets through the Quattro Task team.
- Assist new entrants and junior miners in the mining industry.

01 DECEMBER 2000 – 31 MARCH 2007

INSPECTOR OF MINES, DEPARTMENT OF MINERALS AND ENERGY

- Monitor compliance with the Mine Health and Safety Act in the mines.
- Provide technical advice on conflict between land development and mining operations.

25 JANUARY 2000 – 30 NOVEMBER 2000

SENIOR MINE SURVEYOR AND JUNIOR MINE PLANNER, TAVISTOCK COLLIERIES

05 AUGUST 1994 – 31 DECEMBER 2000

LEARNER OFFICIAL AND BURSAR, TAVISTOCK COLLIERIES

EDUCATION

JUNE 2022 TO NOVEMBER 2022

CERTIFICATE: MINE CLOSURE AND LAND REHABILITATION, UNIVERSITY OF RETORIA (UP)

- Closure Design
- Regional Planning considerations and operational mitigation
- Land preparation and soil management
- Land cover/surface stabilization-economic value
- Maintenance and land management systems
- Identifying closure planning challenges and problem areas
- Mine closure planning consideration

- Closure documents required Baseline environment and closure risks
- Closure success criteria and rehabilitation monitoring
- Financial provisioning and social planning

OCTOBER 2021 TO DECEMBER 2021
CERTIFICATE: ENERGY EFFICIENCY AND SUSTAINABILITY, UNIVERSITY OF CAPE TOWN (UCT)

- Energy-importance, Strategy and Challenges
- Energy Metrics, Economics and Efficiency
- Energy-efficient and Sustainable Buildings
- Energy-efficiency management and technologies in buildings
- Energy-efficiency management and technologies in industrial sector
- Energy auditing
- Energy Measurement Verification and Management Systems

MARCH 2021 TO JULY 2021
POST GRADUATE CERTIFICATE: CLIMATE CHANGE AND ENERGY LAW, UNIVERSITY OF WITWATERSRAND

- Climate Change and Energy
- Energy Law Concepts and Economics
- Theories of Energy and Climate Regulation
- Sources of Energy: Fossil Fuels
- Sources of Energy: Petroleum Sector
- Sources of Energy: Gas Sector
- The South African Electricity Supply Industry
- Climate Change Law and Policy Framework
- Energy, Climate Change & Just Transition
- Nuclear as a Source of Electricity
- Energy Efficiency and Demand Side Management
- Regulation of Energy Procurement

FEBRUARY 2018 TO JULY 2021
MASTER OF BUSINESS ADMINISTRATION, MILPARK BUSINESS SCHOOL

- Advanced Business Research Methodology
- Business Ethics and Corporate Governance
- Business in Emerging Markets
- Business Report Writing, Quantitative Analysis and Presentation Skills
- Dissertation
- General Management Environment
- Global Trade (Macro-economic – BRICS – Developing Markets)
- Integrated Business Strategy
- Leadership and Change Management
- Management Accounting and Finance (part 1)
- Management Accounting and Finance (part 2)
- Marketing and Sales Management
- Operations and Technology Management
- People Management
- Social Responsibility and Environmental Management

OCTOBER 2014 TO JANUARY 2015

CERTIFICATE IN BASIC TRAINING FOR ENVIRONMENTAL MINERAL RESOURCE INSPECTORS, UNIVERSITY OF PRETORIA

- Constitutional Background
- NEMA and MPRDA framework legislation
- Sustainable Development Principles
- EIA process, Scoping reports, and review of EA applications and Integrated EAs
- NEMA: WASTE Act
- The National Water Act
- The Biodiversity Act
- Administrative Law
- Criminal Enforcement
- Special forms of Liability
- Powers of Environmental Mineral Resources Inspectors-EMRI
- Ethics, Health and Safety and relevant issues
- Sampling
- Inspections
- Investigations
- Appeals
- Exemptions and exceptional circumstances

MARCH 2006 TO NOVEMBER 2008
GRADUATE DIPLOMA IN MINING ENGINEERING, UNIVERSITY OF WITWATERSRAND

- Mineral Economics
- Mineral Policy and Investment
- Compliance and Reporting Rules in the Mining Industry
- Economic Geology of South African Coal
- Coal extraction and Exploitation
- Coal and the Environment

JULY 1999 TO JULY 2000
NATIONAL HIGHER DIPLOMA, MINERAL RESOURCE MANAGEMENT, TECHNIKON WITWATERSRAND

- Mineral Engineering Management IV
- Mine Survey IV
- Mine Planning IV
- Mine Valuation IV
- Experiential Training

JULY 1996 TO MAY 1999
NATIONAL DIPLOMA, MINE SURVEYING, TECHNIKON WITWATERSRAND

SKILLS

- In-depth understanding of mine planning, valuation and mining economic value chain,
- Good communication skills
- Conflict resolution

- In-depth understanding of the regulatory and compliance regime in the mining industry

- Good decision making
- Ability to work under pressure.
- Time management
- Good Leadership and management

PERSONAL INFORMATION

I'm a male South African Tsonga speaking citizen, born on 29 November 1976 in Bushbuckridge, Mpumalanga Province where I started my primary schooling at Mpikaniso Primary school in 1983 and matriculated at Orhovelani High School in 1993. I'm currently married with four children and have been residing in Mulbarton, Johannesburg South since June 2017.

PERSONAL HOBBIES

My personal hobbies include playing golf, watching, and following soccer, rugby, and other national sporting codes. Mentoring my kids through schoolwork and sport. I spend more time outside work with my family to groom my kids to become better citizens and leaders of the future generation.

REFERENCES

Mr Mosa Mabuza
Chief Executive Officer
Council for Geoscience
012 841 1911
082449 8650
mmabuza@geoscience.org.za

Dr Thibedi Ramontja
Former Director General: DMRE
Currently Director: School of Mining
University of Witwatersrand
083 388 9122
thibedi.ramontja@wits.ac.za /
Ramontja2@gmail.com

Dr Tania Marshall
Director: School of Mining
University of Witwatersrand
082 611 3388
marshall.tania@gmail.com

Environmental Assessment Practitioners Association of South Africa

Registration No. 2022/4485

Herewith certifies that

SUNDAY MISHACK MABASO

is registered as an

Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 April 2026

Expires: 31 March 2027

Chairperson

Registrar

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Curriculum Vitae
Of
Nqasha Lusizo

RESIDENTIAL ADDRESS AND CONTACT DETAILS

103 Great Britain, Turffontein, Johannesburg 0725046088/ 0639688778 nqashalusizo@gmail.com

PERSONAL DETAILS

Driver's License: code 10
Professional Affiliation: EAPASA and SAIMM candidate

PROFESSIONAL SKILLS

I am a dedicated geoscientist in Environmental Management/Science with extensive experience in GIS and Remote Sensing (RS) techniques, Environmental Health and Safety (EHS), and Environmental Impact Assessments (EIAs), as well as 1 year and 4 months of experience in Environmental Consulting. I'm very skilled in using RS and GIS methods to monitor, map, and analyze environmental trends. I apply RS programming techniques to evaluate land use and land change (LULC), monitor ecological dynamics, and assess natural resource management strategies and sustainable development using RS models. Possesses a strong understanding of environmental science and sustainability and excels at leveraging spatial data analysis to support in-situ strategic decision-making. With a proven record of implementing innovative solutions for environmental challenges, promoting sustainable practices, and remediating ecological impacts for a clean environment through the integration of contemporary technology and comprehensive management strategies.

AREAS OF SPECIALIZATION

- Environmental Specialist in Mining Rehabilitation (TSFs), Water and Waste Management.
- Environmental Health & Safety (EH&S), knowledgeable in NEMA and MPRDA legislations.
- Environmental Impact Assessment (EIA) reports for mining rights and Environmental Audits.
- Mining Impacts and Rehabilitation of the Tailing Storage Facilities (TSFs).
- Geographic Information System (GIS) and Remote Sensing (RS) analyst in Environmental Change and Policy- Disaster management.

SKILLS

- Environmental Impact Assessment (EIA)
- Environmental Management
- Natural Resource Management
- Scientific Writing
- Communication
- Field Water and Soil Sampling
- Microsoft Office Package
- Geographic Information Systems (GIS)
- Remote Sensing (RS) Techniques
- Geospatial programming integrating Machine Learning (GEE)
- Geospatial Visualization
- Remote Sensing Image Processing
- Data Collection
- Database Management Systems and Statistical analysis

EDUCATION

University of The Witwatersrand - Gauteng Province | Master of Science in Geography|2024 - 2025

- Dissertation in Geography (Environmental Science).
- Environmental Management in Mining Impact, GIS, and Remote Sensing.

University of Witwatersrand - Gauteng Province | Bachelor of Arts Honours in Geography |2023

- Environmental management, Geography and Remote Sensing.

Walter Sisulu University - Eastern Cape Province | Bachelor of Arts | 2022

- Geography (Environment Management, GIS, and Remote Sensing).

Daluhlanga Senior Secondary School - Eastern Cape Province | Matric - 2018

- NSC - Grade 12

WORK EXPERIENCE

CURRENTLY WORKING AS A GIS AND EIA CONSULTANT

Vahlengwe Mining Advisory and Consulting – Gauteng Province – 1 year and 4 months of experience

- Mineral Rights applications (Prospecting and Mining Rights) EA and PWP/MWP documents.
- Applying GIS skills to create maps (Regulation 4.2, 2.2, Locality, and all other environmental survey maps) and RS models and produce thematic maps using Google Earth Pro, ArcGIS Pro, QGIS, and ERDAS software.
- Non-invasive activities for mining and environmental surveys.
- Compiling Environmental reports like Basic Assessment Reports, Scoping Reports, and Environmental Impact Reports.
- Environmental Audits in Mines for Environmental Compliance.

Waste Wizard Manager|2025

Wits H2O Laboratory - University of Witwatersrand – Gauteng Province – 11 months of experience

- Arrange waste collection with the designated company.
- Ensuring all chemical water test kits are available, performing proper analysis to prevent pollution, and discarding all the waste after water tests or analysis.
- Make sure we have the correct number of waste bins and bags for general and hazardous waste.
- Ensure proper waste bottles are available and used correctly for chemical disposal.
- Coordinate with the Chemical Commander to ensure safe disposal of hazardous materials and outdated chemicals.

STUDENT SUPERVISION AND REVIEWING |2025

University of Witwatersrand – Gauteng Province – 1 experience

- Currently co-supervising 2 Honours students in RS and GIS modelling for environmental pollution on water and Land Use and Land Cover (LULC).

CONFERENCE PRESENTATIONS

- International Institute of Environmental Science (IIES) Conference – April at Witwatersrand – 2025
- Network for Industrial Contaminated Land in Africa (NICOLA) Conference – October in Durban – 2024

ENVIRONMENTAL PRACTICALS | 02/2023 to 09/2023

University Of the Witwatersrand - Gauteng Province

- Conducted water parameter testing on water samples to assess water quality and find potential environmental challenges.
- Using GIS and RS to create maps and thematic maps, validating environmental impacts for decision-making processes.
- Applied analytical practices and evaluation techniques in EIA to assess the potential consequences of proposed projects on the environment.
- Generated reports summarizing findings from water parameter testing, GIS mapping, and EIA evaluations to communicate effectively with stakeholders.
- Collaborated with interdisciplinary teams to analyze and interpret data, ensuring a comprehensive

understanding of environmental challenges and potential solutions.

- Employed statistical analysis techniques to analyze large datasets, offering valuable insights into trends and patterns related to water quality and environmental impact.
- Conducted field surveys and site visits to gather primary data and verify findings, enhancing the accuracy and reliability of assessments.
- Development strategies in mitigating environmental risks and promoting sustainability in water management practices, incorporating findings from research and analysis.

TUTOR - GIS | 03/2022 to 10/2022

Walter Sisulu University - Eastern Cape Province

- Designed and executed mapping DEM and location projects to enhance spatial data differences and analysis, facilitating formal decision-making.
- Developed custom applications to perfect workflow efficiency and accuracy in data processing.
- Conducted comprehensive spatial data analysis to identify patterns and trends, helping in strategic planning and resource allocation.
- Provided technical ability and training to staff members, empowering them to use tools effectively in their roles.
- Managed GIS databases and ensured data integrity through regular maintenance and quality assurance procedures.

PACKING OPERATOR |04/2019 to 12/2019

C-Pack Corrugated - Western Cape Province

- Managed packing and stripping of cardboard materials concurrently, optimizing efficiency in the packaging process.
- Oversaw the simultaneous packing and stripping of cardboard, streamlining operations to meet production targets effectively.
- Executed packing and stripping procedures for cardboard products, maintaining a consistent workflow to support manufacturing timeliness.
- Implemented strategies for packing and stripping cardboard effectively, enhancing productivity and reducing material waste.

REFERENCES

Available upon request

Environmental Assessment Practitioners Association of South Africa

Registration No. 2024/9364

Herewith certifies that

LUSIZO NQASHA

is registered as an

Candidate Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 April 2026

Expires: 31 March 2027

Chairperson

Registrar

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Appendix 2: Maps

Appendix 2A: Locality map and Regulation 2(2)

Appendix 2B: Land use map

Appendix 2C: Site Plan

Mining Right for diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals , in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality under Waterberg District Municipality.

N

N
W E
S

Airfield

Kwaggasvlakte

Thabazimbi

Doorhoek
Regorogile
Kwaggashoek
Thabazimbi Proper
Ipelegeng
Spitskop

0 1,05 2,1 4,2 6,3 8,4 Kilometers

VAHLENGWE MINING ADVISORY AND CONSULTING

Legend

Towns

Parent Farm

Diagram A-O represents mining right application in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality under Waterberg District Municipality, in Limpopo Province.

MR covers an area approximately 3892.0 ha

Name	POINT_X	POINT_Y
A	-24,47961538	-24,47961538
B	-24,47961533	-24,47961533
C	-24,50185725	-24,50185725
D	-24,49692628	-24,49692628
E	-24,49715137	-24,49715137
F	-24,50563927	-24,50563927
G	-24,53259625	-24,53259625
H	-24,55675642	-24,55675642
I	-24,51251919	-24,51251919
J	-24,49347879	-24,49347879
K	-24,49347879	-24,49347879
L	-24,49914358	-24,49914358
M	-24,50060895	-24,50060895
N	-24,50437158	-24,50437158
O	-24,50109969	-24,50109969

0 0,68 1,35 2,7 4,05 5,4 Kilometers

Arengo 297 (Pty) Ltd

REGULATION 2(2)
THE APPLICATION OF THE MINING RIGHT IN TERMS OF SECTION 22 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT ACT, 2002 (ACT 28 OF 2002)

Legend

- Geographic coordinates
- Mining Right area

Plan Approval
Applicant

Signature:.....

Date:.....

Surveyor

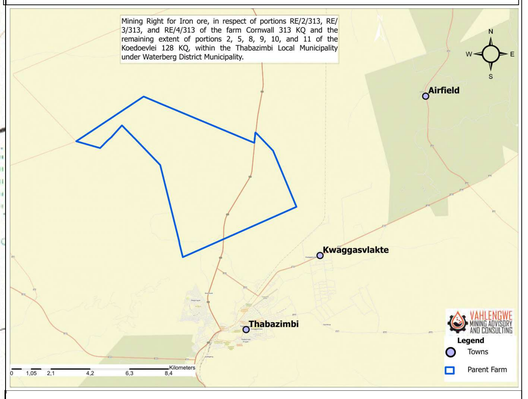
Signature:.....

Date:.....

Regional Manager

Signature:.....

Date:.....



Prepared by

VAHLENGWE MINING ADVISORY AND CONSULTING

LIABILITY CLAUSE:
This map was compiled from a variety of data sets, and Vahlengwe Advisory does not accept any responsibility for the accuracy of the data.

Coordinate System: WGS 84

LAND USE MAP

Mining Right Application on farm Cornwall 313 KQ and portion RE,2,5,RE/8,9,10 & 11 of the farm Koedoevlei 128 KQ situated within the Magestrial District of Thabazimbi, Limpopo Province.

Legend

- Mining Right Area
- Mining Area
- Access Route
- Crushing Screening Area 21(g)
- Stockpile Area 21(g)
- Overburden
- Topsoil Stockpile 21(g)
- HMV Parking
- Office & LDV Parking Area
- Weighbridge
- Diesel Tank
- Assembly Point

N
W
E
S

R510

R510

D2509

Kwaggasvlakte

0 0,5 1 2 3 4
Kilometers

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Vahlengwe

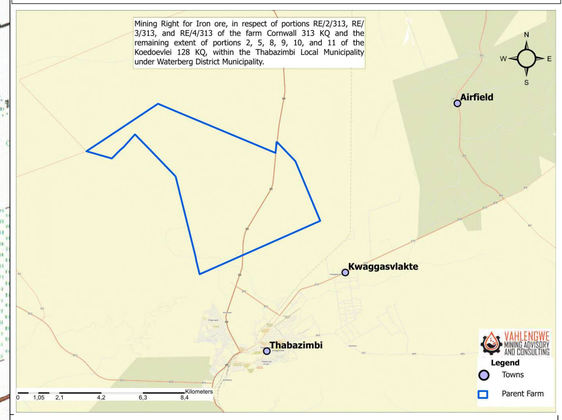
VAHLENGWE MINING ADVISORY AND CONSULTING

LULC Map

THE APPLICATION OF THE MINING RIGHT IN TERMS OF SECTION 22 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT 28 OF 2002)

Legend

- MR area
- Built up
- R510 Road
- Orange River
- Non-paranian Rivers



Prepared by

VAHLENGWE MINING ADVISORY AND CONSULTING

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Kilometers
0 0,9 1,8 3,6 5,4 7,2

Appendix 3: Public Participation Process

Appendix 3A: Proof of Newspaper Advert

Appendix 3B: Site Notice Report

Appendix 3C: Background Information Document and Interested and Affected Parties Registration Form

1 MAY 2026, PLATINUM BUSHVELDER, Tel: 081 309 3876, Fax: 011 252 6669, E-mail: ads2@platinumbushvelder.co.za

From left: Laiden Shai (Thabazimbi Library), Khomotso Tshauke (young local author), and Mable Tsiri (Thabazimbi Library) — united in promoting reading, learning, and youth empowerment.

EARTH DAY MEETS WORLD BOOK DAY

Platinum Bushvelder newspaper | Thabazimbi – A powerful blend of environmental awareness and the love of reading came to life on Wednesday 22 April 2026, as Thabazimbi Library, in partnership with Marakele National Park and the Thabazimbi Local Municipality, hosted a joint World Book Day and Earth Day celebration at Advanced College. Under the theme *"Our Power, Our Planet,"* the event brought together learners from Grades 8 to 12 for a day that went far beyond the classroom – equipping young minds with knowledge, confidence, and a sense of responsibility toward both their future and the environment.

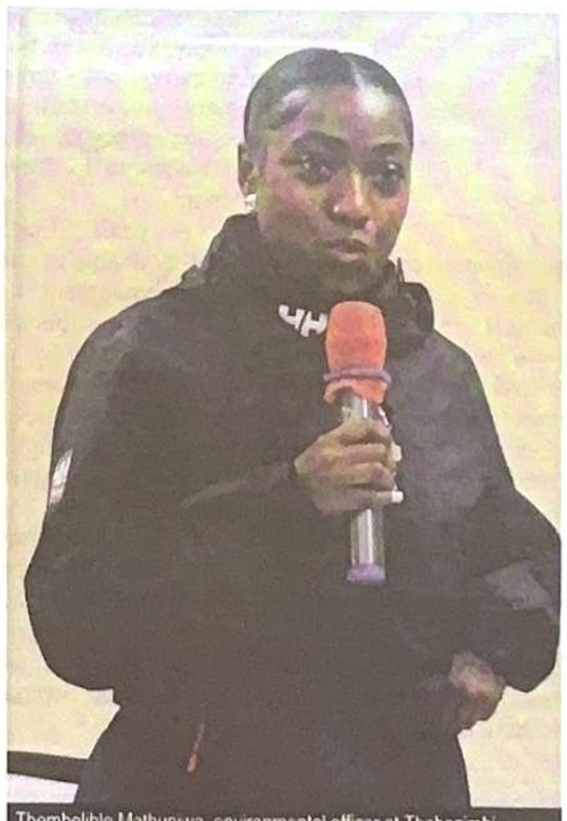
At the heart of the programme was learner participation. Groups were tasked with researching and presenting on pressing environmental issues such as climate change, pollution, wildlife conservation, and waste management - all with a strong focus on how these challenges directly impact Thabazimbi and surrounding communities. From shifting rainfall patterns and extreme weather events, to the growing threat of plastic waste and pollution in local waterways, learners demonstrated not only understanding, but also a willingness to engage with real-world issues. Those focusing on wildlife conservation highlighted the importance of protecting biodiversity, particularly in relation to nearby natural treasures like Marakele National Park, while others explored practical solutions such as recycling initiatives and responsible waste disposal. Importantly, learners were encouraged to move beyond theory – proposing realistic, actionable solutions that could be implemented within their schools and communities.

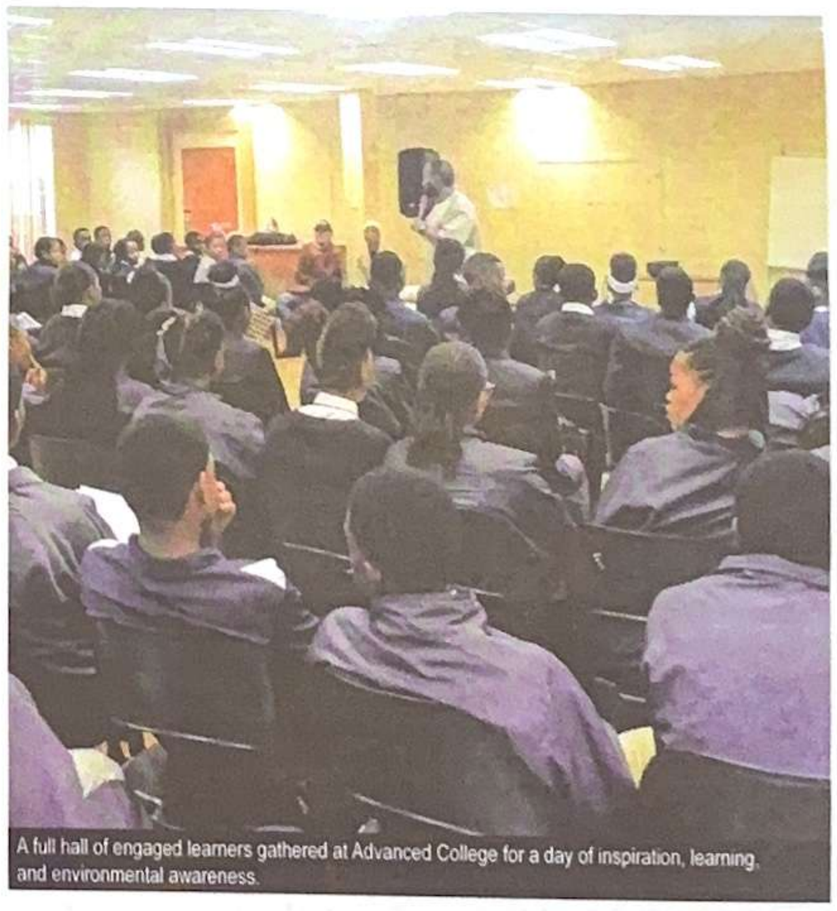
Adding an inspirational touch to the day was guest speaker Khomotso Tshauke, a 25-year-old author from Regorogile, Thabazimbi, who shared her journey from passionate reader to published writer. Having released her first book at the age of 23, she spoke candidly about her love for storytelling and personal growth. "I've always loved writing. At one point, I found myself writing more than 50 pages in just a few weeks," she shared.

Her book, *Malapa ga a lekane*, explores themes of resilience, self-worth, and the dangers of comparison across different socio-economic backgrounds. Her message to learners was clear and powerful: "Where you come from does not define where you are going; your current situation is not your final destination."

By combining the power of books with the urgency of environmental action, Thabazimbi's youth were reminded that they are not just the leaders of tomorrow... they are the changemakers of today.

Moitsheki Machavi from Marakele National Park engaged with learners, highlighting the importance of conservation and protecting local biodiversity.


Thembelihle Mathunjwa, environmental officer at Thabazimbi Local Municipality, addresses learners on the importance of environmental responsibility.


A full hall of engaged learners gathered at Advanced College for a day of inspiration, learning, and environmental awareness.

Learners confidently presented their research, sharing ideas and solutions on key environmental challenges affecting their communities.

Placing an obituary

Announcing the death of a family member is a time-honoured tradition as life should be celebrated and never forgotten.
To help you to celebrate the life of your loved one and share details about the upcoming funeral, place an obituary in our newspaper, free of charge. You can include the date of death, details about their life and surviving family members. You can also write a special message, a poem or a prayer. Please include a photo and the date, time and place of the memorial service.

If you would like to place an obituary in *Platinum Weekly / Platinum Bushvelder*, send the information via WhatsApp to 072 482 6871 or email news@platinumweekly.co.za/ news@platinumbushvelder.co.za

116 childline South Africa

INVITATION TO REGISTER AS AN INTERESTED AND AFFECTED PARTY AND COMMENT ON THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT.

NOTICE OF ENVIRONMENTAL AUTHORISATION FOR THE MINING RIGHT APPLICATION FOR DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE MINERALS ORE IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF KOEDOEVLEI 128 KQ WITHIN THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.
DMPR REFERENCE NO: LP 30/5/1/2/3/2/1/10287 MR

Notice is hereby given in the intent to conduct an environmental authorization process for an application of a mining right of general diamonds, gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals. Arengo 297 (Pty) Ltd in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998) as amended and the Environmental Impact Assessment (EIA) Regulations, 2014. Notification is hereby given to all Interested and Affected Parties (I&APs) in terms of Sections 39 to 44 of GNR 982. The EIA process would be undertaken in terms of these guidelines and be submitted to the competent authority, the Department of Mineral and Petroleum Resources (DMPR).

THE ABOVE ACTIVITIES TRIGGERED:

- GN R 984 (Listing Notice No. 2 (as amended)): Activity 17: Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right.
- GNR 984 Listing Notice 2, Activity 15
- GNR 921 Activity 10 under category B
- GNR 921 Activity 11 under category B

SITE LOCATION

The mining right area is located in various portions of the following farms: Cornwall 313 KQ and Koedoevlei 128 KQ farms, within the Waterberg District Municipality, Limpopo Province.

PUBLIC MEETING:

Public meeting will be held to facilitae discussions on the Draft EIA and EMPr to obtain comments and inputs from the Interested and Affected Parties (I&APs), therefore you are requested to register your names as I&APs within 15 days, thus, on/before **May 16, 2025**. You are further requested to submit your comments within 30 days from the date this notice was published. Take note that your comments must be submitted on or before **May 31, 2026**, to the details below:

Contact Details of the EAP

Consultant: **Vahlengwe Mining Advisory and Consulting** | Contact person: **Sunday Mabaso** | Postal address: **238 Voster Ave, Glenvista Extension 3, Johannesburg South, 2058** | Contact: **+27 11 432 0062 / 074 569 7312** | E-mail: **info@vahlengweadvisory.co.za**

TALETSO YA GO IKWADISA JAAKA LEKOKO LE LE LE KGATLHEGANG LE LE LE AMEGANG LE GO TLHAGISA PEGELO YA LENANEO LA LENANEO LA TSAMAISO YA TIKOLOGO LE LENANEO LA TAOLO YA TIKOLOGO.

KITSISO YA TUMELO YA TIKOLOGO YA KOPO YA TSHWANELO YA MOEPO YA DITAEMANE (KA KAKARETSO), GAUTA, DIMETALE TSA SETLHOPHA SA POLATINAMO, ARSENIC, CHROME, COBALT, KOPORE, MERCURY, NICKERLERLINE, SILV MABAPI LE DIKAROLO TSA RE/2/313, RE/3/313, LE RE/4/313 TSA POLASE YA CORNWALL 313 KQ LE BOKALO JO SALETSENG JWA DIKAROLO TSA 2, 5, 8, 9, 10 TSA OKOTHEFLEQO, LE KWAE181. MASEPALA WA KGAOLO YA WATERBERG, POROFENSE YA LIMPOPO.
NOMORO YA TSHUPISO YA DMPR: LP 30/5/1/2/3/2/1/10287MR

Kitsiso e neetswe fano ka maikaelelo a go dira thulaganyo ya tetlelelo ya tikologo ya kopo ya tshwanelo ya meepo ya ditaemane ka kakaretso, gauta, dimetale tsa setlhopha sa polatinamo, arsenic, chrome, cobalt, kopore, mercury, nikele, selefera, zinki, le diminerale tsa tshipi. Arengo 297 (Pty) Ltd go ya ka Molao wa Bosetšhaba wa Taolo ya Tikologo (NEMA) (Molao wa 107 wa 1998) jaaka o tlhabolotswe le Melawana ya Tshekatsheko ya Ditlamorago tsa Tikologo (EIA), 2014. Kitsiso fano e neelwa Batho botlhe ba ba Nang le Kgatlhego le ba ba Amegang mo9. 44 ya GNR 982. Thulaganyo ya EIA e ne e tla dirwa go ya ka dikaelo tse mme e ne e tla romelwa kwa bothating jo bo nang le bokgoni, e leng Lefapha la Diminerale le Didirisiwa tsa Petroliamo (DMPR).

DITIRO TSE DI FA GODIMO DI TLHOTLHOMISITSWE:

- GN R 984 (Kitsiso ya Lenaane No. 2 (jaaka e baakantswe)): Tiro 17:Tiro nngwe le nngwe e e akaretsang tiro ya tiro eo e e tlhokang tshwanelo ya meepo go ya ka karolo 22 ya Molao wa Tlhabololo ya Metswedi ya Diminerale le Petroleamo, mmogo le tiro nngwe le nngwe e e maleba jaaka e le mo Kitsisong eno ya Lenaane, mo Kitsisong ya Lenaane 1 ya 2014 kgotsa Kitsiso ya Lenaane 3 ya 2014.
- GNR 984Kitsiso ya Lenaane 2, Tiro 15
- GNR 921 Tiro 10 ka fa tlase ga setlhopha sa B
- GNR 921 Tiro 11 ka fa tlase ga setlhopha sa B

LEFELO LA LEFELO

Lefelo la tshwanelo ya meepo le mo dikarolong tse di farologaneng tsa dipolase tse di latelang: Cornwall 313 KQ le Koedoevlei . Dipolase tsa KQ di le 128, mo teng ga Mmasepala wa Kgaolo ya Waterberg, Porofense ya Limpopo.

KOPANO YA SETŠHABA:

Go tla tshwarwa kopano ya setšhaba go tlhofofatsa dipuisano ka ga Sekwalwa sa EIA le EMPr go bona ditshwaelo le ditshwaelo go tswa go Makoko a a Nang le Kgatlhego le a a Amegang (I&APs), ka jalo lo kopiwa go kwadisa maina a lona jaaka I&APs mo malatsing a le 15, ka jalo, ka/pele ga Motsheganong 2019.16, 2025. O kopiwa gape go romela ditshwaelo tsa gago mo malatsing a le 30 go tloga ka letlha le kitsiso e e phasaladitsweng ka lone. Ela tlhoko gore ditshwaelo tsa gago di tshwanetse go romelwa ka kgotsa pele ga Motsheganong.31, 2026,go ya kwa dintlheng tse di fa tlase:

Dintlha tsa kgolagano tsa EAP

Mogakolodi: **Kgakololo le Bogakolodi jwa Meepo ya Vahlengwe** | Motho wa kgolagano: **Sontaga Mabaso** | Aterese ya poso: **238 Mmila wa Voster, Katoloso ya Glenvista 3, Johannesburg Borwa, 2058** | Kgolagano: **+27 11 432 0062 / 074 569 7312** | Imeile: **info@kgakololo ya bogakolodi.co.za**

UITNODIGING OM AS 'N BELANGHEBBENDE EN GEAFFEKTEERDE PARTY TE REGISTREER EN KOMMENTAAR TE LEWER OP DIE KONSEP-OMGEWINGS-IMPAKASSESSERING EN OMGEWINGSBESTUURSPROGRAMVERSLAG.

KENNISGEWING VAN OMGEWINGSMAGTIGING VIR DIE MYNREG-AANSOEK VIR DIAMANTE (ALGEMEEN), GOUD, PLATINUMGROEPMETALE, ARSEEN, CHROOM, KOBALT, KOPER, KWIK, NIKKEL, SILWER, SINK EN YSTERERTS MINERALE MET BETREKKING TOT GEDEELTES RE/2/313, RE/3/313 EN RE/4/313 VAN DIE PLAAS CORNWALL 313 KQ EN DIE OORBLYF VAN GEDEELTES 2, 5, 8, 9, 10 EN 11 VAN KOEDOEVLEI 128 KQ BINNE DIE WATERBERG-DISTRIKSMUNISIPALITEIT, LIMPOPO-PROVINSIE.

DMPR VERWYSINGSNR: LP 30/5/1/2/3/2/1/10287 MR

Kennis word hiermee gegee van die voorneme om 'n omgewingsmagtigingsproses uit te voer vir 'n aansoek om 'n mynreg van algemene diamante, goud, platinumgroepmetale, arseen, chroom, kobalt, koper, kwik, nikkel, silwer, sink en ysterertsminerale. Arengo 297 (Edms) Bpk ingevolge die Nasionale Omgewingsbestuurswet (NEMA) (Wet 107 van 1998) soos gewysig en die Omgewingsimpakbepalingsregulasies (OIB) van 2014. Kennisgewing word hiermee gegee aan alle Belanghebbende en Geaffekteerde Partye (B&GP's) ingevolge Artikels 39 tot 44 van GNR 982. Die OIB-proses sal onderneem word ingevolge hierdie riglyne en voorgeskrewe aan die betroegde owerheid, die Departement van Minerale en Petroleumbronne (DMPR).

DIE BOSTAANDE AKTIWITEITE VEROORSAAK:

- GN R 984 (Lyskennisgewing Nr. 2 soos gewysig): Aktiwiteit 17. Enige aktiwiteit, insluitend die bedryf van daardie aktiwiteit wat 'n mynreg vereis ingevolge artikel 22 van die Wet op die Ontwikkeling van Minerale en Petroleumhulpbronne, sowel as enige ander toepaslike aktiwiteit soos vervat in hierdie Lyskennisgewing, in Lyskennisgewing 1 van 2014 of Lyskennisgewing 3 van 2014, wat vereis word om die mynreg uit te oefen.
- GNR 984 Notering/kennisgewing 2, Aktiwiteit 15
- GNR 921 Aktiwiteit 10 onder kategorie B
- GNR 921 Aktiwiteit 11 onder kategorie B

WERFLIGGING

Die mynreggebied is gelee in verskeie gedeeltes van die volgende plase: Cornwall 313 KQ en Koedoevlei 128 KQ-plase, binne die Waterberg-distriksmunisipaliteit, Limpopo-provinsie.

OPENBARE VERGADERING:

'n Openbare vergadering sal gehou word om besprekings oor die Konsep-OIB en OBPr te fasiliteer om kommentaar en insette van die Belanghebbende en Geaffekteerde Partye (B&GP's) te bekom. Daarom word u versoek om u name as B&GP's binne 15 dae te registreer, dus voorlop Mei **16 2025.** U word verder versoek om u kommentaar binne 30 dae vanaf die datum waarop hierdie kennisgewing gepubliseer is, in te dien. Let wel dat u kommentaar voor of op Mei **31 2026,** ingedien moet word na die besonderhede hieronder:

Kontakbesonderhede van die EAP

Konsultant: **Vahlengwe Mining Advisory and Consulting** | Kontakpersoon: **Sunday Mabaso** | Posadres: **239 Voster Ave, Glenvista Ext 3, Johannesburg Suid, 2059** | Kontak: **+27 11 432 0062 / 074 569 7312** | E-pos: **info@vahlengweadvisory.co.za**

Minor raped in mall, neighbour arrested

Platinum Bushvelder newspaper | Thabazimbi – A 54-year-old man has been arrested in connection with the alleged rape of a 15-year-old girl in an incident that reportedly took place at a local mall.

According to a media statement issued by the South African Police Service in Limpopo, the incident is alleged to have occurred on Thursday, 30 April 2026, at approximately 15:00. The victim had been at the mall with a friend and the friend's father – their neighbours.

Colonel Malesela Ledwaba reported that the teenager allegedly went to the restroom, where she encountered the man waiting near the exit. It is alleged that he forcibly took her into the male restroom, where the assault occurred, and threatened her not to report the matter.

The incident was reported to police on 4 May 2026, after the victim's mother became concerned upon noticing unusual substances on her daughter's clothes – a few days after the incident. A case was immediately opened, and the suspect was subsequently arrested.

He appeared before the Thabazimbi Magistrate's Court on Wednesday, 6 May 2026. Investigations are ongoing.

Swaai vir 'n saak

Gholfdag bring Thabazimbi saam vir geloof en gemeenskap

Platinum Bushvelder koerant | Thabazimbi – Die NG Kerk Thabazimbi nooi die gemeenskap hartlik uit na hul jaarlikse gholfdag wat op Saterdag, 30 Mei 2026 by die Thabazimbi Gholfklub plaasvind. Die gewilde dag vorm deel van die kerk se Gemeentefees en dien ook as 'n belangrike fondsinsamelingsprojek. Met hul missie, "*Ons leef vir Christus en Sy Koninkryk*," streef die gemeente daarna om 'n verskil te maak binne én buite die gemeenskap – en die gholfdag bied die perfekte geleentheid vir inwoners en besighede om betrokke te raak.

Deelnemers kan uitsien na 'n dag vol Bosveld-gasvryheid en asemrowende natuurskoon, met 'n parespel (*full scramble*) formaat en 'n afslaan om 11:00. Die inskrywingsfooi sluit onder meer koffie en broodjies, nat gate, 'n halfweg-ete en aantreklike pryse in.

Besighede en individue word ook aangemoedig om as borge betrokke te raak, met verskeie borgopsies beskikbaar. Enige verdere donasies of pryse is welkom.

Vir meer inligting of om in te skryf, kontak Chappies Behrens by 073 605 8033, Esmé Behrens by 076 798 4636 of Luzaan Combrink by 082 593 7084.

TAR REALLY NEEDS YOUR HELP

Thabazimbi – There is a special plea to the community of Thabazimbi to support Thabazimbi Animal Rescue (TAR), your local animal shelter. TAR needs donations of food. The facility is filled with animals that need your help. Please assist TAR to feed the animals in their care. Without donations they will not be able to feed, home and medically treat the animals. The community has proven time and again how they can stand together and support this worthy cause and this time is no exception. **For more information, please contact TAR on 084 885 6487.**

SANRAL | bvi 50 | WBHO CEBEKHULU CONSTRUCTION JOINT VENTURE

WBHO/Cebekhulu JV invites enterprises from with the Thabazimbi Local Municipality to submit their bids for contract SANRAL R.516-010-2019/1R FOR THE IMPROVEMENT OF NATIONAL ROAD R516 SECTION 1 FROM R516 (KM 0.00) TO TOOYSPRUIT (KM 36.67)

Preference will be given to prospective tenderers from within the Thabazimbi Local Municipality. The following packages will be going out for tender as part of the Round 3 scope.

Scope of Works	Type	Work package Number	Minimum CIDB requirement	Tender Documents
Guardrails	Supply and Install	R.516-010-2019/1R-TE22	CIDB 3 & 4	https://sendfile.wbho.co.za/app?operation=pubcop&id=1777963748187X6959155441000gkH30
Subsoils	Supply and Install	R.516-010-2019/1R-TE23	CIDB 1 & 2	https://sendfile.wbho.co.za/app?operation=pubcop&id=1777963969809X6959155441000ZwVyR
Prime	Supply and Spray	R.516-010-2019/1R-TE24	N/A	https://sendfile.wbho.co.za/app?operation=pubcop&id=1777964072994X6959155441000ZmfT

These tenders will be evaluated in terms of the following criteria locality, BBBEE ownership, functionality, price and preference points system. Tenderers who satisfy the following criteria are eligible to submit tenders:

1. B-BBEE Level 1 or 2 contributor.
2. Exempted Micro Enterprise (EME) or Qualifying Small Enterprise (QSE).
3. Registered on the National Treasury Central Supplier Database (CSD).
4. An award will only be given to preferred tenderers that are:
   - Compliant with the Compensation for Occupational Injuries and Diseases Act (COID)
   - Tax Compliant with South African Revenue Service (SARS).

Note: Tenderers should not be a member of the Public Liaison Committee (PLC), or an employee of or affiliated to any Municipal and Government Department.

Compulsory information briefing sessions and Tender closing dates:

Scope of Works	Type	Work package Number	Information Briefing Venue & Date	Tender Submission Closing Date & Time
Guardrails	Supply and Install	R.516-010-2019/1R-TE22	Leeupoort Mining Town, recreational club (next to Church) – 15th May 2026 @ 13:00 pm	Tuesday, 26th May 2026 @13:00
Subsoils	Supply and Install	R.516-010-2019/1R-TE23	Leeupoort Mining Town, recreational club (next to Church) – 15th May 2026 @ 14:00 pm	Tuesday, 26th May 2026 @13:00
Prime	Supply and Spray	R.516-010-2019/1R-TE24	Leeupoort Mining Town, recreational club (next to Church) – 15th May 2026 @ 15:00 pm	Tuesday, 26th May 2026 @13:00

Notes to Tenderers: WBHO/Cebekhulu JV will reserve the right to negotiate feasible rates with the preferred tenderers if necessary. Tenderers must specify on their cover page the tender package they are applying for Tenderers may submit tenders for all sub-contracts in this Tender Notice, but only 1 (one) subcontract will be let per preferred Tenderer at any one time for this project.

The tender and supporting documents shall be sealed in an envelope and clearly marked:

"SUBCONTRACT SANRAL R.516-010-2019/1R FOR THE IMPROVEMENT OF NATIONAL ROAD R516 SECTION 1 FROM R516 (KM0.00) TO TOOYSPRUIT (KM 36.67)" and shall be delivered by hand and placed in the tender box marked **"R516 Tooyspruit Tender Box"** Leeupoort Mining Town, **WBHO/CEBEKHULU Site Offices** co-ordinates **24°64'40.5"S 27°43'38.8"E**

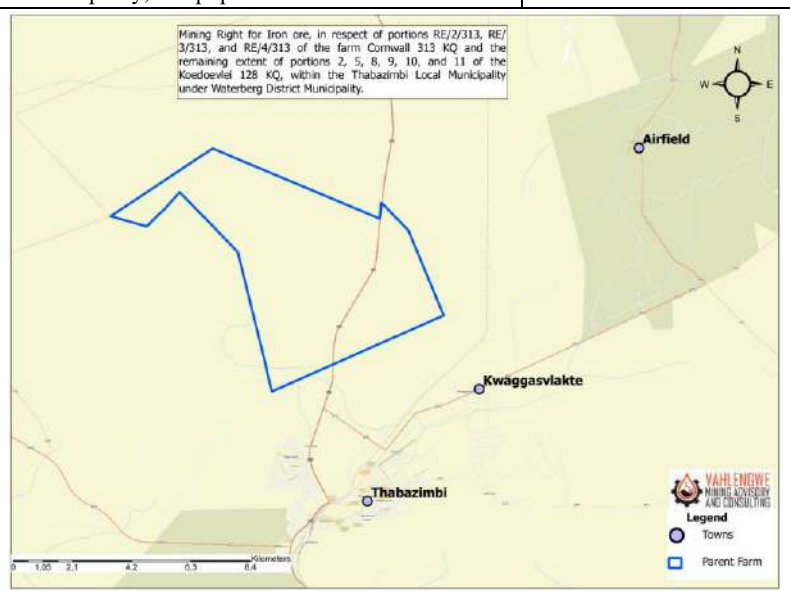
Tenders must specify on cover page the tender package they are applying for. All tenders to be submitted no later than 13h00 on the 26th of May 2026

Queries may be addressed to Thobekile Tshabalala – Email: Tooyspruit@wbho.co.za Subject Line: R516 Tooyspruit – "Company Name" – "Scope Mentioned Above"

Arengo 297 (PTY) LTD

INVITATION TO REGISTER AS AN INTERESTED AND AFFECTED PARTY AND COMMENT ON THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT.	**UITNODIGING OM AS 'N BELANGHEBBENDE EN GEAFFEKTEERDE PARTY TE REGISTREER EN KOMMENTAAR TE LEWER OP DIE KONSEP-OMGEWINGSIMPAKASSESSERING EN OMGEWINGSBESTUURSPROGRAMVERSLAG.**	**TALETSO YA GO IKWADISA JAAKA LEKOKO LE LE LE KGATLHEGANG LE LE LE AMEGANG LE GO TLHAGISA PEGELO YA LENANEO LA LENANEO LA TSAMAISO YA TIKOLOGO LE LENANEO LA TAOLO YA TIKOLOGO.**
NOTICE OF ENVIRONMENTAL AUTHORISATION FOR THE MINING RIGHT APPLICATION FOR DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE MINERALS ORE IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF KOEDOEVLEI 128 KQ WITHIN THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE. **DMPR REFERENCE NO: LP 30/5/1/2/3/2/1 10287 MR**	**KENNISGEWING VAN OMGEWINGSMAGTIGING VIR DIE MYNREG-AANSOEK VIR DIAMANTE (ALGEMEEN), GOUD, PLATINUMGROEPMETALE, ARSEEN, CHROOM, KOBALT, KOPER, KWIK, NIKKEL, SILWER, SINK EN YSTERERTS MINERALE MET BETREKKING TOT GEDEELTES RE/2/313, RE/3/313 EN RE/4/313 VAN DIE PLAAS CORNWALL 313 KQ EN DIE OORBLYF VAN GEDEELTES 2, 5, 8, 9, 10 EN 11 VAN KOEDOEVLEI 128 KQ BINNE DIE WATERBERG-DISTRIKSMUNISIPALITEIT, LIMPOPO-PROVINSIE.** **DMPR VERWYSINGSNR: LP 30/5/1/2/3/2/1 10287 MR**	**KITSISO YA TUMELO YA TIKOLOGO YA KOPO YA TSHWANELO YA MOEPO YA DITAEMANE (KA KAKARETSO), GAUTA, DIMETALE TSA SETLHOPHA SA POLATINAMO, ARSENIC, CHROME, COBALT, KOPORE, MERCURY, NICKERLERLINE, SILV MABAPI LE DIKAROLO TSA RE/2/313, RE/3/313, LE RE/4/313 TSA POLASI YA CORNWALL 313 KQ LE BOKALO JO SALETSENG JWA DIKAROLO TSA 2, 5, 8, 9, 10, OKOTHEFLEQO, LE K811. MASEPALA WA KGAOLO YA WATERBERG, POROFENSE YA LIMPOPO.** **DMPR REFERENCE NO: LP 30/5/1/2/3/2/1 10287 MR**
Notice is hereby given in the intent to conduct an environmental authorization process for an application of a mining right of general diamonds, gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore minerals. Arengo 297 (Pty) Ltd in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998) as amended and the Environmental Impact Assessment (EIA) Regulations, 2014. Notification is hereby given to all Interested and Affected Parties (I&APs) in terms of Sections 39 to 44 of GNR 982. The EIA process would be undertaken in terms of these guidelines and be submitted to the competent authority, the Department of Mineral and Petroleum Resources (DMPR).	Kennis word hiermee gegee van die voorneme om 'n omgewingsmagtigingsproses uit te voer vir 'n aansoek om 'n mynreg van algemene diamante, goud, platinumgroepmetale, arseen, chroom, kobalt, koper, kwik, nikkel, silwer, sink en ysterertsminerale. Arengo 297 (Edms) Bpk ingevolge die Nasionale Omgewingsbestuurswet (NEMA) (Wet 107 van 1998) soos gewysig en die Omgewingsimpakbepalingsregulasies (OIB) van 2014. Kennisgewing word hiermee gegee aan alle Belanghebbende en Geaffekteerde Partye (B&GP's) ingevolge Artikels 39 tot 44 van GNR 982. Die OIB-proses sal onderneem word ingevolge hierdie riglyne en voorgelê word aan die bevoegde owerheid, die Departement van Minerale en Petroleumbronne (DMPR).	Kitsiso e neetswe fano ka maikaelelo a go dira thulaganyo ya tetlelelo ya tikologo ya kopo ya tshwanelo ya meepo ya ditaemane ka kakaretso, gauta, dimetale tsa setlhopha sa polatinamo, arsenic, chrome, cobalt, kopore, mercury, nikele, selefera, zinki, le diminerale tsa tshipi. Arengo 297 (Pty) Ltd go ya ka Molao wa Bosetšhaba wa Taolo ya Tikologo (NEMA) (Molao wa 107 wa 1998) jaaka o tlhabolotswe le Melawana ya Tshekatsheko ya Ditlamorago tsa Tikologo (EIA), 2014. Kitsiso fano e neelwa Batho botlhe ba ba Nang le Kgatlhego le ba ba Amegang mo9. 44 ya GNR 982. Thulaganyo ya EIA e ne e tla dirwa go ya ka dikaelo tse mme e tla neelwa bothati jo bo nang le bokgoni, e leng Lefapha la Diminerale le Didirisiwa tsa Petroliamo (DMPR).

<u>GN R 984 (Listing Notice No. 2 (as amended)): Activity 17:</u> Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right.	**<u>GN R 984 (Lyskennisgewing Nr. 2 (soos gewysig)): Aktiwiteit 17</u>:** Enige aktiwiteit, insluitend die bedryf van daardie aktiwiteit wat 'n mynreg vereis ingevolge artikel 22 van die Wet op die Ontwikkeling van Minerale en Petroleumhulpbronne, sowel as enige ander toepaslike aktiwiteit soos vervat in hierdie Lyskennisgewing, in Lyskennisgewing 1 van 2014 of Lyskennisgewing 3 van 2014, wat vereis word om die mynreg uit te oefen	**<u>GN R 984(Kitsiso ya Lenaane No. 2 (jaaka e baakantswe)): Tiro 17:</u>** Tiro nngwe le nngwe e e akaretsang tiro ya tiro eo e e tlhokang tshwanelo ya meepo go ya ka karolo 22 ya Molao wa Tlhabololo ya Metswedi ya Diminerale le Petroleamo, mmogo le tiro nngwe le nngwe e e maleba jaaka e le mo Kitsisong eno ya Lenaane, mo Kitsisong ya Lenaane 1 ya 2014 kgotsa Kitsiso ya Lenaane 3 ya 2014.
<u>PROPOSED SITE LOCATION.</u> The mining right area is located in various portions of the following farms: Cornwall 313 KQ and Koedoevlei 128 KQ farms, within the Waterberg District Municipality, Limpopo Province.	**<u>VOORGESTELDE TERREINLIGGING.</u>** Die mynreggebied is geleë in verskeie gedeeltes van die volgende plase: Cornwall 313 KQ en Koedoevlei 128 KQ-plase, binne die Waterberg-distriksmunisipaliteit, Limpopo-provinsie.	**<u>LEFELO LA LEFELO LE LE TSHINYELWANG.</u>** Lefelo la tshwanelo ya meepo le mo dikarolong tse di farologaneng tsa dipolase tse di latelang: Cornwall 313 KQ le Koedoevlei . Dipolase tsa KQ di le 128, mo teng ga Mmasepala wa Kgaolo ya Waterberg, Porofense ya Limpopo.



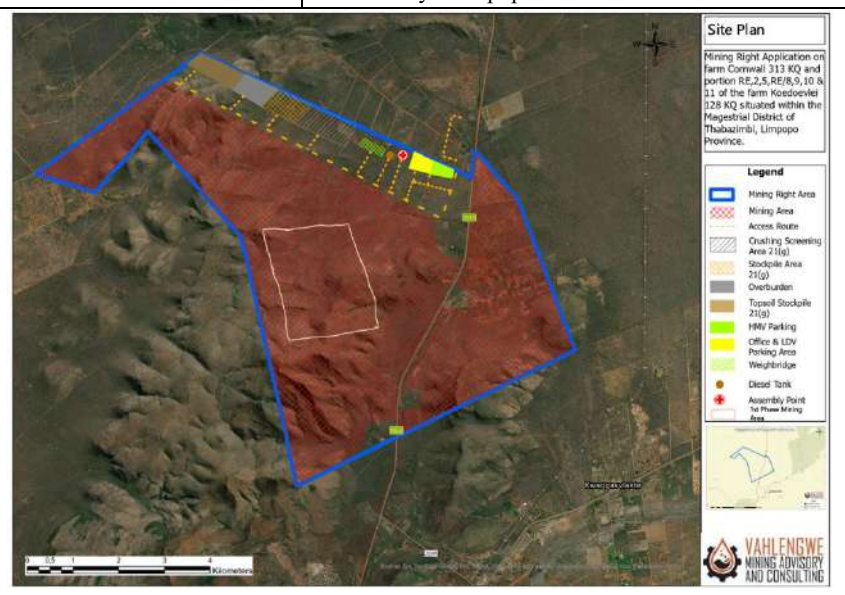


Figure 1: Locality map of the proposed mining right area

Applicant : **Arengo 297 (Pty) Ltd** Contact person : **Allen Tavakoli** Tel : **+27 83 333 0000** E-mail : **dlxsteelhq@gmail.com** Consultant : **Vahlengwe Mining Advisory and Consulting** Contact person: **Sunday Mabaso** Postal address : **238 Voster Ave, Glenvista Extension 3, Johannesburg South, 2058** Tel : E-mail : sunday@vahlengweadvisory.co.za	Maatskappy : **Arengo 297 (Pty) Ltd** Kontakpersoon : **Allen Tavakoli** Tel : **+27 83 333 0000** E-pos : **dlxsteelhq@gmail.com** Konsultant: **Vahlengwe Mining Advisory and Consulting** Kontakpersoon: **Sunday Mabaso** Posadres : **238 Voster Ave, Glenvista Extension 3, Johannesburg South, 2058** Tel : +27 11 432 0062 / 074 569 7312 E-pos : sunday@vahlengweadvisory.co.za	Setlamo : **Arengo 297 (Pty) Ltd** Motho yo o ka ikgolaganyang le ene: **Allen Tavakoli** Mogala : **+27 83 333 0000** Imeile : **dlxsteelhq@gmail.com** Mogakolodi: **Vahlengwe Mining Advisory and Consulting** Motho yo o ka ikgolaganyang le ene: **Sunday Mabaso** Aterese ya poso : **238 Voster Ave, Glenvista Extension 3, Johannesburg South, 2058** Mogala : +27 11 432 0062 / 074 569 7312 Imeile : sunday@vahlengweadvisory.co.za
A public meeting will be held to facilitate discussions on the Draft Environmental Impact Report to obtain comments and inputs from all Interested and Affected Parties (I&APs) involving the landowners and lawful occupiers of the proposed property; therefore, you are requested to register your names as I&APs within 15 days. You are further requested to submit your comments within 30 days from the date this notice was published. Take note that your comments must be submitted to the details below: Contact : +27 11 432 0062 / 074 569 7312 E-mail : info@vahlengweadvisory.co.za or sunday@vahlengweadvisory.co.za	'n Openbare vergadering sal gehou word om besprekings oor die Konsep Omgewingsimpakverslag te fasiliteer om kommentaar en insette van alle Belanghebbende en Geaffekteerde Partye (B&GP's) wat die grondeienaars en wettige okkupeerders van die voorgestelde eiendom betref, te bekom; daarom word u versoek om u name as B&GP's binne 15 dae te registreer. U word verder versoek om u kommentaar binne 30 dae vanaf die datum waarop hierdie kennisgewing gepubliseer is, in te dien. Let daarop dat u kommentaar aan die onderstaande besonderhede voorgelê moet word: Kontak : +27 11 432 0062 / 074 569 7312 E-pos : info@vahlengweadvisory.co.za or sunday@vahlengweadvisory.co.za	Go tla tshwarwa kopano ya setšhaba go tlhofofatsa dipuisano ka ga Pegelo ya Tlhatlhobo ya Ditlamorago tsa Tikologo go bona ditshwaelo le ditshwaelo go tswa mo Makokong otlhe a a Nang le Kgatlhego le a a Amegang (I&APs) a a akaretsang beng ba lefatshe le baagi ba semolao ba thoto e e tshitshintsweng; ka jalo, lo kopiwa go kwadisa maina a lona jaaka I&APs mo malatsing a le 15. O kopiwa gape go romela ditshwaelo tsa gago mo malatsing a le 30 go tloga ka letlha le kitsiso e e phasaladitsweng ka lone. Ela tlhoko gore ditshwaelo tsa gago di tshwanetse go romelwa kwa dintlheng tse di fa tlase **Kgolagano** : +27 11 432 0062 / 074 569 7312 **Imeile** : info@vahlengweadvisory.co.za or sunday@vahlengweadvisory.co.za

VAHLENGWE MINING ADVISORY AND CONSULTING

***Address*: 238 Voster Avenue, Glenvista, 2058**
Tel: +27 11 432 0062 / 074 569 7312
E-mail*: *info@vahlengweadvisory.co.za

BACKGROUND INFORMATION DOCUMENT FOR THE ENVIRONMENTAL AUTHORIZATION: MINING RIGHT (EIA) APPLICATION.

ENVIRONMENTAL AUTHORISATION FOR MINING RIGHT APPLICATION FOR DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE, IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.

DMRE REFERENCE NO: LP 30/5/1/2/3/2/1/10287 MR

PURPOSE OF THIS DOCUMENT

This Background Information Document (BID) has been prepared as part of the notification and consultation process required in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998). It describes the following:

- Background information regarding the proposed project;
- Information about the site and the proposal being considered;
- Public participation process; and
- Suggestions on how the stakeholders, including the I&APs, can participate in the process.

APPOINTMENT OF ENVIRONMENTAL ASSESSMENT PRACTITIONERS

Vahlengwe Mining Advisory and Consulting, as an Environmental Assessment Practitioner (EAP), will conduct the Environmental Authorization process for the mining right (EIA) application in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of Farm Koedoevlei 128 KQ.

PROJECTION LOCATION

The proposed mining right is located in the northern part of Thabazimbi and approximately 6.02 km, in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality. This area covers an extent of 3,892.0 ha.

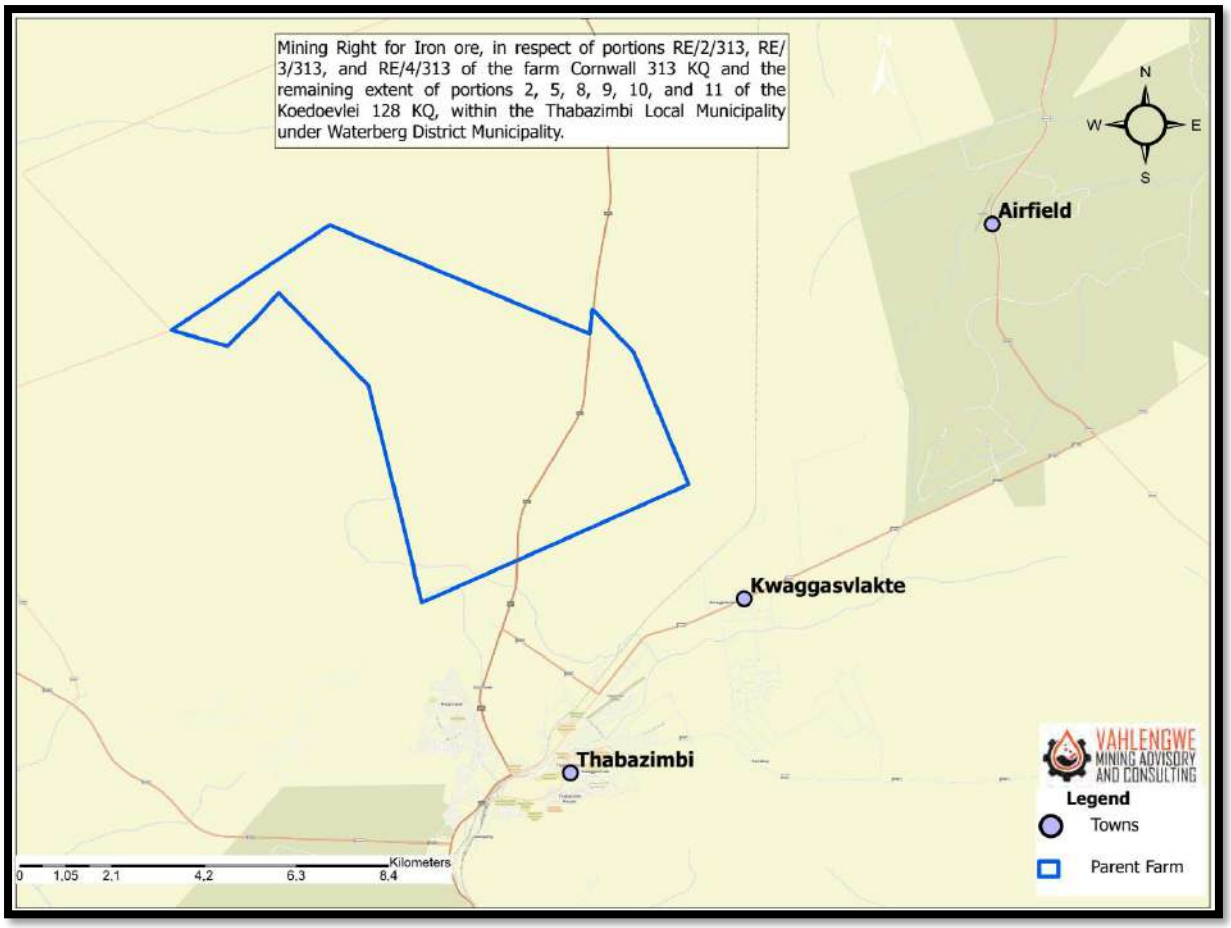


Figure 1: Locality map of the proposed mining right area in Thabazimbi

PROJECT DESCRIPTION

Arengo 297 (Pty) Ltd proposes to undertake the mining right activities in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality. This area covers an extent of 3,892.0 ha. The project entails the proposed mining right application for the mining of diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore. Vahlengwe Mining Advisory and Consulting (Pty) Ltd will compile the mining right (EIA) and environmental management program report (EMPR) for the mining of mineral excavations and facilitate the public participation process (PPP).

PUBLIC PARTICIPATION PROCESS.

The public consultation process aims to enable landowners, lawful occupiers, directly affected individuals, and/or other Interested and Affected Parties (I&APs) to raise any issues, concerns, and/or comments regarding the mining activities. A proof of consultation report will be

developed and submitted to the Department of Mineral and Petroleum Resources (DMPR). The proposed project requires an environmental impact assessment process in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended).

The following steps will be followed while conducting public participation.

- Issuing of notification of this project to:
  - Owners and occupiers of the farms, as well as those adjacent to the site
  - Municipal Councillor
  - The municipality that has jurisdiction and any organ of state having jurisdiction
- Placing an advert in a local newspaper.
- Placing a notice on the site's notice.
- Meetings with landowners and key I&APs, as required.
- Public review of the draft environmental impact assessment and environmental management program.

PUBLIC INVOLVEMENT

Public involvement is an essential component of the process. It addresses the right of interested and affected parties (I&APs) to be informed of the proposed activities.
All Interested and Affected Parties (I&APs) are invited to submit their inputs, concerns, and comments regarding the proposed mining right activities to Arengo 297 (Pty) Ltd via email, registered post, or telephonically. The Interested and Affected Parties (I&APS) Form is made available below for you to fill in your personal details and comments. Kindly do so and submit it back to us.

HOW TO OBTAIN FURTHER INFORMATION.

Registering as I&APs will ensure that you are placed on a database to be informed of any progress regarding the project. You can do so by filling in the form below and returning it to the relevant person listed below.

We encourage the I&APs to review the information presented to you in this Background Information Document (BID) and to register as an I&AP for the attached respondent sheet and return it to us.

PUBLIC CONSULTATION CONTACTS:

Name : Sunday Mabaso
Postal address : 238 Vorster Ave, Glenvista Ext 3, Glenvista, 2058
Contact : +27 11 432 0062/074 569 7312
E-mail : info@vahlengweadvisory.co.za

APPLICANT CONTACTS

Name : Allan Tavakoli
Postal Address : 533 Cliff Avenue, Waterkloof Ridge, Pretoria 0181
Tel : +27 83 333 0000
E-mail : dlxsteelhq@gmail.com

AGTERGRONDINLIGTINGSDOKUMENT VIR DIE OMGEWINGSMAGTIGING:AANSOEK OM MYNREG (OIS).

OMGEWINGSMAGTIGING VIR MYNREG AANSOEK VIRDIAMANTE (ALGEMEEN), GOUD, PLATINUMGROEPMETALE, ARSEEN, CHROOM, KOBALT, KOPER, KWIK, NIKKEL, SILWER, SINK EN YSTERERTS, MET BETREKKING TOT GEDEELESRE/2/313, RE/3/313, EN RE/4/313 VAN DIE PLAAS CORNWALL 313 KQ EN DIE OORBLYF VAN GEDEELTES 2, 5, 8, 9, 10, EN 11 VAN DIE KOEDOEVLEI 128 KQ, BINNE DIE THABAZIMBI PLAASLIKE MUNISIPALITEIT VAN DIE WATERBERG DISTRIKSMUNISIPALITEIT, LIMPOPO PROVINSIE.

DMRE VERWYSINGSNR: LP 30/5/1/2/3/2/1/10287 MR

DOEL VAN HIERDIE DOKUMENT

Hierdie Agtergrondinligtingsdokument (AID) is voorberei as deel van die kennisgewing- en konsultasieproses wat vereis word ingevolge die Wet op Nasionale Omgewingsbestuur (NEMA) (Wet 107 van 1998). Dit beskryf die volgende:

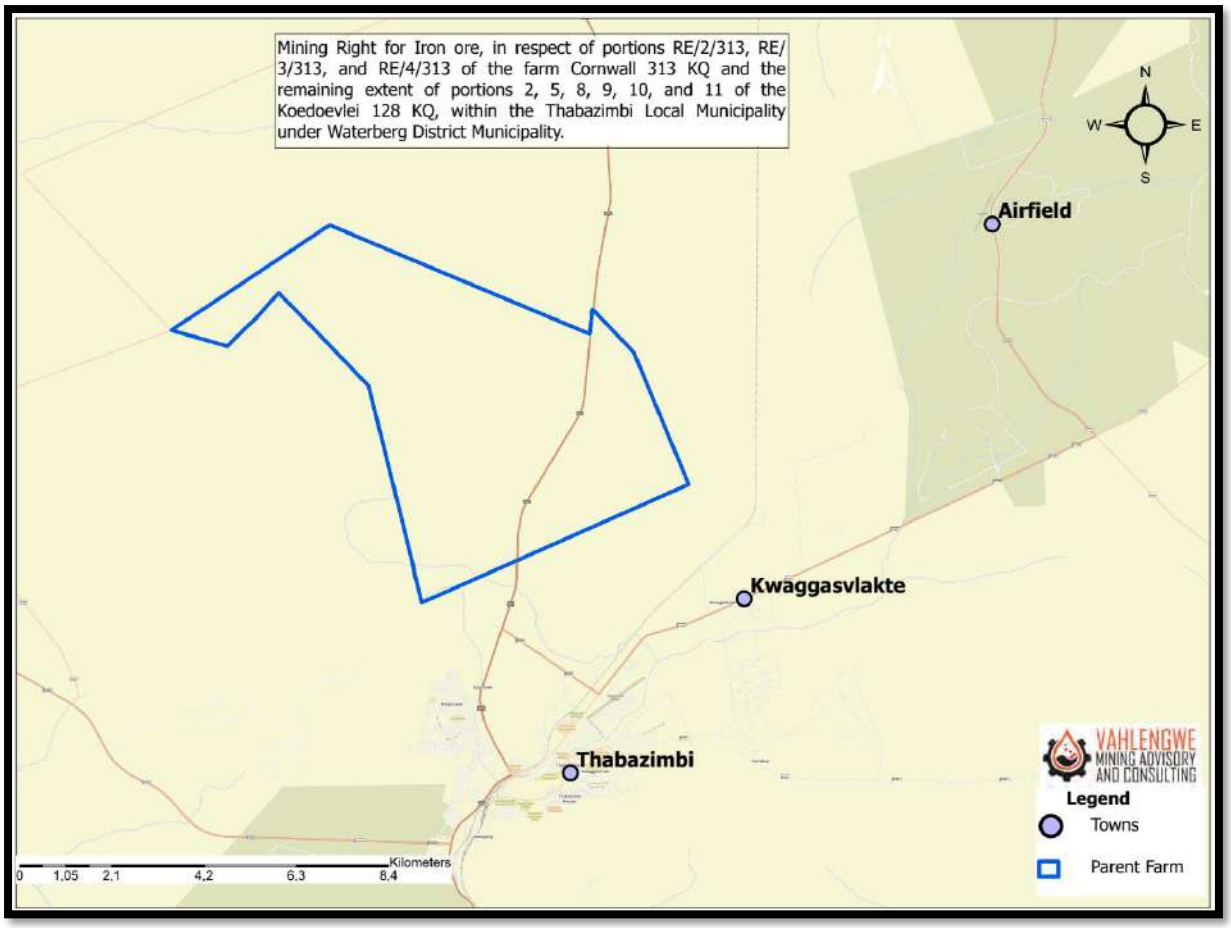
- Agtergrondinligting rakende die voorgestelde projek;
- Inligting oor die terrein en die voorstel wat oorweeg word;
- Openbare deelnameproses; en
- Voorstelle oor hoe die belanghebbendes, insluitend die B&GP's, aan die proses kan deelneem.

AANSTELLING VAN OMGEWINGSEVAARDERINGSPRAKTISYNS

Vahlengwe Mining Advisory and Consulting, as 'n Omgewingsassesseringspraktisyn (OAP), sal die Omgewingsmagtigingsproses vir die mynreg (OIA) aansoek uitvoer met betrekking tot gedeeltes RE/2/313, RE/3/313, en RE/4/313 van die plaas Cornwall 313 KQ en die oorblywende gedeeltes 2, 5, 8, 9, 10, en 11 van Plaas Koedoevlei 128 KQ.

PROJEKSIE LIGGING

Die voorgestelde mynreg is geleë in die noordelike deel van Thabazimbi en ongeveer 6.02 km, met betrekking tot gedeeltes RE/2/313, RE/3/313, en RE/4/313 van die plaas Cornwall 313 KQ en die oorblywende gedeeltes 2, 5, 8, 9, 10, en 11 van die Koedoevlei 128 KQ, binne die Thabazimbi Plaaslike Munisipaliteit van die Waterberg Distriksmunisipaliteit. Hierdie gebied beslaan 'n oppervlakte van 3,892.0 ha.



Figuur 1: Lokaliteitskaart van die voorgestelde mynreggebied in Thabazimbi

PROJEKBESKRYWING

Arengo 297 (Edms) Bpkstel voor om die mynbouregte-aktiwiteite uit te voerten opsigte van gedeeltes RE/2/313, RE/3/313, en RE/4/313 van die plaas Cornwall 313 KQ en die oorblywende gedeelte van gedeeltes 2, 5, 8, 9, 10, en 11 van die Koedoevlei 128 KQ, binne die Thabazimbi Plaaslike Munisipaliteit van die Waterberg Distriksmunisipaliteit. Hierdie gebied beslaan 'n oppervlakte van 3,892.0 ha.Die projek behels die voorgestelde aansoek om mynreg vir die ontginning vandiamante (algemeen), goud, platinumgroepmetale, arseen, chroom, kobalt, koper, kwik, nikkel, silwer, sink en ysterertsVahlengwe Mining Advisory and Consulting (Edms) Bpk sal die mynreg (OIE) en omgewingsbestuursprogramverslag (OMV) vir die mynbou van mineraaluitgrawings saamstel en die openbare deelnameproses (OPP) fasiliteer.

OPENBARE DEELNAMEPROSES.

Die openbare konsultasieproses is daarop gemik om grondeienaars, wettige okkupeerders, direk geaffekteerde individue en/of ander Belanghebbende en Geaffekteerde Partye (B&GP's) in staat te stel om enige kwessies, bekommernisse en/of kommentaar rakende die mynbouaktiwiteite te opper. 'n Bewys van konsultasieverslag sal ontwikkel en aan die Departement van Minerale en Petroleumhulpbronne (DMBR) voorgelê word. Die voorgestelde projek vereis 'n omgewingsimpakstudieproses ingevolge die Wet op Nasionale Omgewingsbestuur, 1998 (Wet 107 van 1998) (soos gewysig).

Die volgende stappe sal gevolg word tydens die uitvoering van openbare deelname.

- Uitreiking van kennisgewing van hierdie projek aan:
  - Eienaars en bewoners van die plase, sowel as dié aangrensend aan die perseel
  - Munisipale Raadslid
  - Die munisipaliteit wat jurisdiksie het en enige staatsorgaan wat jurisdiksie het
- Die plasing van 'n advertensie in 'n plaaslike koerant.
- Plaas 'n kennisgewing op die webwerf se kennisgewing.
- Vergaderings met grondeienaars en belangrike B&GP's, soos nodig.
- Openbare oorsig van die konsep-omgewingsimpakstudie en omgewingsbestuursprogram.

OPENBARE BETROKKENHEID

Openbare betrokkenheid is 'n noodsaaklike komponent van die proses. Dit spreek die reg van belanghebbende en geaffekteerde partye (B&GP's) aan om ingelig te word oor die voorgestelde aktiwiteite.

Alle Belangstellende en Geaffekteerde Partye (B&GP's) word uitgenooi om hul insette, bekommernisse en kommentaar rakende die voorgestelde mynbou-aktiwiteite aan Arengo 297 (Edms) Bpk. per e-pos, geregistreerde pos of telefonies in te dien. Die Belangstellende en Geaffekteerde Partye (B&GP)-vorm word hieronder beskikbaar gestel sodat u u persoonlike besonderhede en kommentaar kan invul. Doen dit asseblief en stuur dit terug aan ons.

HOE OM VERDERE INLIGTING TE BEKOM.

Registrasie as B&GP's sal verseker dat u op 'n databasis geplaas word om op hoogte te bly van enige vordering rakende die projek. U kan dit doen deur die onderstaande vorm in te vul en dit terug te stuur na die betrokke persoon wat hieronder gelys word.

Ons moedig die B&GP's aan om die inligting wat in hierdie Agtergrondinligtingsdokument (BID) aan u aangebied word, te hersien en as 'n B&GP vir die aangehegte respondentvorm te registreer en dit aan ons terug te stuur.

OPENBARE RAADPLEGINGSKONTAKTE:

Naam	:Sondag Mabaso
Posadres	:238 Vorster Ave, Glenvista Ext 3, Glenvista, 2058
Kontak	: +27 11 432 0062/074 569 7312
E-pos	:info@vahlengweadvisory.co.za

AANSOEKER KONTAKTE

Naam	: Allan Tavakoli
Posadres	:533 Cliff Avenue, Waterkloof Ridge, Pretoria 0181
Tel.	: +27 83 333 0000
E-pos	: dlxsteelhq@gmail.com

Arengo 297 (PTY) LTD

Interested & Affected Party Registration Form

Project Reference No: LP 30/5/1/2/3/2/1 10287 MR

Name and Surname	
Physical Address	
Contact Details	***Telephone No.:*** ***Fax No.:*** ***Cell No.:*** ***E-mail Address:***
Please indicate any issues, comments, and concerns regarding the proposed project.	
Please indicate in which aspects you would require more information.	
Please indicate any I&APs whom you think should be contacted.	
To be registered as an I&AP for this project, mail or e-mail the completed registration form to: **Sunday M Mabaso** **Postal address: 238 Vorster Ave, Glenvista Ext 3, Glenvista, 2058** **Contact: +27 11 432 0062 / 074 569 7312** **E-mail: info@vahlengweadvisory.co.za**	

Appendix 4:

Environmental Sensitivity Screening Report

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: LP 30/5/1/2/2/ 10287MR

Project name: Mining Right

Project title: Mining Right

Date screening report generated: 06/02/2026 15:38:04

Applicant: Arengo 297 (Pty) Ltd

Compiler: Nqasha Lusizo

Compiler signature: .....

Application Category: Mining|Mining Right

OFFICIAL

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MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY 11

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY 12

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY 13

MAP OF RELATIVE DEFENCE THEME SENSITIVITY 14

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY 15

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 16

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 17

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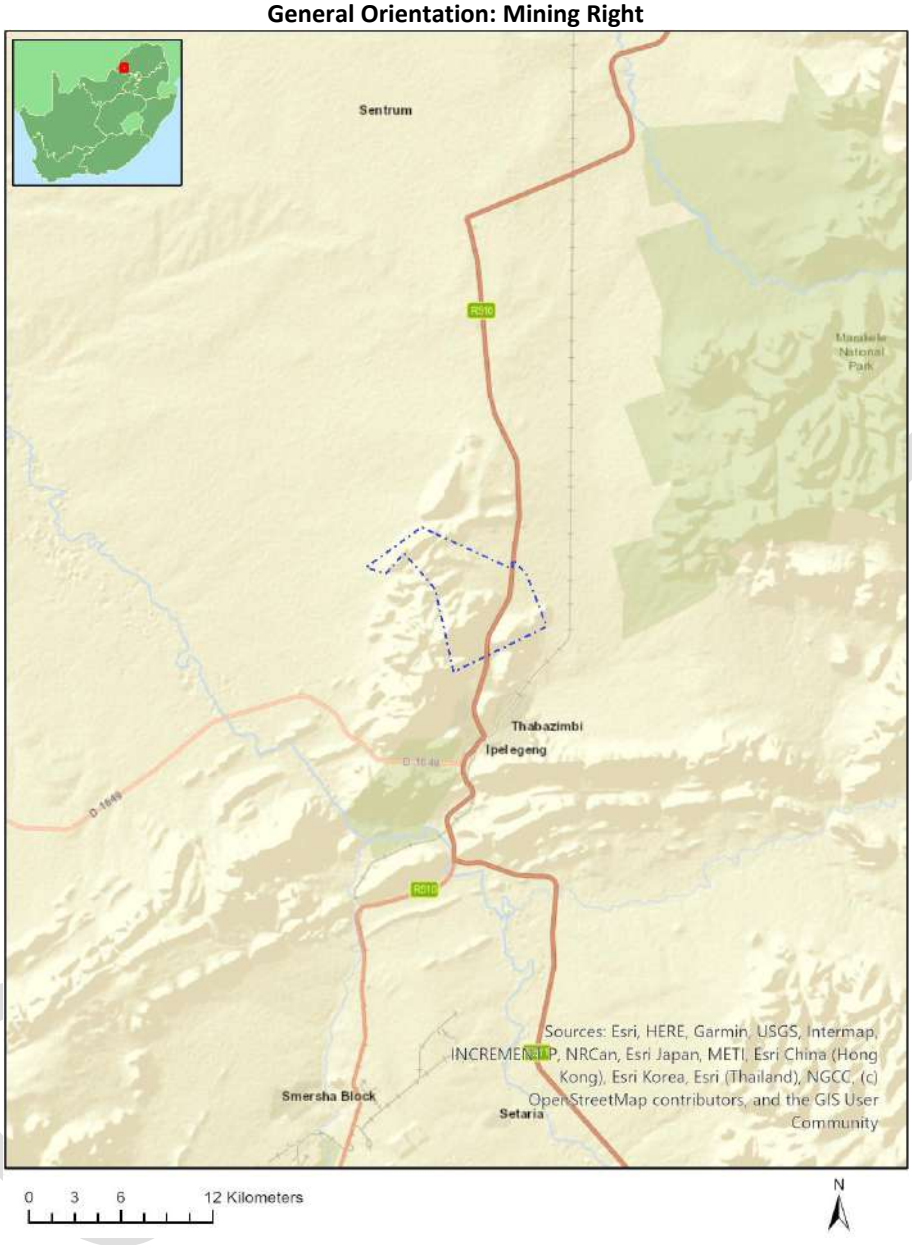
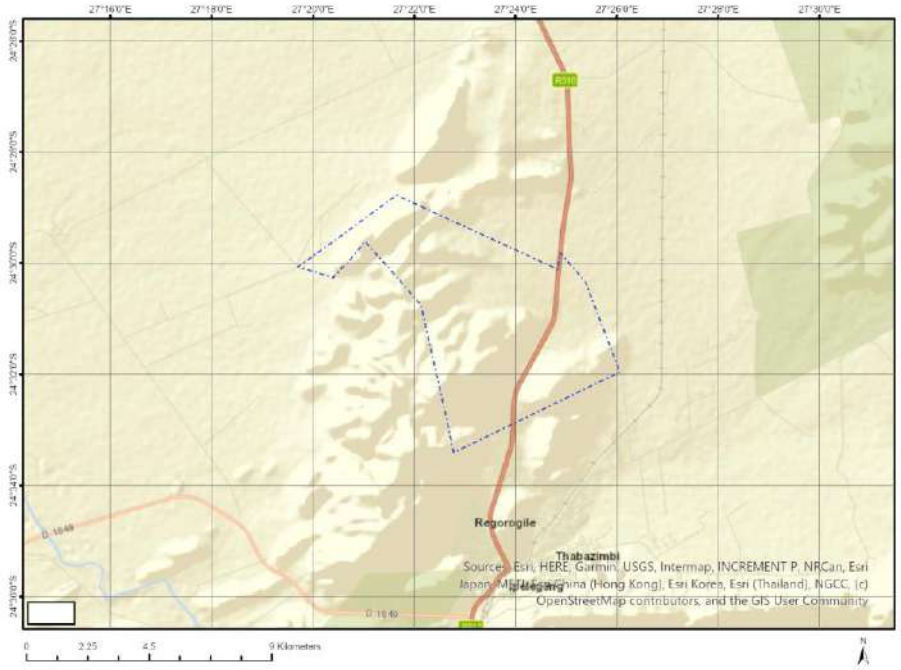
Proposed Project Location

Orientation map 1: General location

General Orientation: Mining Right



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		713	0	24°30'26.91S	27°26'10.42E	Farm
2	CORNWALL	313	0	24°31'39.85S	27°23'58.49E	Farm
3	VLAKPLAATS	137	0	24°27'15.69S	27°26'3.26E	Farm
4	KOEDOEVLEI	128	0	24°29'47.02S	27°22'44.98E	Farm
5	LEEUWBOSCH	129	0	24°27'4.22S	27°23'38.28E	Farm
6	KOEDOEVLEI	128	0	24°29'56.26S	27°22'45.83E	Farm Portion
7	KOEDOEVLEI	128	2	24°29'10.62S	27°21'19.07E	Farm Portion
8	KOEDOEVLEI	128	5	24°29'53.42S	27°20'24.81E	Farm Portion
9	KOEDOEVLEI	128	9	24°30'16.03S	27°24'50.76E	Farm Portion
10	KOEDOEVLEI	128	8	24°30'7.51S	27°24'58.89E	Farm Portion
11	KOEDOEVLEI	128	10	24°30'15.22S	27°24'50.2E	Farm Portion
12	KOEDOEVLEI	128	11	24°29'58.61S	27°24'52.01E	Farm Portion
13	LEEUWBOSCH	129	5	24°29'37.09S	27°24'54.42E	Farm Portion
14	LEEUWBOSCH	129	3	24°28'47.04S	27°24'13.86E	Farm Portion
15	CORNWALL	313	9	24°30'56.16S	27°24'46.4E	Farm Portion
16	CORNWALL	313	6	24°32'22.96S	27°23'59.66E	Farm Portion
17	CORNWALL	313	7	24°31'1.68S	27°24'44.62E	Farm Portion
18	CORNWALL	313	3	24°31'19.55S	27°23'24.53E	Farm Portion
19	CORNWALL	313	2	24°32'50.14S	27°23'22.22E	Farm Portion
20	CORNWALL	313	4	24°31'47.22S	27°25'1.27E	Farm Portion
21	CORNWALL	313	5	24°32'34.33S	27°23'57.66E	Farm Portion
22	CORNWALL	313	8	24°31'30.3S	27°24'28.84E	Farm Portion
23		713	1	24°29'48.44S	27°25'0.93E	Farm Portion

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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

Environmental Management Framework	LINK
Waterberg District Municipality EMF	https://screening.environment.gov.za/ScreeningDownloads/EMF/WDEMF_Final_EMF_Report.pdf

[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 Right**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Air Quality-Waterberg-Bojanala Priority Area	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/gg39489_nn1207a.pdf
Marakele National Park Buffer	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/marakele_approved_plans.pdf
South African Protected Areas	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/SAPAD_OR_2025_Q3_Metadata.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	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GuidanceforHIA.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GuidanceforPIA.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Hydrology Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
9	Radioactivity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Climate Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
13	Health Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
14	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
15	Ambient Air Quality Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
16	Seismicity Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
17	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.

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		pdf
18	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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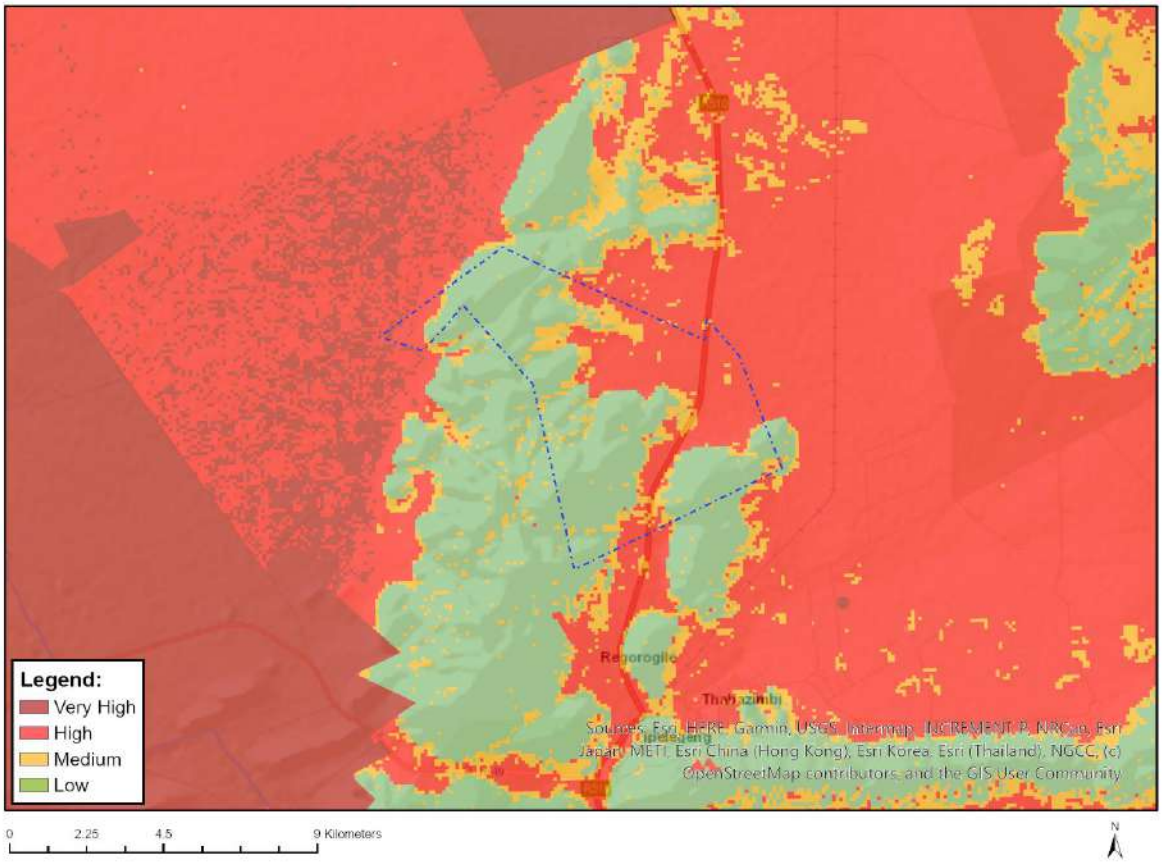
Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



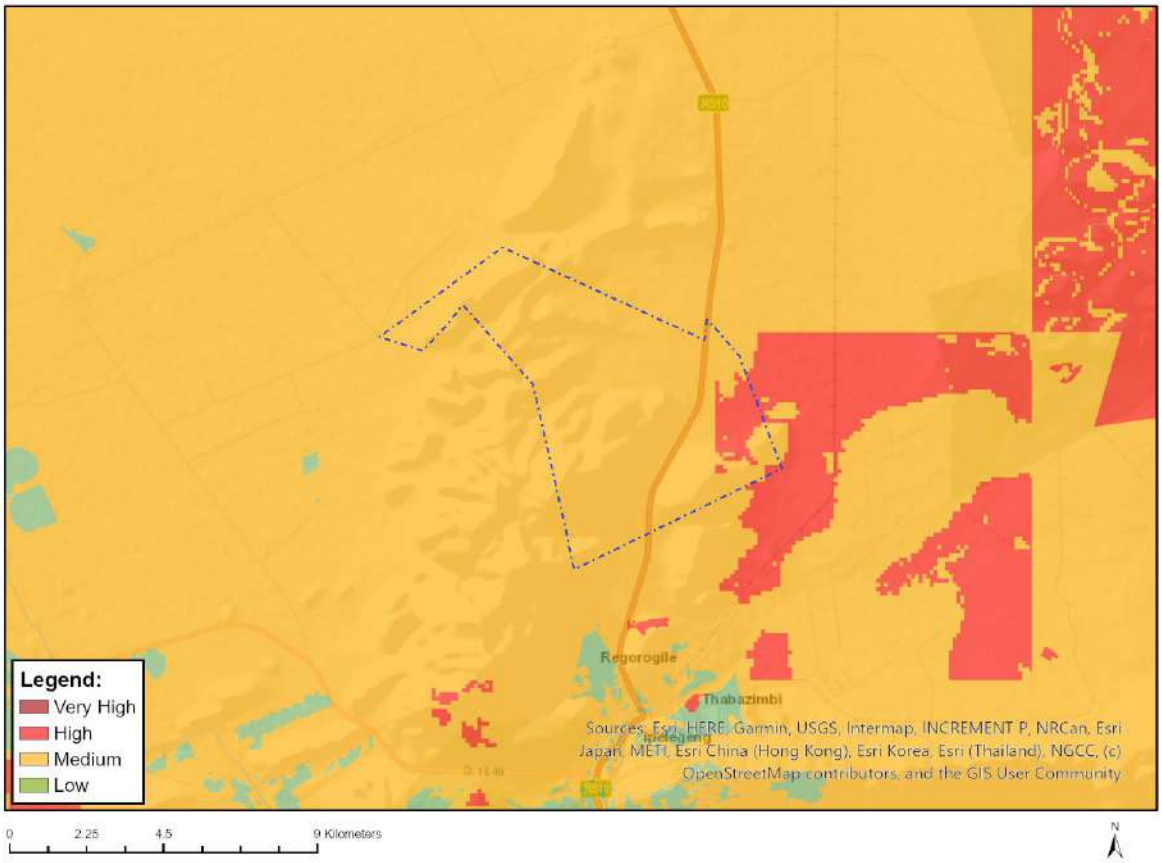
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
High	Rainfed Annual Crop Cultivation / Planted Pastures
High	08. Moderate
High	09. Moderate-High
High	10. Moderate-High
Low	05. Low
Low	04. Low-Very low
Low	03. Low-Very low
Low	01. Very low
Low	02. Very low
Medium	06. Low-Moderate

Medium	07. Low-Moderate
Very High	11. High

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		

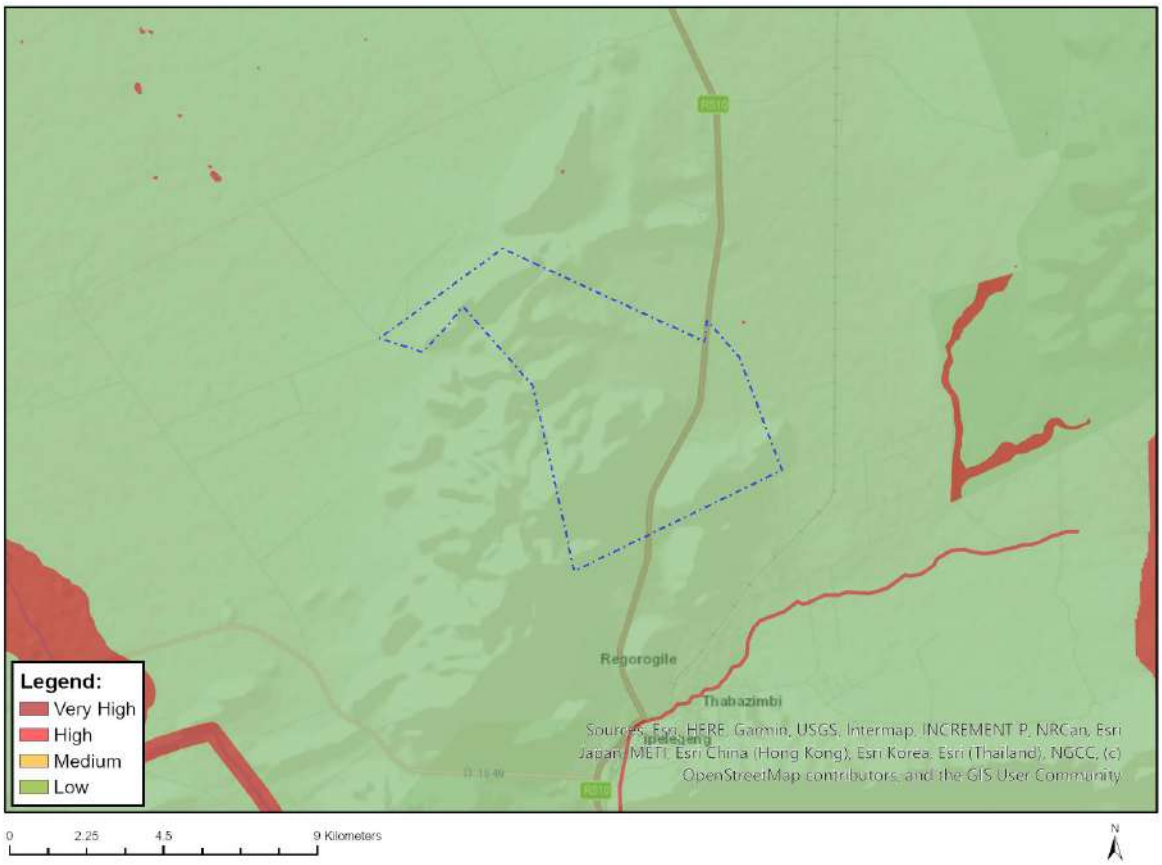
Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Polemaetus bellicosus
High	Aves-Aquila verreauxii
Medium	Aves-Aquila rapax
Medium	Aves-Podica senegalensis
Medium	Aves-Stephanoaetus coronatus
Medium	Aves-Aquila verreauxii
Medium	Sensitive species 5
Medium	Mammalia-Dasymys robertsii
Medium	Mammalia-Lycaon pictus
Medium	Reptilia-Kinixys lobatsiana

Disclaimer applies

Medium	Invertebrate-Amyttacta marakelensis

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

Disclaimer applies

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

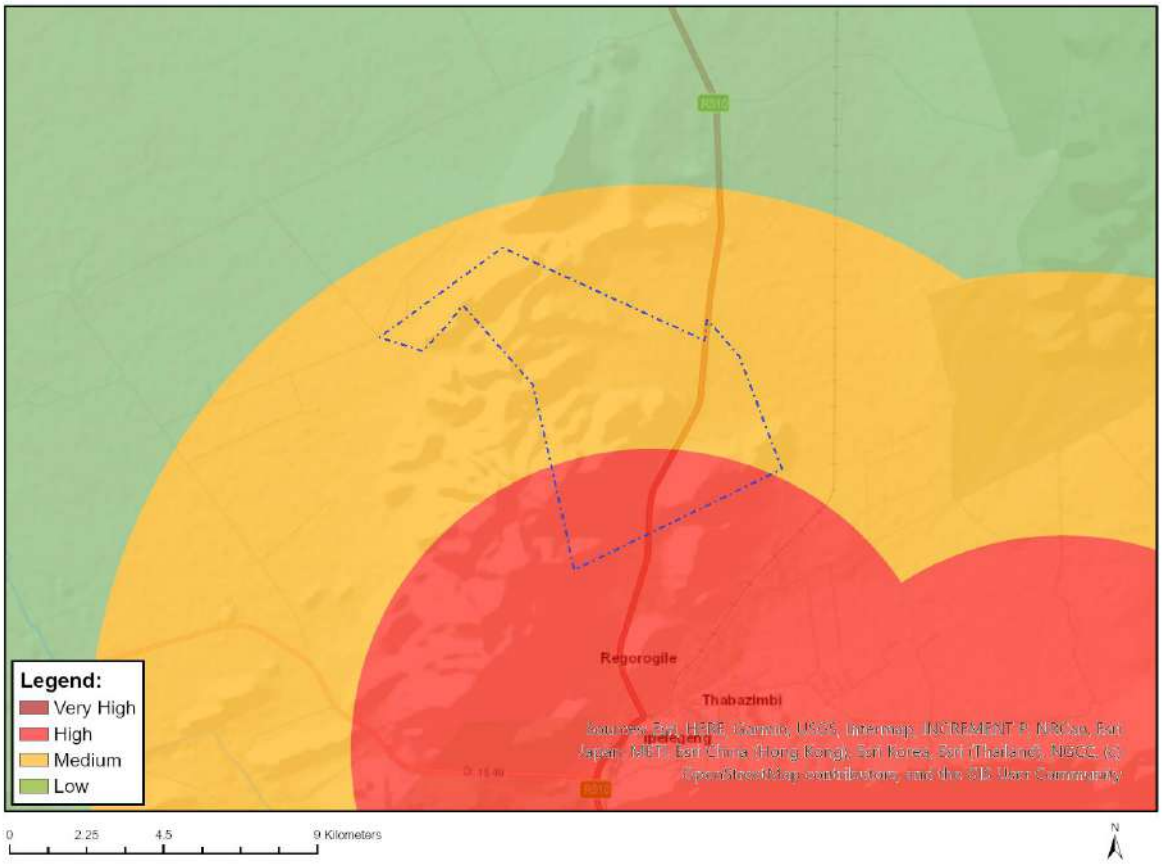
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies
06/02/2026

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome
Medium	Between 8 and 15 km of other civil aviation aerodrome

Disclaimer applies
06/02/2026

MAP OF RELATIVE DEFENCE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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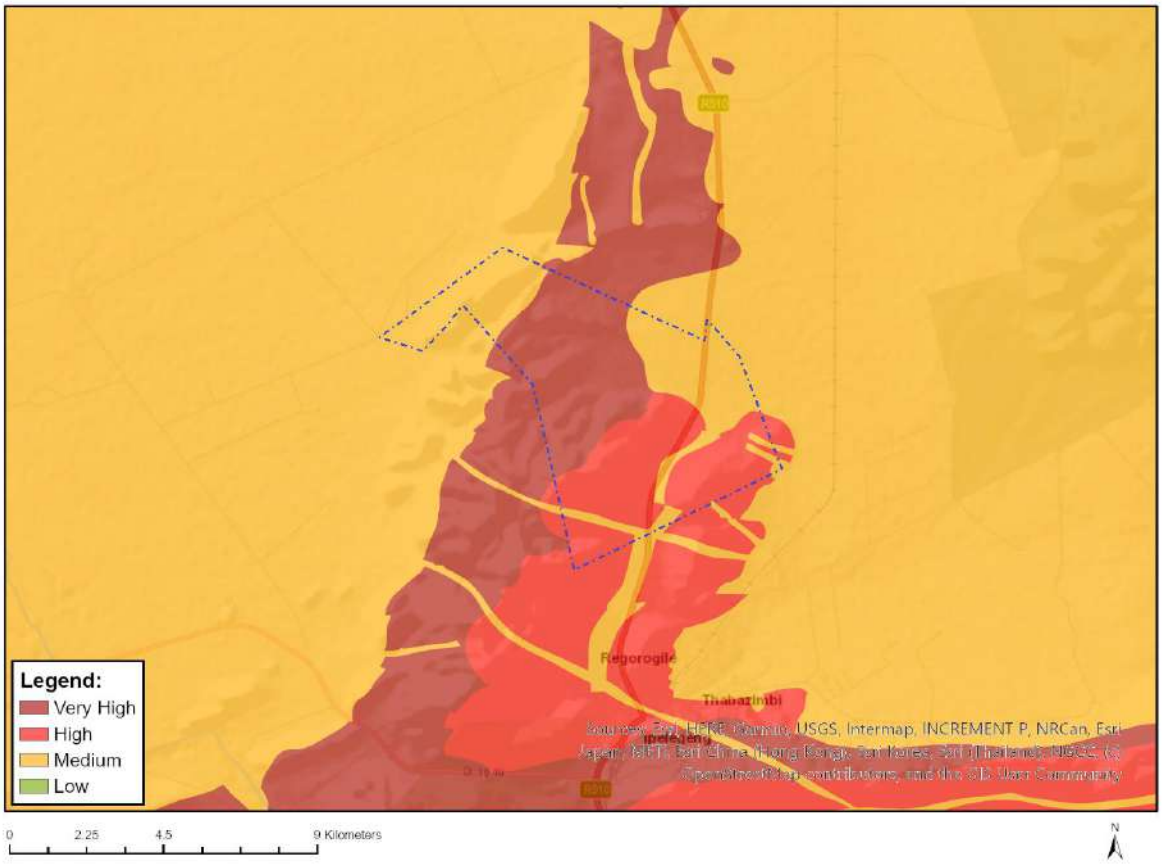
06/02/2026

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



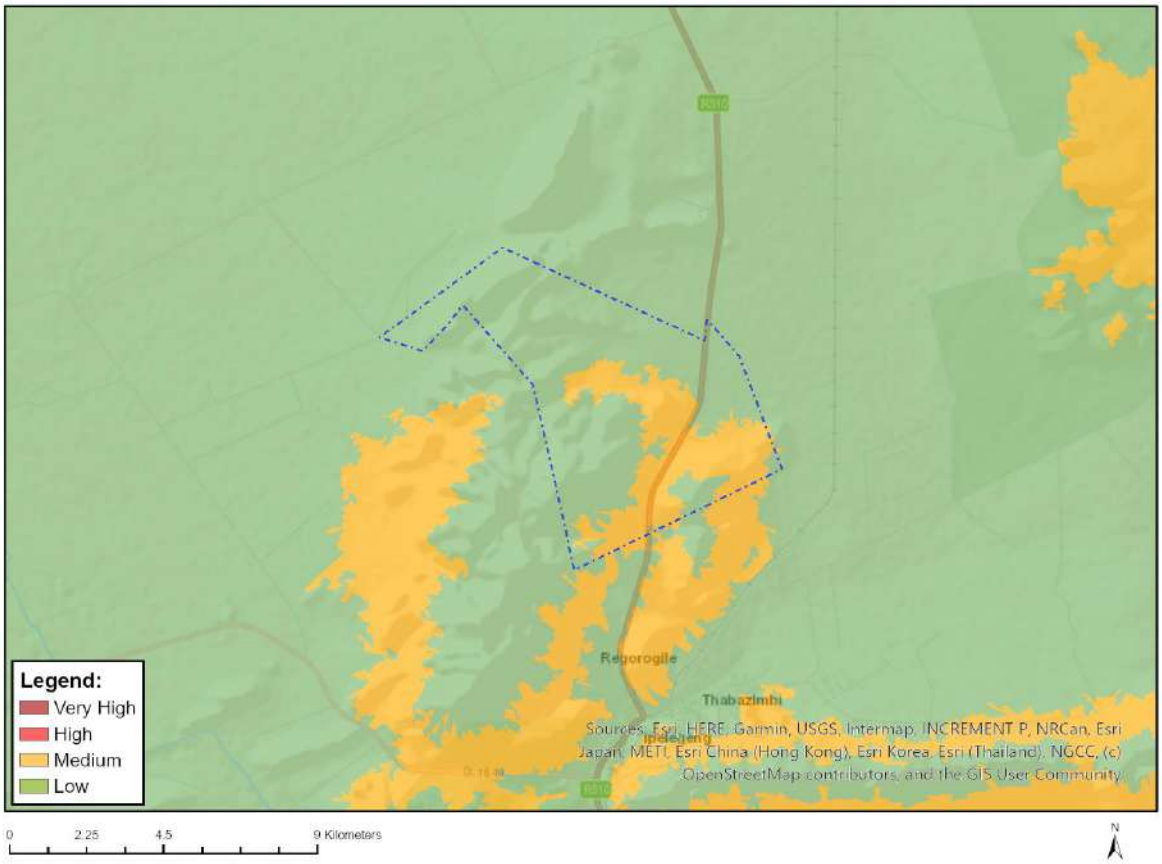
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
High	Features with a High paleontological sensitivity
Low	Features with a Low paleontological sensitivity
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Disclaimer applies

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Jamesbrittenia bergae
Medium	Hesperantha bulbifera

Disclaimer applies
06/02/2026

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA 1
Very High	CBA 2
Very High	ESA 1
Very High	Karel Coetzee Private Nature Reserve
Very High	Lushof Private Nature Reserve
Very High	Paarl Private Nature Reserve
Very High	Parkveld Private Nature Reserve
Very High	Patrysbos Private Nature Reserve

Disclaimer applies

Appendix 5:

Specialist Studies

AIR QUALITY IMPACT ASSESSSMENT FOR THE PROPOSED APPLICATION FOR MINING RIGHT FOR IRON ORE (FE) AND ASSOCIATED MINERALS ON PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF FARM CORNWALL 313 KQ AND REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF FARM KOEDOEVLEI 128 KQ, THABAZIMBI LOCAL MUNICIPALITY, LIMPOPO PROVINCE.

LP 30/5/1/2/3/2/1/(10287) MR

PREPARED FOR:

ARENGO 297 (PTY) LTD

DATE OF SUBMISSION:
March 2026

Website: www.kmgenviro.co.za
Tel: 011 969 6184
Email: marabekg@kmgenviro.co.za
LEAD SPECIALIST: Khumbelo Given Marabe
Director and Principal Environmental Consultant
SACNASP NO: 132731
WISA REG NO :39885
IAIAsa: Membership no: 7837
IIAV Member No. 3163

AIR QUALITY IMPACT ASSESSMENT REPORT
FOR THE PROPOSED PROSPECTING RIGHT APPLICATION
ARENGO MINERALS (PTY) LTD

PROJECT NAME:

Proposed Prospecting Right Application for Mineral Exploration

PROJECT LOCATION:

Hartbeesbult Area, Thabazimbi Local Municipality

Waterberg District Municipality

Limpopo Province, South Africa

APPLICANT:

Arengo Minerals (Pty) Ltd

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP):

Vahlengwe Mining Advisory & Consulting

AIR QUALITY SPECIALIST:

KMG Environmental Solutions Services (Pty) Ltd

REPORT TYPE:

Air Quality Impact Assessment Report

DATE OF SITE VISIT:

09 March 2026

REPORT DATE:

March 2026

PREPARED BY:

KMG Environmental Solutions Services (Pty) Ltd

08 Hillside Road, Metropolitan Building, 1st Floor B

Parktown, Johannesburg, 2193

Tel: 011 969 6184 / 011 480 4822

Email: info@kmgenviro.co.za
Website: www.kmgenviro.co.za

PROJECT REFERENCE NUMBER:

KMG-AQ2026/01

AUTHORS:

Khumbelo Given Marabe (Pr.Sci.Nat.)
Principal Environmental Consultant

VERSION: Final Draft

DOCUMENT INFORMATION

Item	Description
Project Title	Air Quality Impact Assessment for the Proposed Prospecting Right Application
Project Name	Arengo Minerals Prospecting Right Application
Project Location	Hartbeesbult Area, Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province
Applicant	Arengo Minerals (Pty) Ltd
Environmental Assessment Practitioner (EAP)	Vahlengwe Mining Advisory & Consulting
Air Quality Specialist	KMG Environmental Solutions Services (Pty) Ltd
Report Type	Air Quality Impact Assessment Report
Report Status	Final Draft
Date of Site Visit	09 March 2026
Report Date	March 2026
Project Reference Number	KMG-AQ2026/01
Prepared By	KMG Environmental Solutions Services (Pty) Ltd
Principal Author	Khumbelo Given Marabe (Pr.Sci.Nat.)
Quality Reviewed By	Mpho Ramalivhana
Approved By	Khumbelo Given Marabe

DOCUMENT CONTROL

Version	Date	Description of Changes	Author
Draft 1	March 2026	Initial draft report	KMG Environmental Solutions Services
Final Draft	March 2026	Updated following internal review	KMG Environmental Solutions Services

DISCLAIMER

This Air Quality Impact Assessment Report has been prepared by KMG Environmental Solutions Services (Pty) Ltd on behalf of Vahlengwe Mining Advisory and Consulting for the proposed prospecting right application by Arengo Minerals (Pty) Ltd in the Hartbeesbult area, Thabazimbi Local Municipality, Limpopo Province.

The information presented in this report is based on available project information, desktop review, applicable legislation, and a site visit conducted on 09 March 2026. Where necessary, reasonable assumptions have been made using accepted scientific methods and professional judgement. While all reasonable care has been taken in the preparation of this report, KMG Environmental Solutions Services does not guarantee the completeness or accuracy of all third party information used.

This report has been compiled in accordance with relevant South African environmental legislation and guidelines, including the National Environmental Management Act (Act No. 107 of 1998) and the National Environmental Management: Air Quality Act (Act No. 39 of 2004), as well as applicable standards and best practice guidelines.

The findings, conclusions, and recommendations presented in this report are based on the conditions observed at the time of the site visit and the information available at the time of assessment. Environmental conditions may change over time due to natural processes or changes in land use and activities.

This report is intended solely for the purpose of supporting the environmental authorisation process for the proposed development. It may not be used for any other purpose without the written consent of KMG Environmental Solutions Services (Pty) Ltd.

KMG Environmental Solutions Services (Pty) Ltd shall not be held liable for any losses, damages, or consequences arising from the use of this report by any third party, other than for its intended purpose as stated above.

ACRONYMS AND DEFINITIONS

Acronym	Description
AQIA	Air Quality Impact Assessment
AQMP	Air Quality Management Plan
AQMS	Air Quality Monitoring Station
AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
DEA / DFFE	Department of Environment, Forestry and Fisheries
DMRE	Department of Mineral Resources and Energy
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
KMG	KMG Environmental Solutions Services (Pty) Ltd
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act (Act No. 107 of 1998)
PM_{10}	Particulate Matter with aerodynamic diameter less than 10 micrometres
$PM_{2.5}$	Particulate Matter with aerodynamic diameter less than 2.5 micrometres
TSP	Total Suspended Particulates
SO_2	Sulphur Dioxide
NO_2	Nitrogen Dioxide
CO	Carbon Monoxide
CO_2	Carbon Dioxide
VOCs	Volatile Organic Compounds
H_2S	Hydrogen Sulphide
O_3	Ozone
m/s	Metres per second
$\mu g/m^3$	Micrograms per cubic metre
ppm	Parts per million

DEFINITIONS

Air Quality Impact Assessment refers to a specialist environmental study that evaluates the potential impacts of a proposed development on ambient air quality. The assessment considers emission sources, pollutant dispersion, potential exposure of sensitive receptors, and compliance with applicable air quality standards.

Ambient Air Quality refers to the condition of the air in the external environment, excluding indoor air. It is influenced by both natural processes and human activities, and is assessed based on the concentration of pollutants present in the atmosphere.

Air Pollutant refers to any substance present in the atmosphere that may have harmful effects on human health, the environment, or property. Common pollutants include particulate matter, sulphur dioxide, nitrogen oxides, carbon monoxide, and volatile organic compounds.

Particulate Matter refers to a mixture of very small solid particles and liquid droplets suspended in the air. These particles originate from sources such as dust, combustion processes, and industrial activities, and vary in size and composition.

PM_{10} refers to particulate matter with an aerodynamic diameter of 10 micrometres or less. These particles can be inhaled into the upper respiratory tract and may cause health effects such as irritation and respiratory illness.

$PM_{2.5}$ refers to fine particulate matter with an aerodynamic diameter of 2.5 micrometres or less. These particles can penetrate deep into the lungs and bloodstream, posing more serious health risks including cardiovascular and respiratory diseases.

Total Suspended Particulates refers to the total concentration of airborne particles suspended in the atmosphere, including both fine and coarse particles.

Dust Emissions refer to the release of particulate matter into the air from activities such as excavation, drilling, blasting, material handling, and vehicle movement on unpaved surfaces.

Dust Fallout refers to particulate matter that settles out of the atmosphere onto surfaces over a period of time. It is typically measured to assess nuisance dust levels and environmental impacts.

Emission Source refers to any point or activity from which pollutants are released into the atmosphere. These may include stationary sources such as machinery and mobile sources such as vehicles.

Fugitive Emissions refer to emissions that are not released through a defined point source such as a stack, but instead escape from open areas, equipment leaks, or disturbed surfaces.

Sensitive Receptors refer to individuals, communities, or environmental features that may be adversely affected by air pollution. These typically include residential areas, schools, clinics, agricultural land, and ecologically sensitive areas.

Baseline Air Quality refers to the existing air quality conditions in a study area prior to the commencement of a proposed activity. It provides a reference point against which future impacts can be assessed.

Air Dispersion refers to the process by which air pollutants are transported, diluted, and spread in the atmosphere due to meteorological conditions such as wind speed, wind direction, and atmospheric stability.

Meteorological Conditions refer to atmospheric factors such as temperature, wind speed, wind direction, humidity, and atmospheric stability that influence the behaviour and dispersion of air pollutants.

National Ambient Air Quality Standards refer to legally established limits for pollutant concentrations in ambient air, as defined under the National Environmental Management: Air Quality Act. These standards are designed to protect human health and the environment.

Compliance refers to adherence to applicable environmental legislation, regulations, and standards, including the National Ambient Air Quality Standards and any conditions set out in environmental authorisations.

Cumulative Impact refers to the combined effect of multiple emission sources or activities over time, which may result in greater environmental impacts than individual sources acting alone.

Mitigation Measures refer to actions implemented to avoid, reduce, or manage negative environmental impacts. These may include engineering controls, operational practices, and monitoring programmes.

Air Quality Management Plan refers to a structured plan that outlines procedures and measures to monitor, control, and manage air emissions during the construction and operational phases of a project.

Study Area refers to the geographical area considered in the assessment, including the project site and surrounding areas that may be affected by air emissions.

Zone of Influence refers to the area within which air quality impacts from a project are expected to occur, based on the nature of emissions and prevailing environmental conditions.

Health Risk refers to the potential for adverse health effects resulting from exposure to air pollutants, depending on concentration levels, duration of exposure, and sensitivity of individuals.

Nuisance Dust refers to airborne dust that may not pose a direct health risk but can cause discomfort, reduced visibility, and deposition on surfaces such as buildings, vegetation, and equipment.

DECLARATION OF INDEPENDENCE

I, Khumbelo Given Marabe, in my capacity as the Principal Environmental Consultant and Air Quality Specialist at KMG Environmental Solutions Services (Pty) Ltd, hereby declare that I am an independent specialist appointed to undertake the Air Quality Impact Assessment for the proposed prospecting right application by Arengo Minerals (Pty) Ltd.

I confirm that I have no financial or personal interest in the proposed project, the applicant, or any other parties involved in the development, other than fair remuneration for the professional services rendered in the compilation of this report. The work undertaken has been conducted in an objective and unbiased manner, in accordance with generally accepted scientific principles and professional standards.

I further declare that the information presented in this report is, to the best of my knowledge, accurate and based on available data, site observations, and professional judgement. All reasonable steps have been taken to ensure that the assessment is complete and reliable within the scope of the study.

This report has been prepared in accordance with applicable South African environmental legislation, including the National Environmental Management Act (Act No. 107 of 1998) and the National Environmental Management: Air Quality Act (Act No. 39 of 2004), as well as relevant guidelines and best practice standards.

I acknowledge my responsibility to disclose any information that may influence the decision-making process and confirm that no such information has been withheld.

Date: March 2026

Signature

Name: Khumbelo Given Marabe (Pr.Sci.Nat.)
Position: Principal Environmental Consultant
Company: KMG Environmental Solutions Services (Pty) Ltd

EXECUTIVE SUMMARY

This Air Quality Impact Assessment has been undertaken to evaluate the potential air quality impacts associated with the proposed mining right application. The assessment focused primarily on particulate matter, specifically PM_{10} and $PM_{2.5}$, which were identified as the key pollutants of concern based on site characteristics, baseline conditions, and the nature of the proposed activities. The study was conducted in accordance with applicable South African environmental legislation and best practice guidelines, with the aim of determining the potential risks to the surrounding environment and sensitive receptors, and to recommend appropriate mitigation measures.

The baseline air quality assessment indicates that the study area is characterised by relatively low concentrations of gaseous pollutants such as nitrogen dioxide, sulphur dioxide, carbon monoxide, and ozone. These pollutants were found to be within acceptable limits and are not expected to pose significant environmental or health risks under current conditions. However, particulate matter, particularly PM_{10}, was identified as the dominant pollutant within the study area. This is largely attributable to dry climatic conditions, exposed soil surfaces, and the influence of wind-driven dust entrainment. $PM_{2.5}$ concentrations were observed to be consistently lower than PM_{10}, confirming that coarse particulates are the primary contributor to ambient air quality in the area.

Field verification and on-site monitoring confirmed the findings of the baseline assessment. Measured particulate matter concentrations showed variability in response to environmental conditions and site activities. Higher PM_{10} concentrations were associated with increased wind speeds and dry conditions, which promote dust mobilisation from exposed surfaces. The field data also confirmed that mechanical disturbance of soil, such as that associated with vehicle movement and surface activities, contributes significantly to dust generation. Meteorological conditions, including wind speed, wind direction, temperature, and humidity, were found to play a critical role in influencing both the generation and dispersion of particulate matter.

The conceptual air quality modelling undertaken as part of this assessment indicates that particulate matter dispersion is strongly influenced by prevailing wind patterns. Winds in the study area are predominantly from the northern sector, resulting in the transport of dust towards the southern direction. As a result, sensitive receptors located downwind of the proposed site, particularly within the southern sector, may be exposed to elevated dust concentrations under

certain conditions. The highest impacts are expected within the immediate site area and along haul roads, with decreasing concentrations observed with increasing distance from emission sources. The modelling further confirms that PM_{10} is the primary pollutant of concern, while $PM_{2.5}$ contributes to a lesser extent and is mainly associated with combustion-related sources.

The impact assessment identified several key sources of particulate matter emissions associated with the proposed mining activities. These include land clearing, excavation, drilling and blasting, haul road traffic, stockpiling of materials, and wind erosion from exposed surfaces. Among these, haul road traffic was identified as the most significant and continuous source of PM_{10} emissions. Pre-mitigation impact significance ranged from medium to high, particularly in relation to dust generated from haul roads and exposed surfaces. Without mitigation, these emissions have the potential to affect nearby sensitive receptors, including farmhouses, rural dwellings, and agricultural areas.

Following the implementation of recommended mitigation measures, the significance of impacts is expected to reduce substantially. Most impacts are reduced to low or low to medium significance, while haul road emissions remain at medium significance due to their continuous nature. The mitigation measures proposed in this assessment include regular watering of haul roads and exposed areas, application of dust suppressants, enforcement of speed limits, management of stockpiles, progressive rehabilitation of disturbed areas, and scheduling of high dust-generating activities during favourable meteorological conditions. These measures are considered standard industry practices and are expected to be effective in controlling particulate emissions.

The Air Quality Management and Monitoring Plan developed as part of this assessment provides a structured framework for managing air quality impacts throughout the project lifecycle. The plan includes provisions for continuous monitoring of PM_{10} and $PM_{2.5}$ concentrations, dust fallout monitoring, meteorological data collection, and routine site inspections. Monitoring locations are to be strategically positioned to capture on-site conditions, site boundary conditions, and conditions at sensitive receptors. The plan also establishes trigger levels and response actions to ensure that any exceedances are promptly addressed. Regular reporting and review of monitoring data will support adaptive management and continuous improvement.

The assessment concludes that the proposed project is acceptable from an air quality perspective, provided that all recommended mitigation and monitoring measures are implemented effectively. The dominant pollutant, PM_{10}, can be managed through appropriate dust control strategies, and no significant long-term exceedances of applicable air quality standards are anticipated. Residual impacts are expected to remain within acceptable limits and are not likely to result in significant adverse effects on human health or the environment.

In conclusion, the proposed mining activities can proceed without resulting in unacceptable air quality impacts, subject to the implementation of the Air Quality Management and Monitoring Plan. Continued compliance with regulatory requirements, combined with proactive environmental management, will ensure that air quality is maintained at acceptable levels throughout the duration of the project.

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1. INTRODUCTION

1.1 Background

KMG Environmental Solutions Services (Pty) Ltd was appointed as the Air Quality Specialist to undertake an Air Quality Impact Assessment for the proposed mining right application by Arengo Minerals (Pty) Ltd. The Environmental Impact Assessment process is being undertaken by Vahlengwe Mining Advisory and Consulting, who is the appointed Environmental Assessment Practitioner for the project.

The proposed mining right area is located within the Hartbeesbult area under the Thabazimbi Local Municipality, within the Waterberg District Municipality of Limpopo Province. The application is submitted to the Department of Mineral Resources and Energy in terms of the Mineral and Petroleum Resources Development Act.

The proposed development involves mining-related activities which may include site clearing, drilling, blasting, excavation, hauling of material, stockpiling, and the use of heavy-duty diesel-powered equipment. These activities have the potential to generate dust and gaseous emissions, which may affect ambient air quality if not properly managed.

This Air Quality Impact Assessment forms part of the specialist studies required to support the Environmental Impact Assessment process and provides an evaluation of the potential impacts of the proposed mining activities on the receiving environment.

1.2 Purpose of the Study

The purpose of this Air Quality Impact Assessment is to evaluate the potential impacts of the proposed mining activities on ambient air quality within the study area. The study assesses emissions from mining-related activities and determines their potential effects on nearby sensitive receptors.

The assessment also aims to ensure compliance with applicable environmental legislation and standards, including the National Environmental Management Act and the National Environmental Management: Air Quality Act, as well as the National Ambient Air Quality Standards.

1.3 Objectives of the Study

The objective of this study is to establish baseline air quality conditions within the study area and to identify potential sources of emissions associated with the proposed mining activities. The study evaluates the potential impacts on surrounding receptors, including residential areas, agricultural land, and natural environments.

The assessment further aims to determine the significance of identified impacts before and after the implementation of mitigation measures, and to provide practical recommendations to minimise negative impacts and ensure environmental compliance throughout the project lifecycle.

1.4 Scope of Work

The scope of this Air Quality Impact Assessment includes a review of project documentation, including the Basic Information Document and supporting environmental information, as well as a site visit conducted on 09 March 2026 to verify site conditions and identify potential emission sources.

The study includes the identification of air emission sources associated with mining activities, including dust generation from land clearing, drilling, blasting, loading, hauling, and stockpiling, as well as exhaust emissions from diesel-powered equipment.

The assessment further includes the evaluation of baseline air quality conditions, identification of sensitive receptors, and assessment of impacts during both the construction and operational phases of the project. Mitigation measures are also developed to reduce identified impacts to acceptable levels.

1.5 Description of the Proposed Mining Activity

The proposed development involves the application for a mining right to extract multiple mineral resources within the defined project area. The mining activities are expected to include site preparation, removal of overburden, drilling and blasting, excavation of ore, and transportation of materials within the site.

Associated infrastructure may include access roads, laydown areas, stockpiles, temporary facilities, and operational equipment areas. The use of heavy machinery and continuous material handling activities is expected to contribute to the generation of dust and emissions.

Compared to prospecting activities, mining operations are more intensive and may result in higher volumes of particulate emissions over an extended period if not effectively controlled.

1.6 Minerals Applied For

The mining right application submitted by Arengo Minerals (Pty) Ltd includes a range of minerals associated with the regional geological formations of the area.

The minerals applied for include diamonds, gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore.

The presence of these minerals indicates that mining activities may involve the extraction and handling of metal-bearing materials, which can contribute to the generation of particulate matter, including dust emissions. Certain minerals, particularly chrome, nickel, copper, and iron ore, are commonly associated with high dust generation during excavation and handling processes.

The diversity of minerals also suggests that there may be variability in the physical and chemical characteristics of emitted dust, which is an important consideration in assessing potential air quality impacts.

1.7 Study Area

The study area includes the proposed mining site and the surrounding environment that may be affected by air emissions generated during the project lifecycle.

The area is characterised by a predominantly rural setting with natural vegetation, agricultural activities, and scattered residential dwellings. The open landscape and relatively low level of existing industrial activity contribute to generally good baseline air quality conditions.

Sensitive receptors within the study area include nearby farmsteads, agricultural land, and natural ecosystems, all of which may be affected by increased dust levels if mitigation measures are not implemented.

1.8 Need and Desirability

The proposed mining development aims to contribute to the extraction of mineral resources that are important for economic growth and industrial development. The project has the potential to create employment opportunities and stimulate local economic activity within the region.

However, it is important that such development is undertaken in a manner that protects the environment and surrounding communities. This assessment supports informed decision-making by identifying potential air quality impacts and recommending appropriate mitigation measures.

1.9 Assumptions and Limitations

This assessment is based on available project information, site observations, and applicable environmental data at the time of the study. It is assumed that the proposed mining activities will be implemented as described and that recommended mitigation measures will be effectively applied.

The assessment does not include detailed mine design or operational modelling, which may influence emission characteristics. Environmental conditions such as meteorological patterns may vary over time and may affect the dispersion of pollutants.

1.10 Structure of the Report

This report is structured to provide a comprehensive assessment of air quality impacts associated with the proposed mining activities.

The report includes a review of the legislative framework, a description of baseline environmental conditions, identification and assessment of potential impacts, and the development of mitigation measures. The report concludes with recommendations to support environmental management and regulatory decision-making.

2. LEGISLATIVE AND POLICY FRAMEWORK

2.1 Introduction

This section outlines the applicable legislative and policy framework relevant to the Air Quality Impact Assessment for the proposed mining right application. The assessment has been conducted in accordance with national environmental legislation, regulations, and guidelines governing air quality management in South Africa.

The legislative framework provides the basis for assessing potential air quality impacts and ensuring that the proposed development complies with environmental requirements aimed at protecting human health and the environment.

2.2 National Environmental Management Act (Act No. 107 of 1998)

The National Environmental Management Act provides the overarching framework for environmental management in South Africa. The Act promotes sustainable development and requires that environmental impacts are identified, assessed, and mitigated before development activities are authorised.

Key principles relevant to this study include the duty of care, the precautionary principle, and the requirement to avoid, minimise, or remedy environmental impacts. The Act also requires that specialist studies, such as this Air Quality Impact Assessment, form part of the Environmental Impact Assessment process.

2.3 National Environmental Management: Air Quality Act (Act No. 39 of 2004)

The National Environmental Management: Air Quality Act provides the legal framework for air quality management and aims to protect the environment by preventing air pollution and promoting sustainable development.

The Act establishes the National Ambient Air Quality Standards and provides for the regulation of emissions from listed activities. It requires that air quality impacts are assessed and managed to ensure that pollutant concentrations remain within acceptable limits.

2.4 National Ambient Air Quality Standards

The National Ambient Air Quality Standards define the maximum allowable concentrations of key pollutants in ambient air to protect human health and the environment.

These standards apply to pollutants such as particulate matter, sulphur dioxide, nitrogen dioxide, ozone, carbon monoxide, and lead. The assessment of air quality impacts in this study is conducted in reference to these standards to determine compliance.

2.5 National Dust Control Regulations (GN R.827 of 2013)

The National Dust Control Regulations provide measures for the management and control of dust emissions. These regulations set permissible dust fallout limits and require that reasonable measures are implemented to prevent dust from becoming a nuisance or causing harm to the environment.

Mining activities are identified as significant sources of dust emissions, and compliance with these regulations is critical in managing air quality impacts associated with the proposed development.

2.6 Listed Activities and Atmospheric Emission Licensing

Certain activities that result in significant atmospheric emissions are classified as listed activities under the Air Quality Act and require an Atmospheric Emission Licence.

While prospecting activities typically do not trigger listed activities, mining operations may require licensing depending on the scale and nature of operations. This assessment considers the potential need for compliance with emission licensing requirements.

2.7 Other Relevant Guidelines and Standards

The assessment also considers international best practice guidelines, including those provided by the World Health Organization for air quality, as well as South African National Standards where applicable.

These guidelines provide additional benchmarks for assessing potential health risks associated with air pollution and support the development of mitigation measures.

2.8 Summative Legislative Compliance

Table 1: Legislative Compliance

Legislation / Guideline	Applicable Requirement	Relevance to Project	Compliance Approach
National Environmental Management Act (Act 107 of 1998)	Requires assessment and mitigation of environmental impacts	Governs the overall EIA process and specialist studies	Air Quality Impact Assessment conducted as part of EIA process
National Environmental Management: Air Quality Act (Act 39 of 2004)	Regulates air quality and emissions	Applicable to all emission-generating activities	Assessment of emissions and compliance with air quality standards
National Ambient Air Quality Standards	Defines acceptable pollutant concentration limits	Used to assess baseline and predicted air quality	Comparison of pollutant levels with national standards
National Dust Control Regulations (GN R.827 of 2013)	Regulates dust emissions and fallout limits	Applicable due to dust-generating mining activities	Implementation of dust suppression and monitoring measures
Listed Activities (AEL Requirements)	Requires licensing for certain emission sources	May apply depending on mining scale and processes	Screening of activities for licensing requirements
World Health Organization Guidelines	Provides health-based air quality limits	Supports assessment of potential health impacts	Used as supplementary reference for air quality assessment

South African National Standards (SANS)	Provides standards for environmental monitoring	Applicable to measurement and monitoring practices	Monitoring aligned with recognised standards

3. PROJECT DESCRIPTION

3.1 Introduction

This section provides a detailed description of the proposed mining right application by Arengo Minerals (Pty) Ltd. The description includes the project location, extent of the mining area, proposed activities, and associated infrastructure. The purpose of this section is to provide sufficient detail to support the assessment of potential air quality impacts.

3.2 Project Location

The proposed mining right area is located in the Hartbeesbult area within the Thabazimbi Local Municipality, under the Waterberg District Municipality in Limpopo Province, South Africa.

The site is accessible via existing regional and local road networks, with access roads connecting the site to nearby towns and surrounding farming areas. The surrounding land use is predominantly rural, characterised by agricultural activities, natural vegetation, and scattered residential dwellings.

Figure 1: Locality Map

3.3 Project Area and Extent

The mining right application area covers a defined portion of land within the Hartbeesbult area. The exact extent of the site is illustrated in the project maps provided, including the locality map, land use map, and contour map.

The terrain is characterised by relatively open landscapes with varying topography, which may influence airflow patterns and the dispersion of air pollutants.

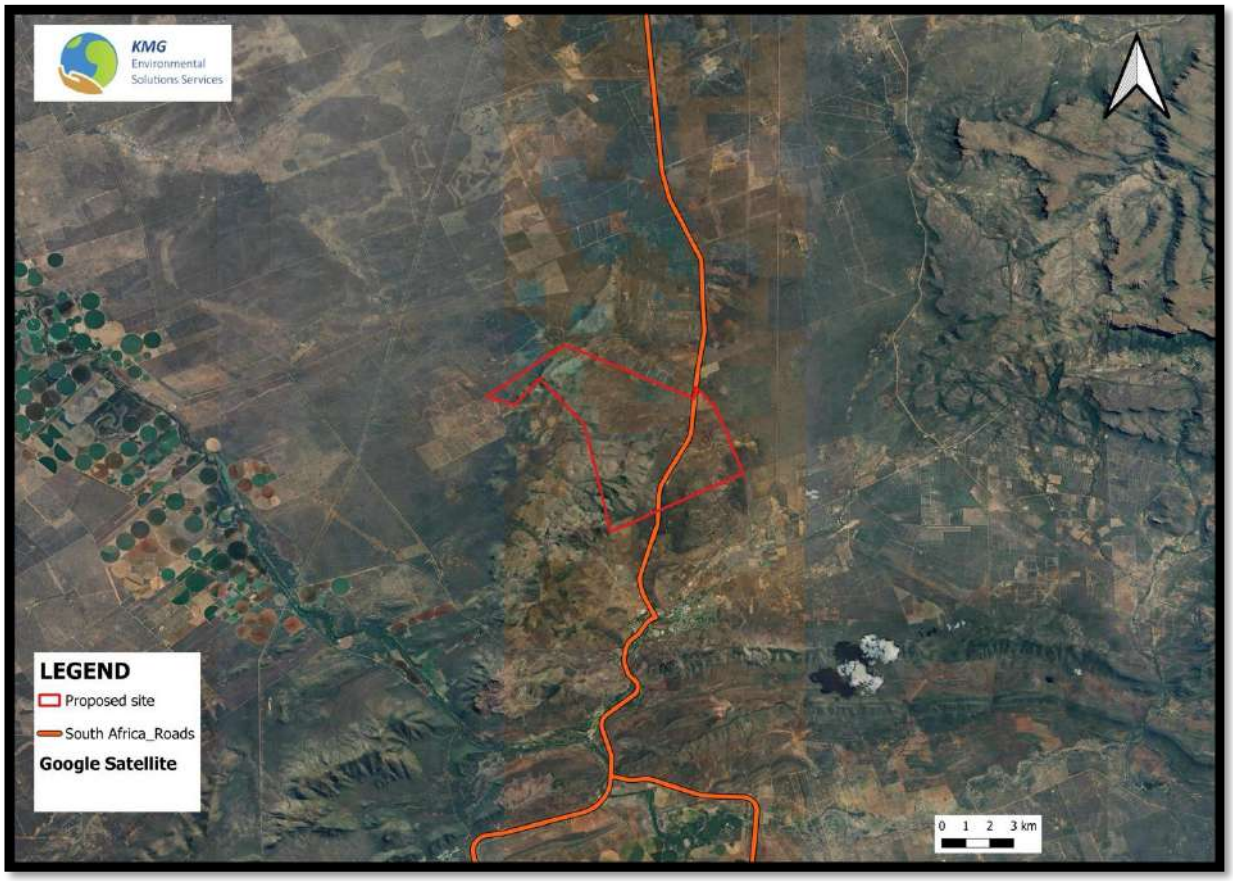

Figure 2: Project Layout / Site Boundary Map

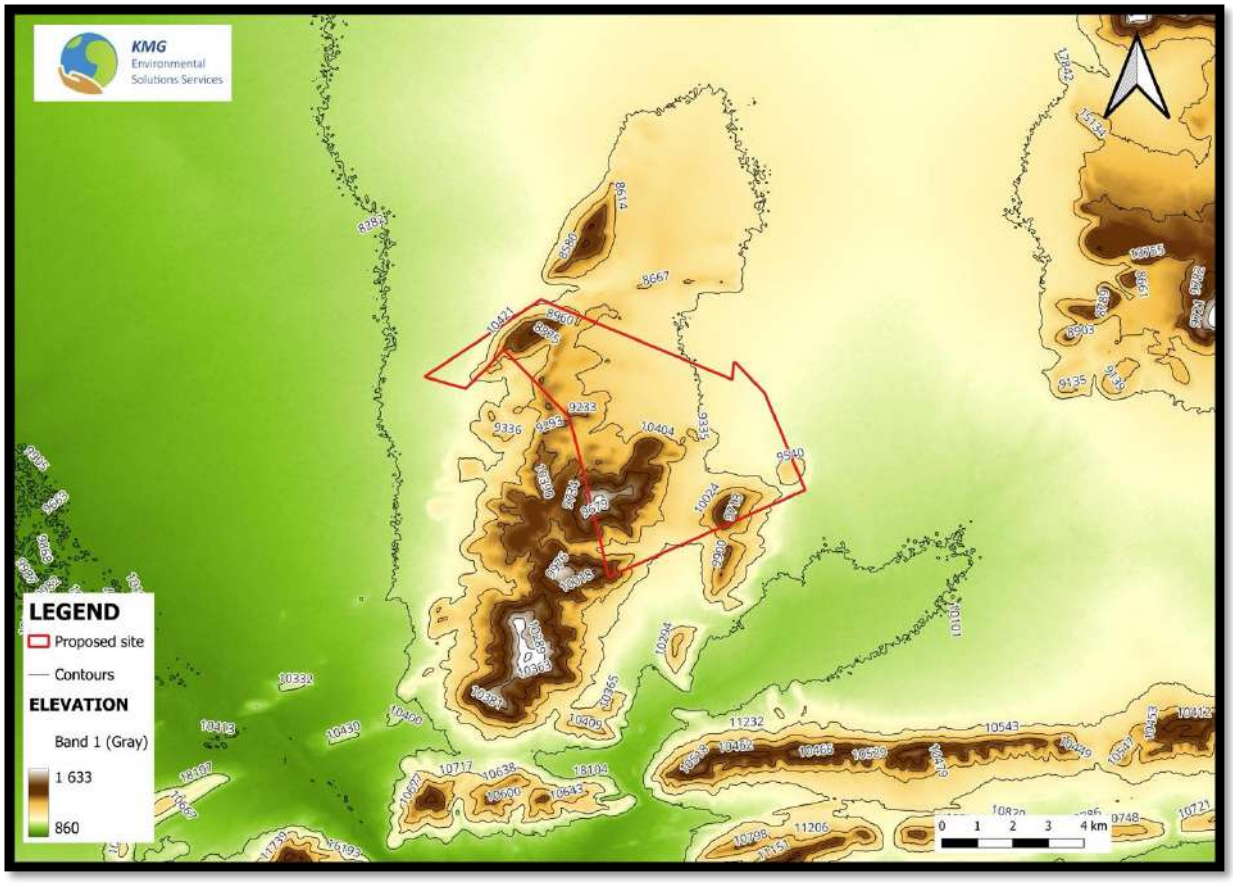

Figure 3: Contour Map

3.4 Current Land Use

The current land use within and surrounding the project area is predominantly rural. Activities in the area include agricultural practices, grazing, and limited residential use.

The natural vegetation within the area is typical of the regional biome and includes a mix of grassland and bushveld vegetation. These land uses are considered sensitive to dust deposition and air pollution, particularly in relation to agricultural productivity and ecological integrity.

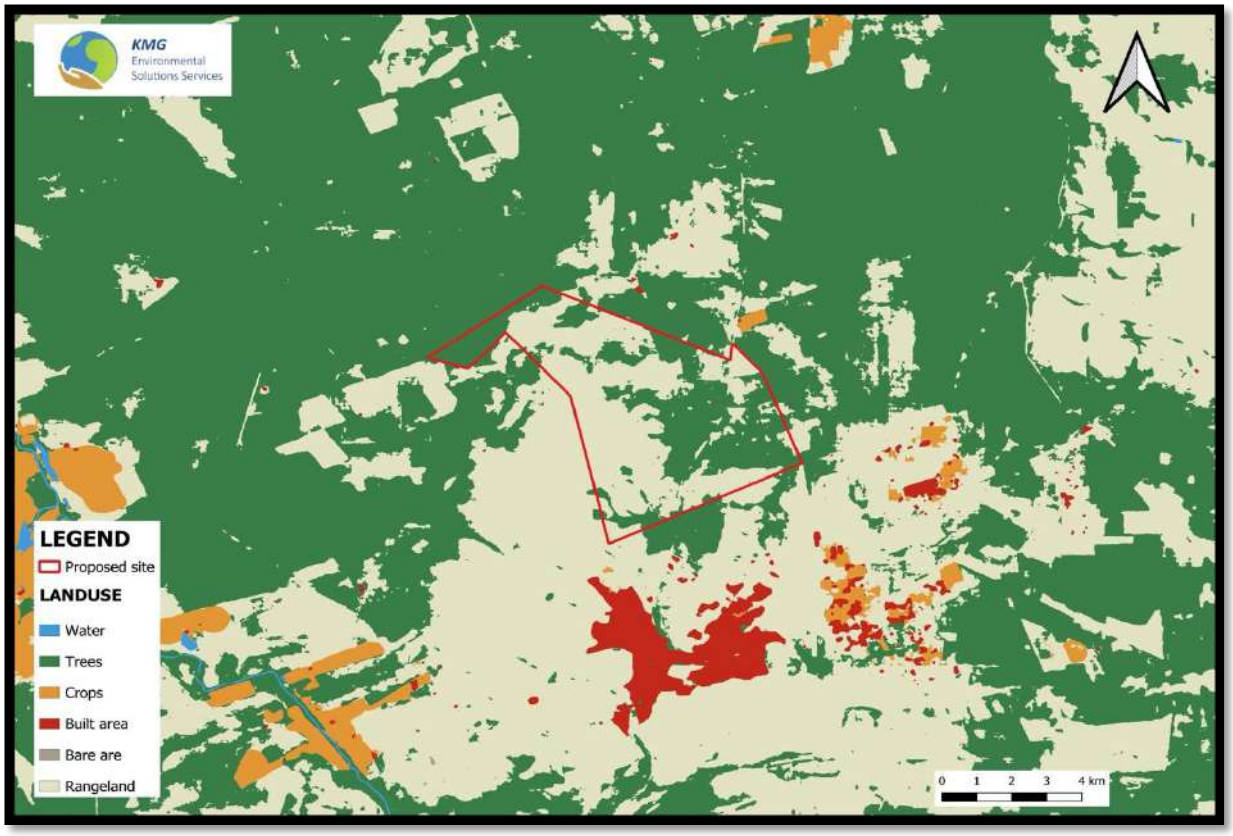

Figure 4: Land Use Map

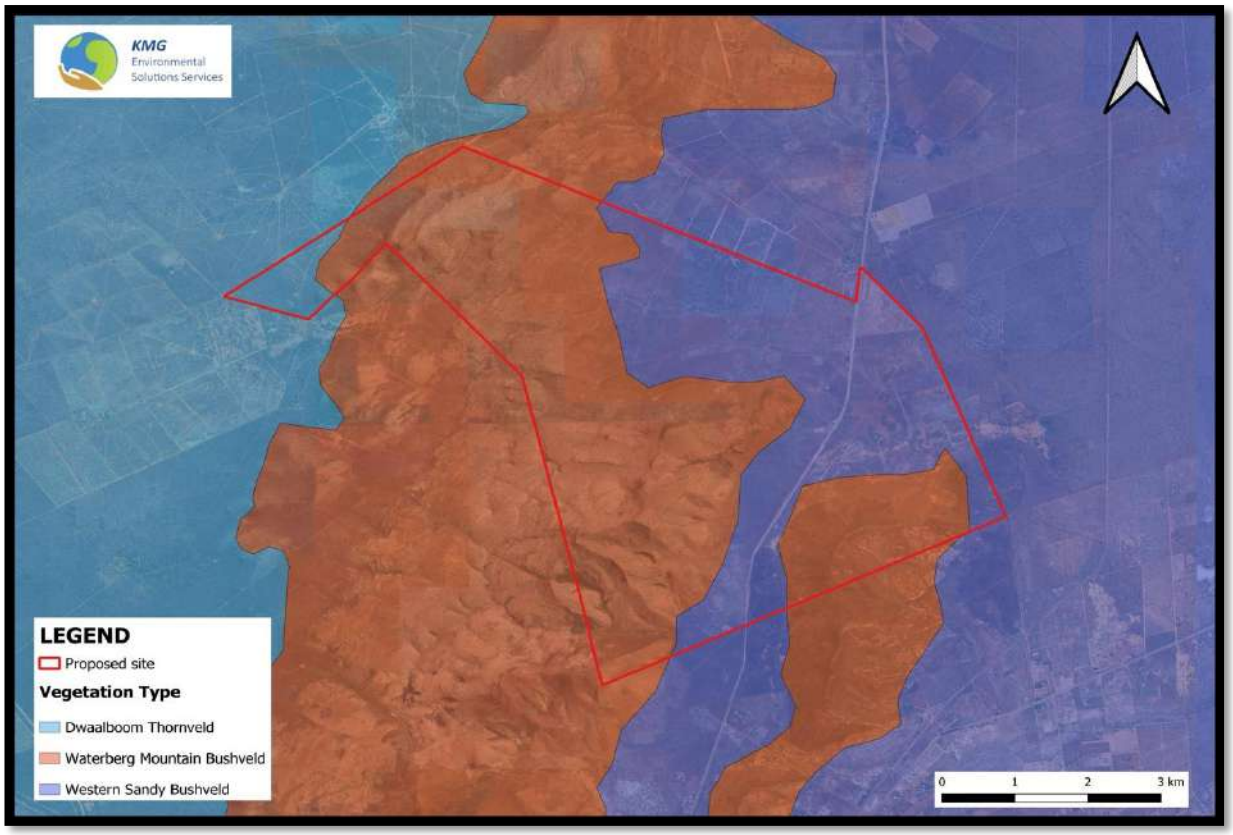

Figure 5: Vegetation Map

3.5 Description of Proposed Activities

The proposed mining activities are expected to include a range of operations associated with the extraction of mineral resources. These activities may include land clearing and site preparation, drilling and blasting, excavation of material, loading and hauling, and stockpiling of mined material.

Additional activities may include the establishment of temporary infrastructure such as access roads, equipment storage areas, and operational facilities required to support mining activities.

These activities are associated with the generation of dust and emissions, particularly from exposed surfaces, material handling, and vehicle movement.

3.6 Mining Methods and Operations

The specific mining method will depend on the nature of the mineral deposit; however, it is expected that surface mining techniques may be employed, given the type of minerals applied for and regional mining practices.

Surface mining operations typically involve the removal of topsoil and overburden, followed by extraction of the mineral resource. These activities are generally associated with significant dust generation due to the disturbance of soil and rock materials.

The use of heavy machinery, including excavators, loaders, haul trucks, and drilling equipment, is expected during operations. These machines contribute to both particulate emissions and exhaust emissions.

3.7 Associated Infrastructure

The proposed development may include the establishment of supporting infrastructure required for mining operations. This may include access roads, laydown areas, stockpile areas, temporary offices, and equipment maintenance areas.

Access roads, particularly unpaved roads, are a major source of dust emissions due to vehicle movement. Stockpile areas may also contribute to windblown dust if not properly managed.

The presence of such infrastructure is important in assessing potential air quality impacts, as they represent continuous sources of emissions during the operational phase.

3.8 Project Phases

The project is expected to be implemented in distinct phases, each with specific activities and associated air quality impacts.

The construction phase will involve site preparation, land clearing, and establishment of infrastructure. This phase is typically associated with increased dust generation due to ground disturbance.

The operational phase will involve active mining, including excavation, hauling, and stockpiling of material. This phase is expected to generate continuous emissions, particularly particulate matter.

The closure and rehabilitation phase will involve the restoration of disturbed areas. During this phase, emissions are expected to decrease as activities reduce and vegetation is re-established.

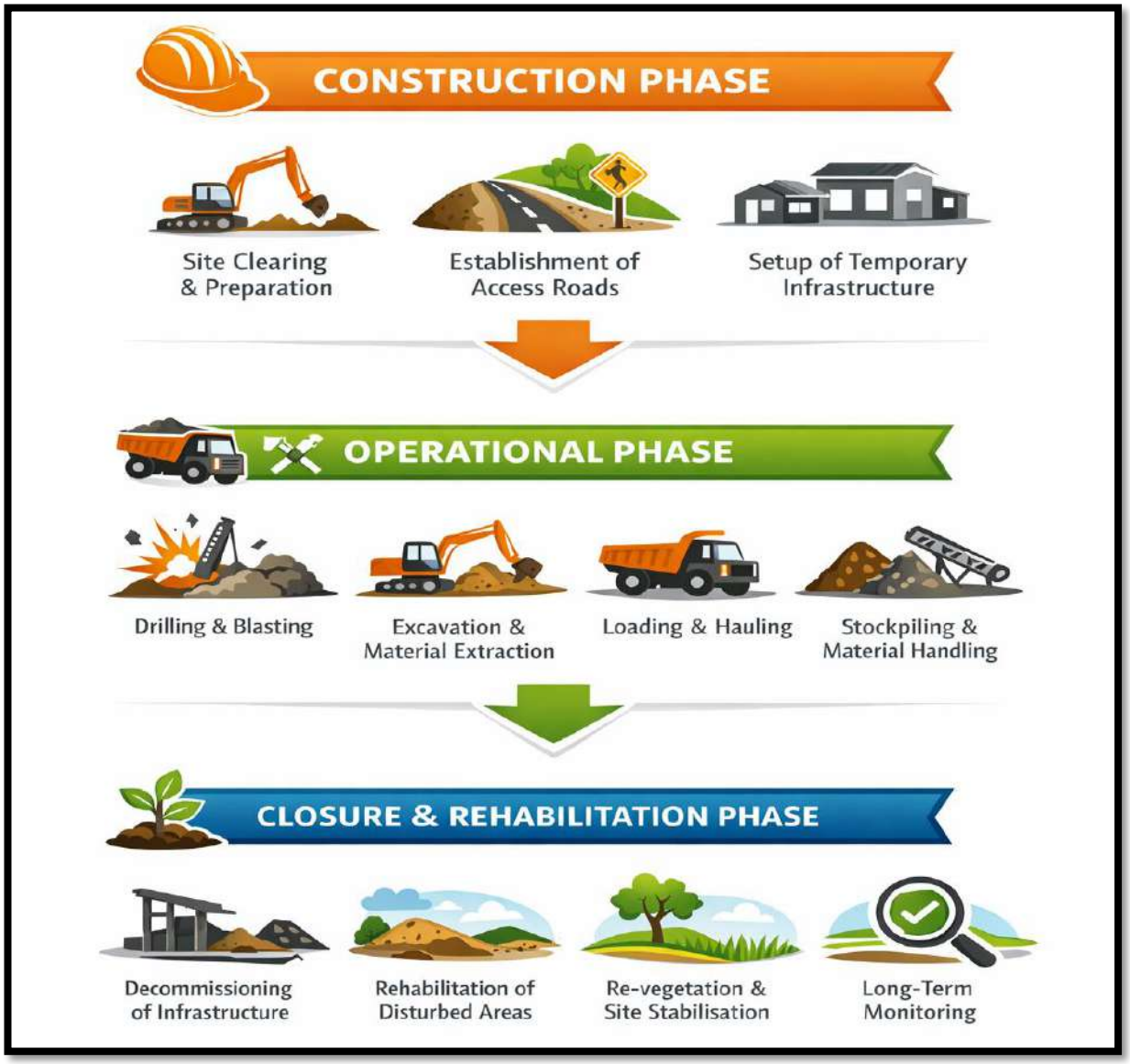

Figure 6 : Mining project lifecycle flowchart

3.9 Potential Air Emission Sources

The main sources of air emissions associated with the proposed mining activities include dust from land clearing, drilling, blasting, and excavation activities. Additional sources include dust from vehicle movement on unpaved roads and wind erosion from exposed surfaces and stockpiles.

Exhaust emissions from diesel-powered machinery and vehicles may contribute to gaseous pollutants such as nitrogen oxides, carbon monoxide, and particulate matter.

These sources are considered in the assessment of potential air quality impacts and form the basis for impact evaluation and mitigation planning.

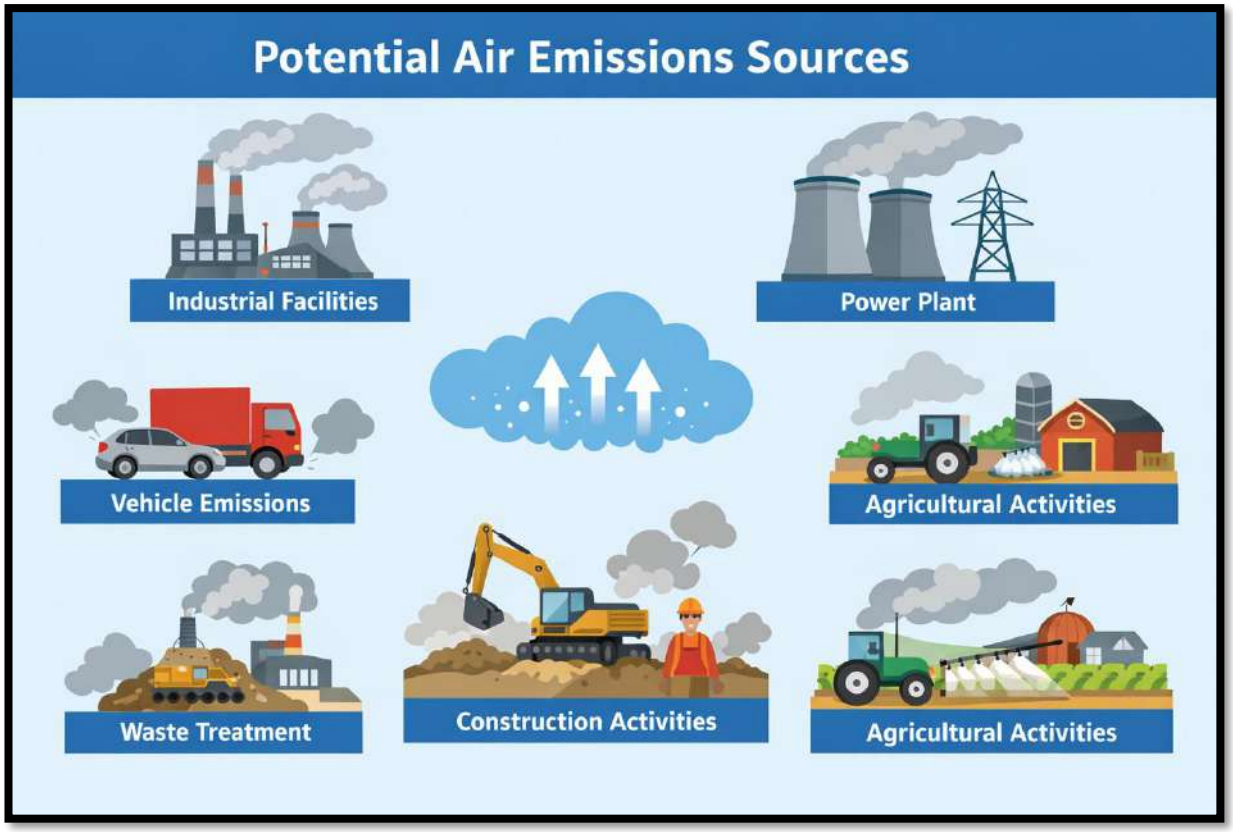

Figure 7:Air emissions sources infographic

3.10 Summary of Key Air Quality Considerations

The proposed mining activities have the potential to generate particulate matter emissions, particularly PM_{10}, $PM_{2.5}$, and total suspended particulates. Dust emissions are expected to be the primary concern, especially during dry and windy conditions.

The rural nature of the area and the presence of sensitive receptors such as farmsteads and agricultural land highlight the importance of effective dust management measures.

Understanding the nature and extent of these emission sources is critical in assessing potential impacts and developing appropriate mitigation measures.

Table 2: Summary of Key Air Quality Considerations

Aspect	Description	Potential Impact	Significance (Pre-Mitigation)	Key Mitigation Measures	Significance (Post-Mitigation)
Dust Generation (PM_{10} & $PM_{2.5}$)	Generated from site clearing, drilling, excavation, hauling, and wind erosion of exposed surfaces	Increased particulate concentrations affecting human health and vegetation	High	- Water spraying of haul roads and exposed areas - Speed control on unpaved roads - Progressive rehabilitation - Use of dust suppression chemicals where required	Medium to Low
Vehicle Emissions	Exhaust emissions from trucks, light vehicles, and machinery (NO_2, CO, PM, VOCs)	Localised air pollution and contribution to greenhouse gases	Medium	- Regular maintenance of vehicles - Use of fuel-efficient equipment - Minimising idling times	Low
Construction Activities	Earthworks, material handling, and infrastructure development	Short-term increase in dust and emissions	Medium	- Dust suppression measures - Scheduling activities during favourable weather - Limiting simultaneous	Low

				high-emission activities	
Material Handling & Stockpiling	Windblown dust from stockpiles and loading/unloading operations	Fugitive dust emissions impacting nearby receptors	High	- Covering stockpiles where feasible - Windbreaks/barriers - Moisture control	Medium
Combustion Emissions	Emissions from generators and fuel combustion (SO_2, NO_x, CO_2)	Degradation of ambient air quality	Medium	- Use of low-sulphur fuels - Efficient combustion systems - Regular servicing of equipment	Low
Greenhouse Gas Emissions (GHGs)	CO_2 and other GHG emissions from fuel combustion and operations	Contribution to climate change	Medium	- Energy efficiency measures - Use of renewable energy where feasible	Low
Windblown Dust	Dust generated from exposed soils during windy conditions	Off-site impacts on communities and ecosystems	High	- Rehabilitation of disturbed areas - Vegetation cover - Wind fencing	Medium
Sensitive Receptors	Nearby communities, farms, and	Exposure to degraded air quality	High	- Establishment of buffer zones - Continuous monitoring	Medium to Low

	ecological areas			- Stakeholder engagement	
Cumulative Impacts	Combined effect of project emissions with existing background sources	Increased regional air pollution levels	Medium to High	- Cumulative impact assessment - Implementation of strict emission controls	Medium

SECTION 4: BASELINE AIR QUALITY ENVIRONMENT

4.1 Introduction

This section presents the baseline air quality conditions for the study area, based on monitored ambient air quality and meteorological data. The purpose of this section is to establish existing air quality conditions against which the potential impacts of the proposed project can be assessed.

Baseline conditions were derived from an established ambient air quality monitoring station representative of the regional airshed.

4.2 Monitoring Station Description

The baseline air quality data utilised in this assessment was obtained from the **Thabazimbi Ambient Air Quality Monitoring Station**, operated by the South African Weather Service (SAWS).

Table 3:Station Details

Parameter	**Description**
Station Name	Thabazimbi Air Quality Monitoring Station
Operator	South African Weather Service (SAWS)
Location	Thabazimbi, Limpopo Province
Station Type	Ambient Monitoring Station
Coordinates	Latitude: -24.591058°, Longitude: 27.391609°
Elevation	~1013 m above sea level
Distance to Site	**8.27 km** from the proposed project site

The station is considered suitable for representing baseline conditions due to its proximity to the project area and its location within the same regional air-shed.

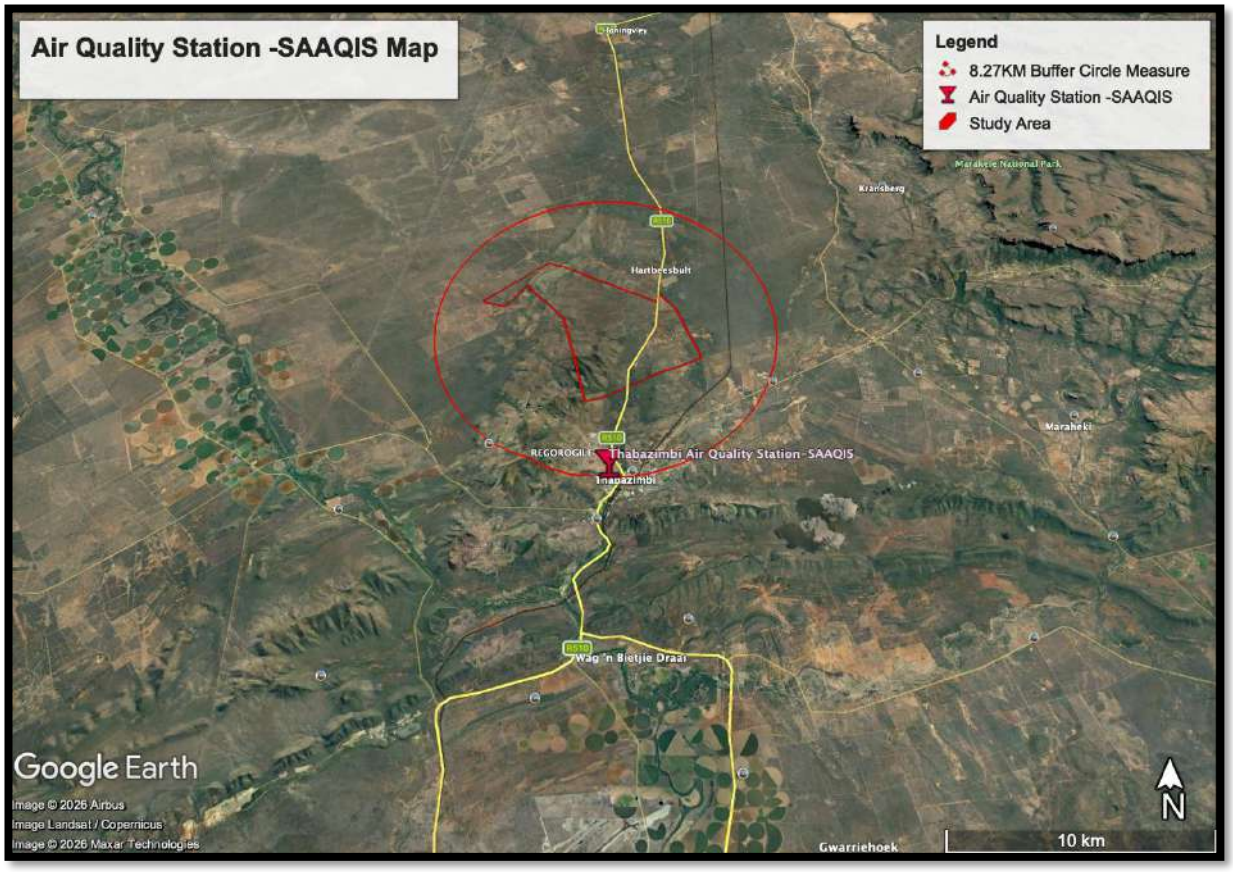

Figure 8 : Thabazimbi Air Quality Station Vs Study Area

4.3 Monitoring Period

The air quality and meteorological dataset covers the following monitoring period:

- **Start Date:** 01 March 2025
- **End Date:** 21 March 2026
- **Data Resolution:** Hourly averages

This period provides a comprehensive dataset capturing seasonal variations, including summer and winter conditions, which are critical for understanding pollutant dispersion and accumulation patterns.

4.4 Parameters Monitored

The monitoring station records a wide range of air quality pollutants and meteorological parameters, as summarised below:

4.4.1 Air Quality Parameters

- Sulphur Dioxide (**SO_2**)
- Nitrogen Dioxide (**NO_2**)
- Nitric Oxide (**NO**)
- Oxides of Nitrogen (**NO_x**)
- Ozone (**O_3**)
- Carbon Monoxide (**CO**)
- Particulate Matter (**$PM_{2.5}$**, **PM_{10}**, PM Coarse)
- Volatile Organic Compounds (**Benzene**, **Toluene**, **p-Xylene**)

4.4.2 Meteorological Parameters

- Wind Speed
- Wind Direction
- Ambient Temperature
- Relative Humidity
- Solar Radiation
- Atmospheric Pressure
- Rainfall

4.5 Baseline Air Quality Conditions

The time-series analysis of air quality data indicates that pollutant concentrations vary both temporally and seasonally.

Particulate Matter (PM_{10} and $PM_{2.5}$)

Elevated concentrations of particulate matter are observed intermittently throughout the monitoring period, with pronounced peaks likely associated with:

- Windblown dust events
- Dry seasonal conditions
- Regional anthropogenic activities

PM_{10} concentrations exhibit higher variability and peak values compared to $PM_{2.5}$, indicating a dominance of coarse dust particles typical of semi-arid environments.

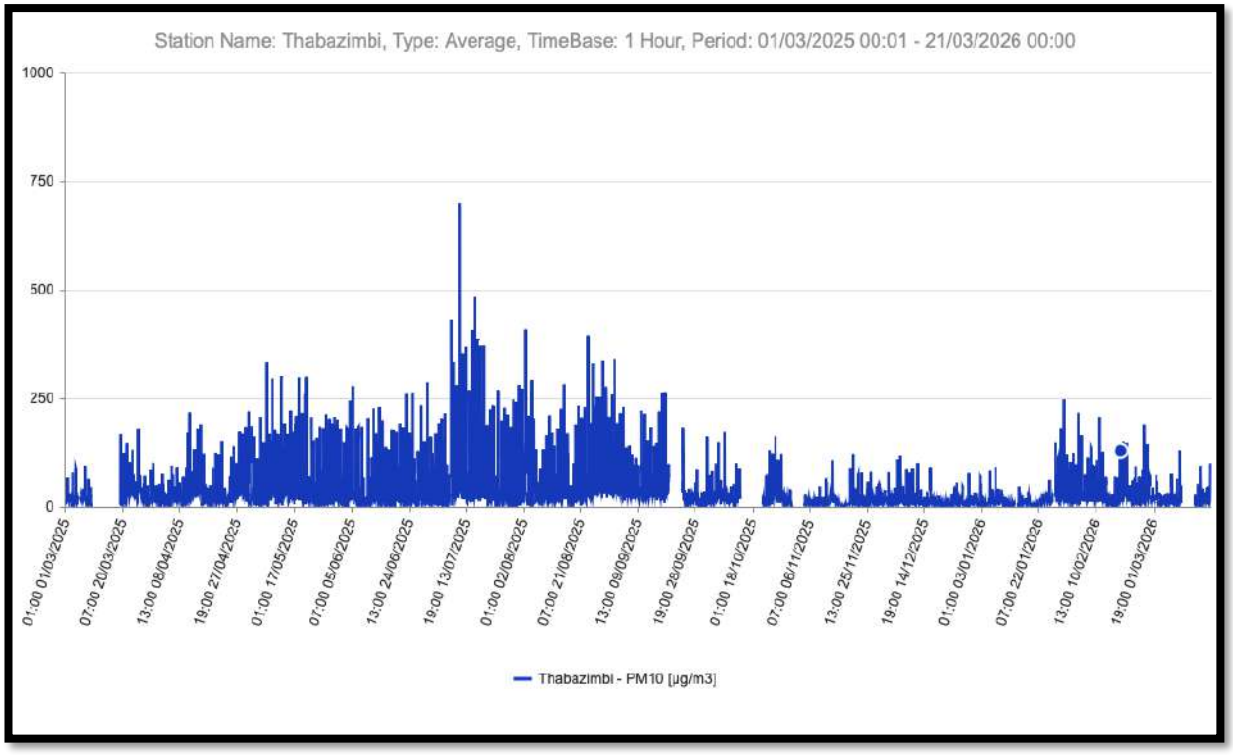

Figure 9: PM10 Annual Graph

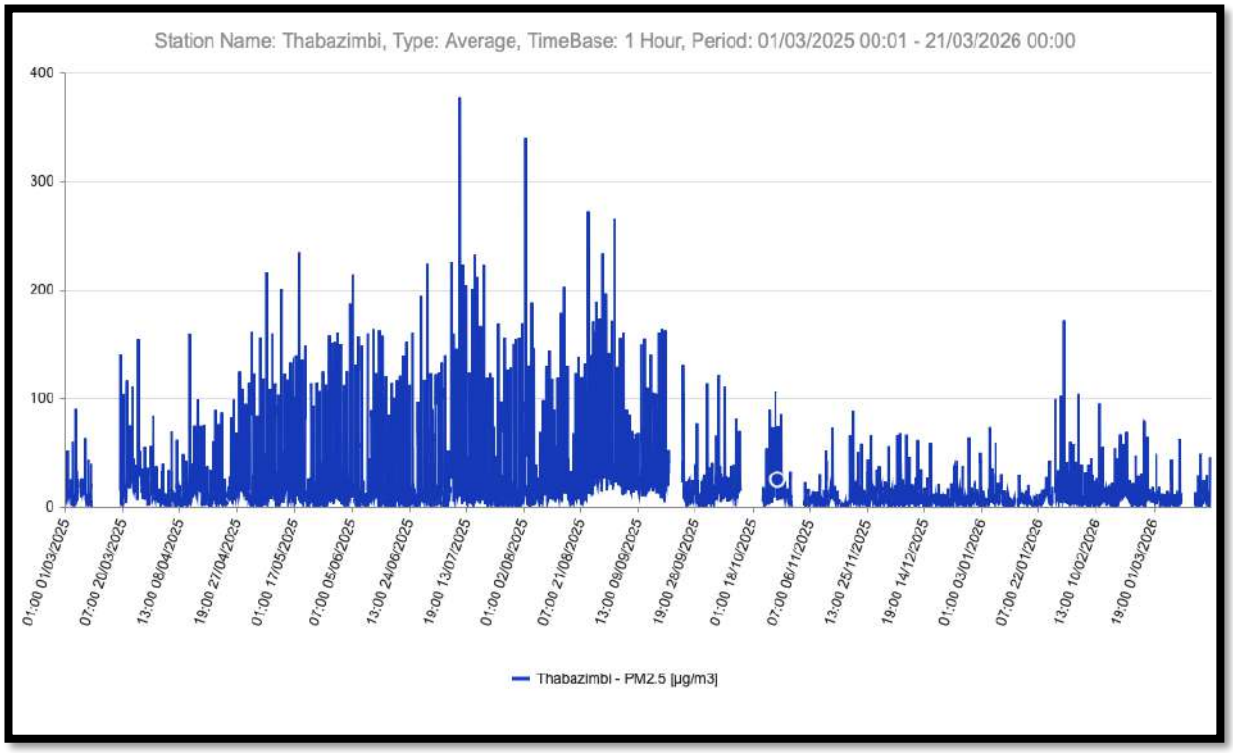

Figure 10 : PM2.5 Annual Graph

Gaseous Pollutants (SO_2, NO_2, NO_x, CO, O_3)

- **Nitrogen oxides (NO_x)** show episodic peaks, likely linked to combustion-related sources such as vehicle emissions and regional industrial activities.

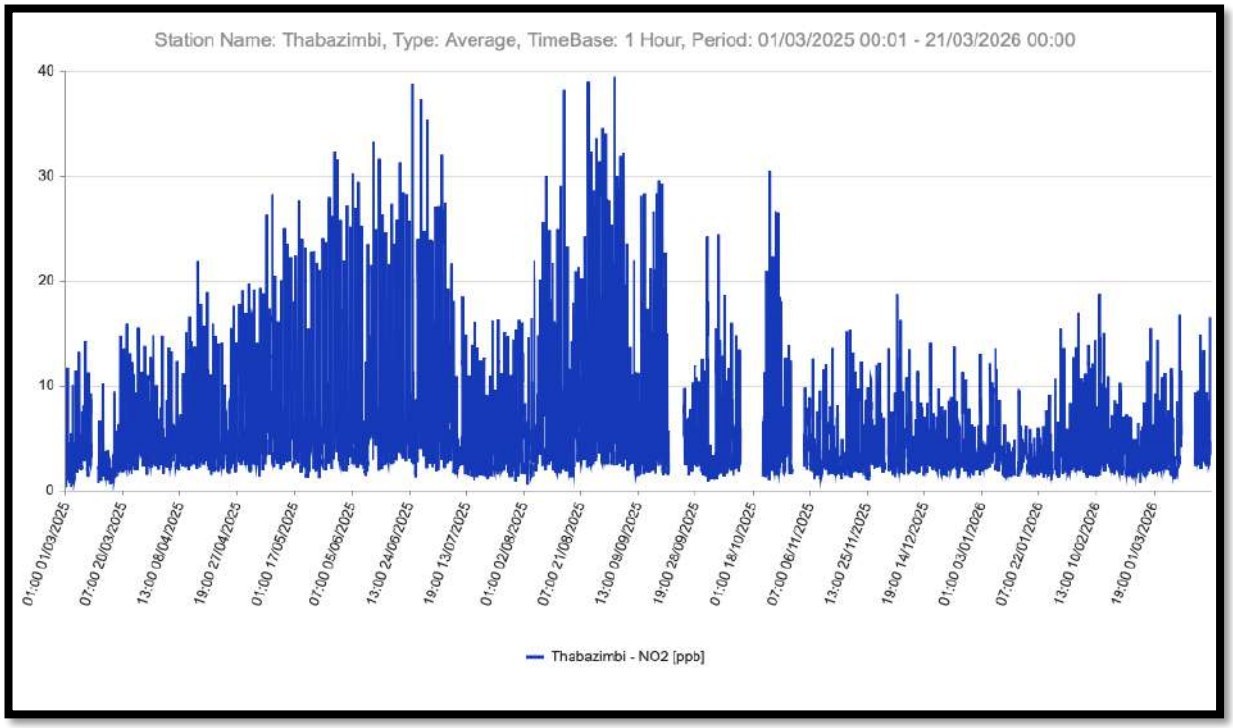

Figure 11: NO2 Annual Graph

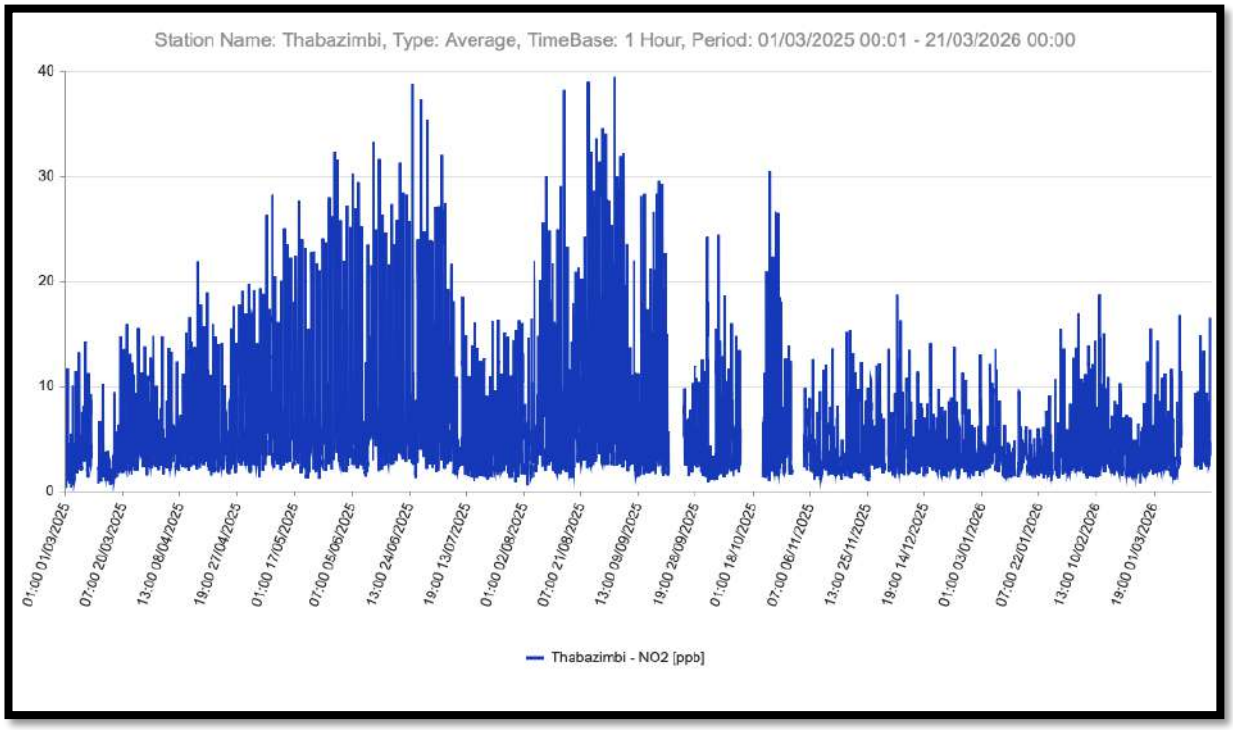

Figure 12:NO2 Annual Graph

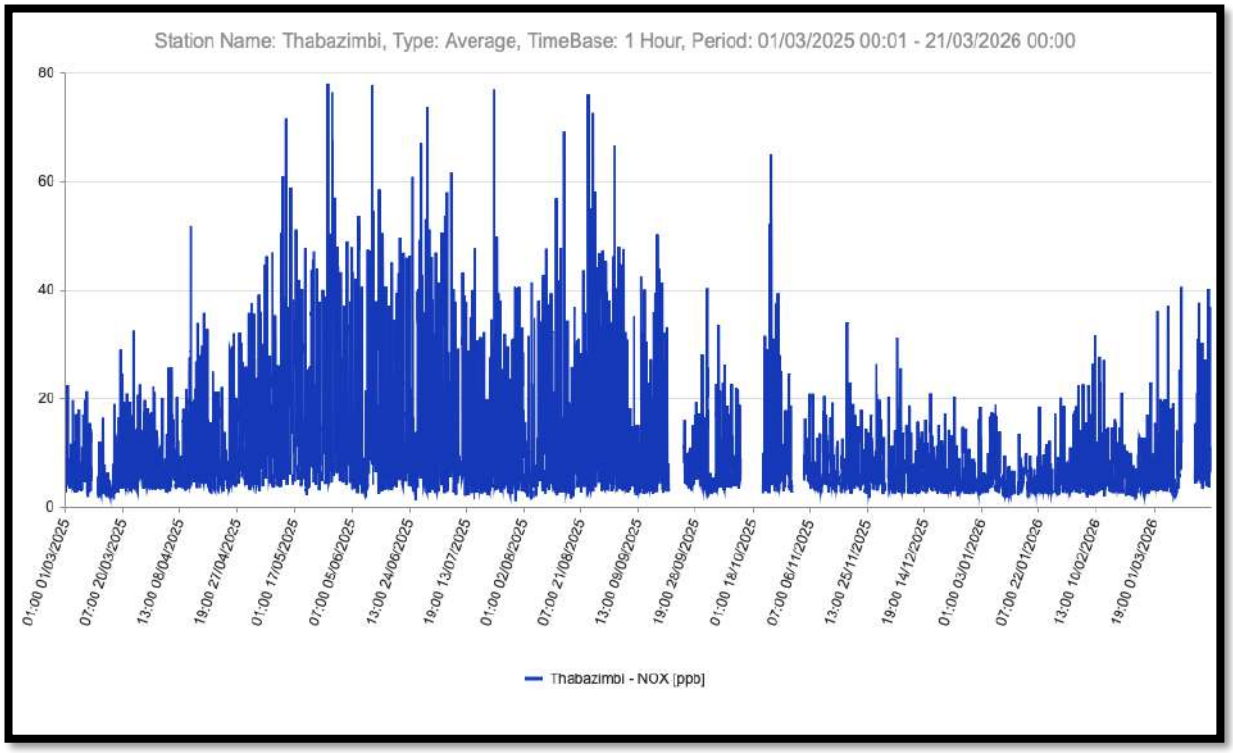

Figure 13 : NOx Annual Graph

- **Ozone (O_3)** displays typical photochemical behaviour, with higher concentrations during periods of increased solar radiation.

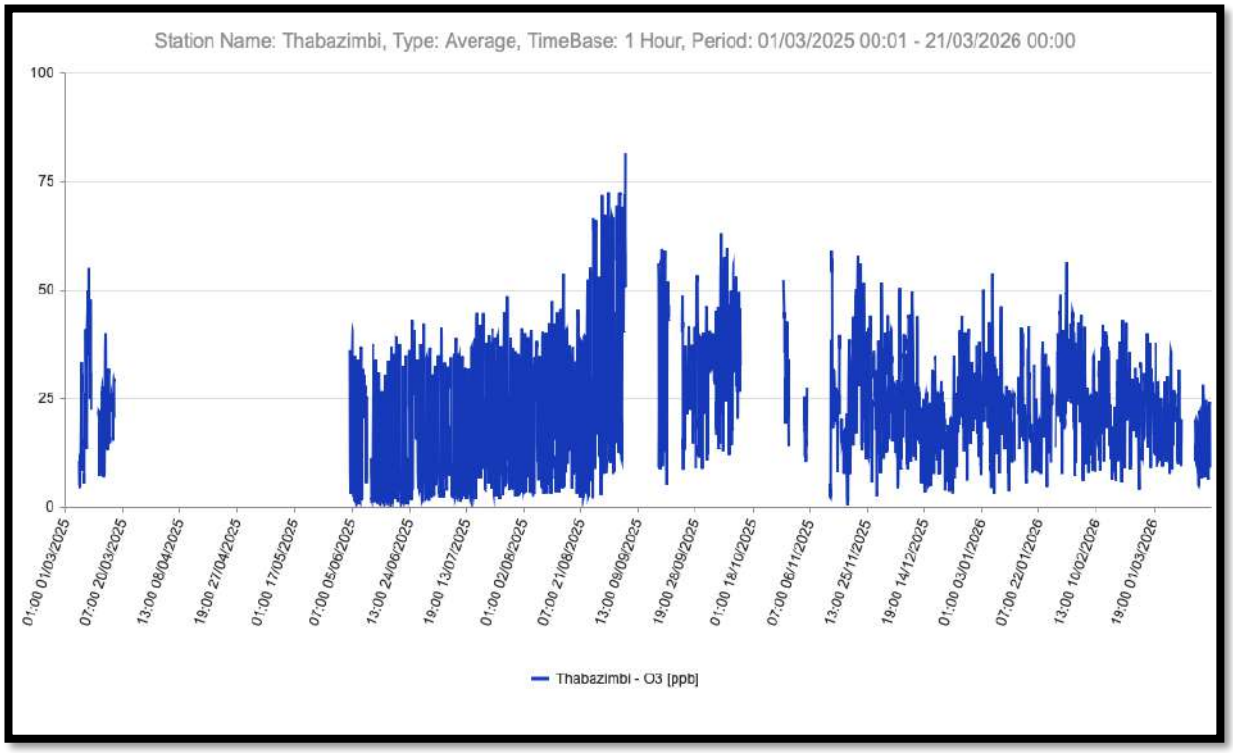

Figure 14 : O3 Annual Graph

- **SO_2 and CO** concentrations remain relatively low, indicating limited influence from significant industrial combustion sources within the immediate vicinity.

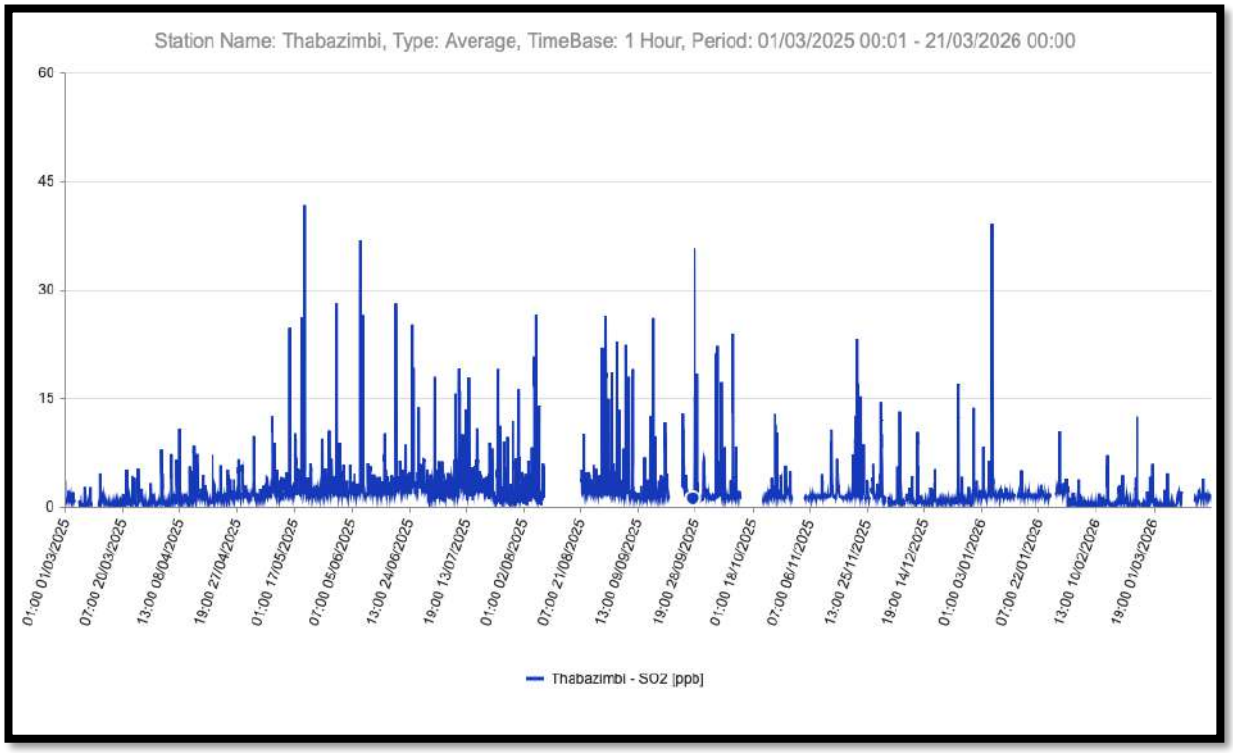

Figure 15:SO2 Annual Graph

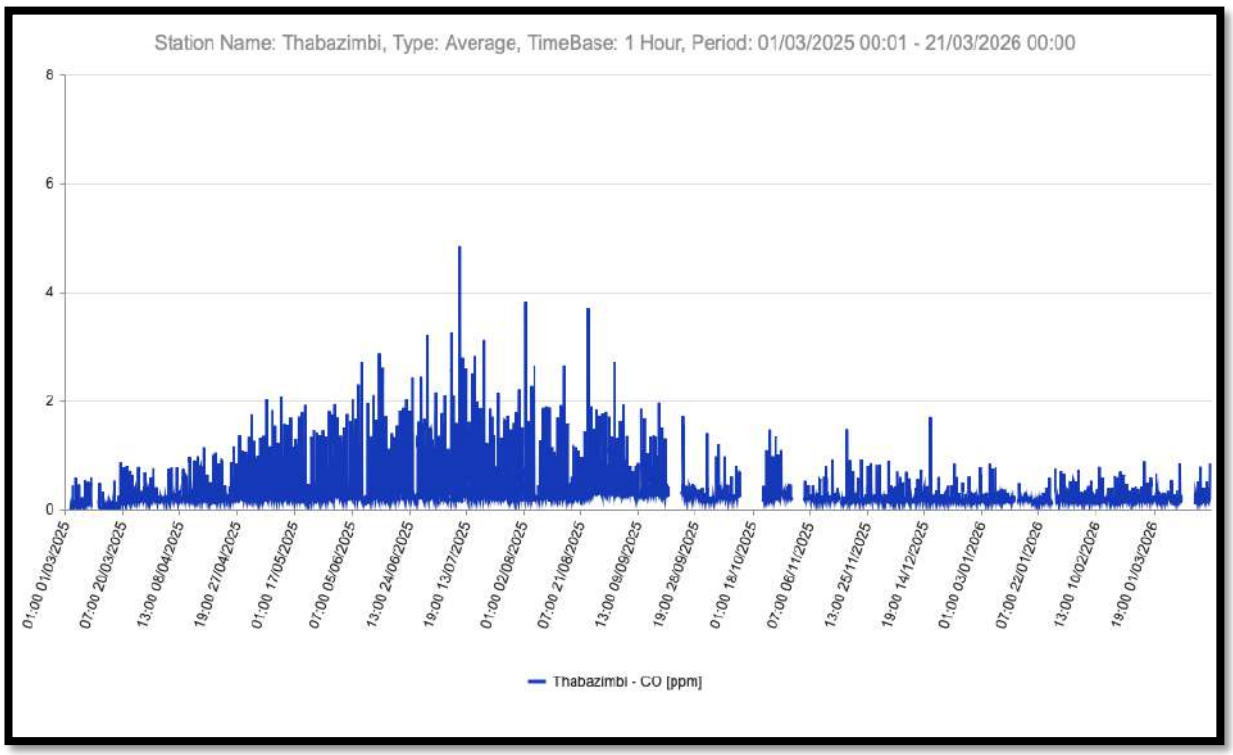

Figure 16:CO Annual Graph

Volatile Organic Compounds (VOCs)

Measured concentrations of benzene, toluene, and p-xylene are generally low or below detection limits, suggesting minimal influence from petrochemical or solvent-related emission sources in the area.

4.6 Meteorological Conditions

Meteorological conditions play a critical role in the dispersion and transformation of air pollutants.

- **Wind Speed:** Generally low to moderate, with periodic higher wind events enhancing dispersion.

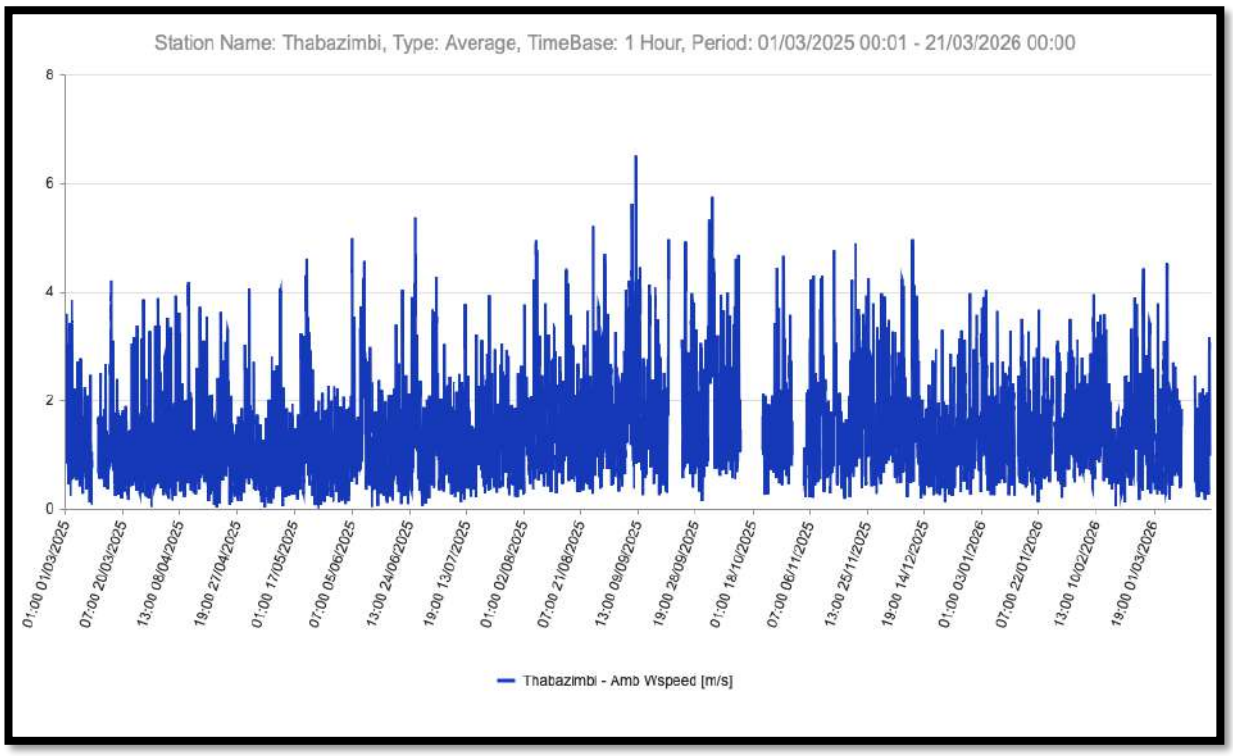

Figure 17 : Ambient Wind Speed Annual Graph

- **Wind Direction:** Variable, indicating multiple potential source contributions within the regional airshed.

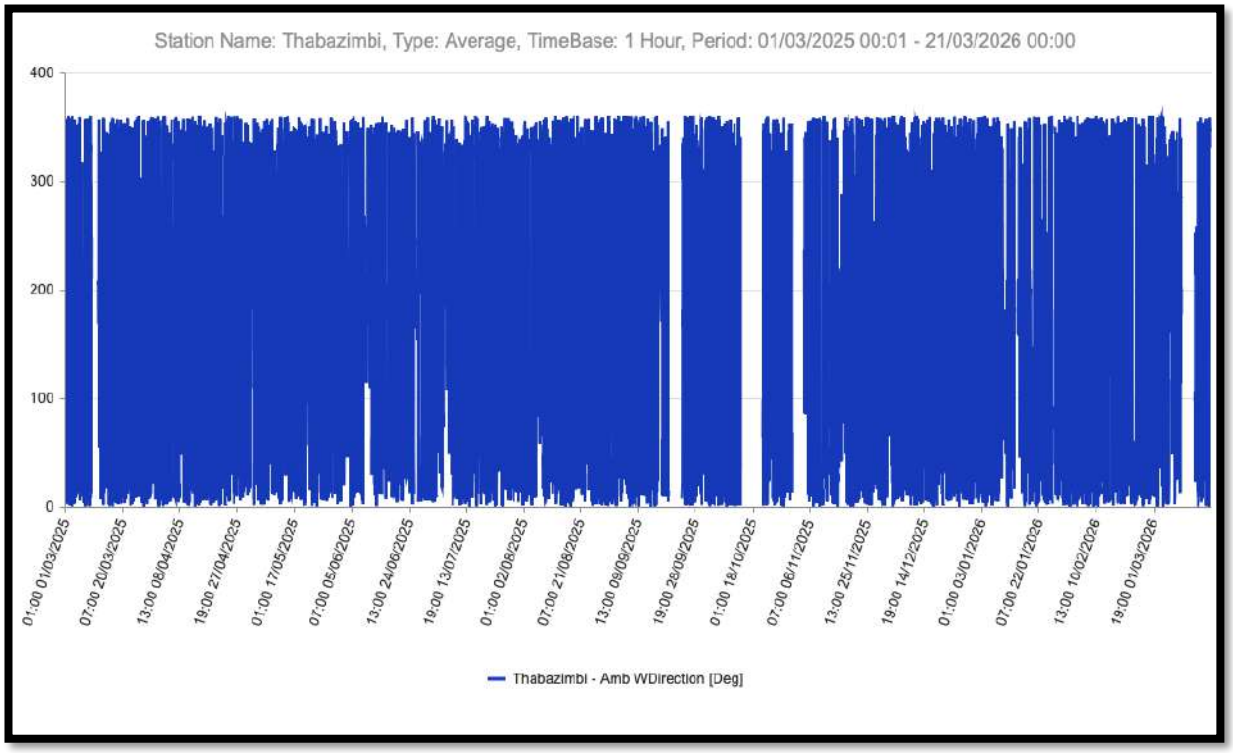

Figure 18: Ambient Wind Direction Annual Graph

- **Temperature:** Exhibits clear seasonal variation, with higher temperatures during summer months.

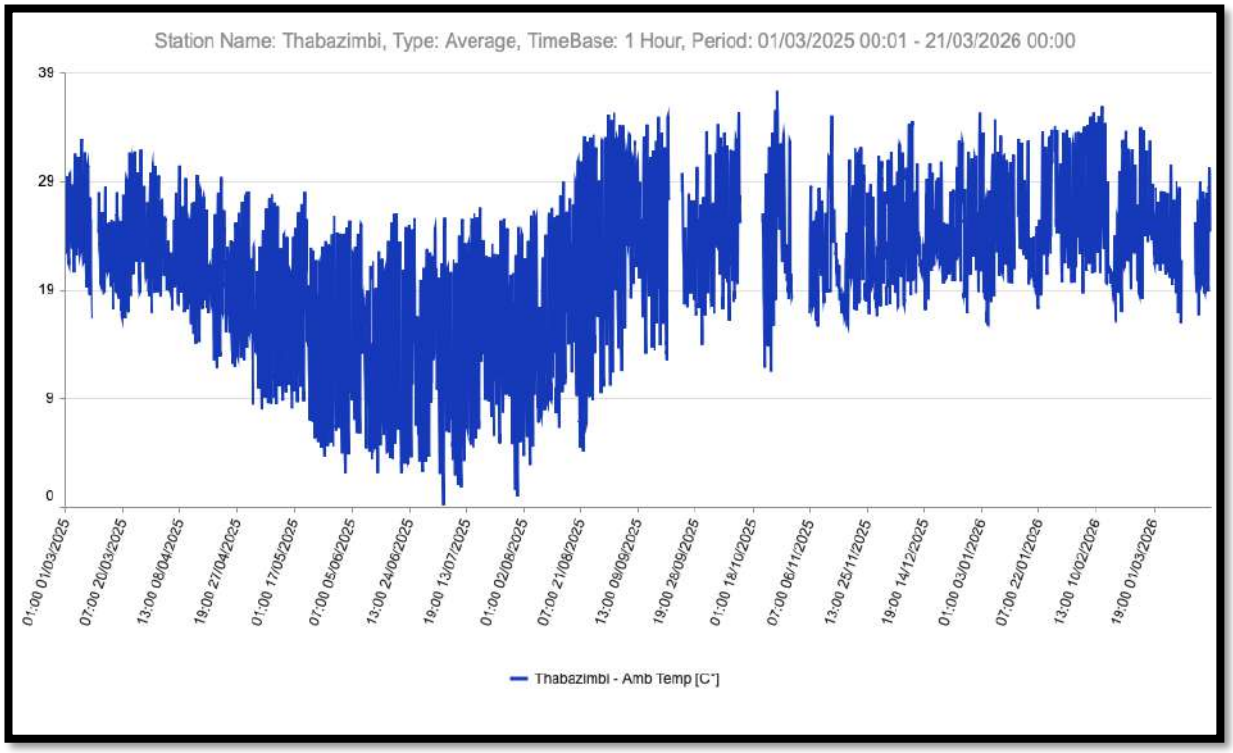

Figure 19 : Ambient Temperature Annual Graph

- **Relative Humidity:** Fluctuates significantly, influencing particle suspension and deposition.

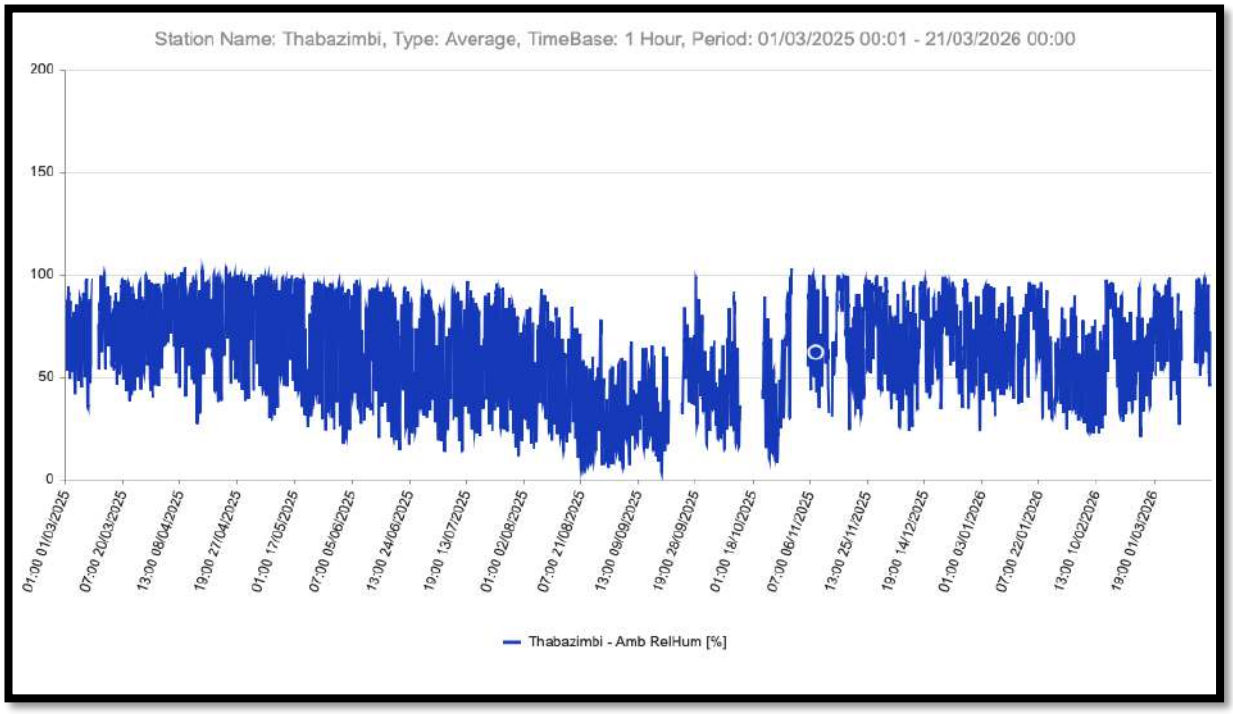

Figure 20 : Ambient Rel Humidity Annual Graph

- **Solar Radiation:** Strong seasonal trends influencing photochemical reactions such as ozone formation.

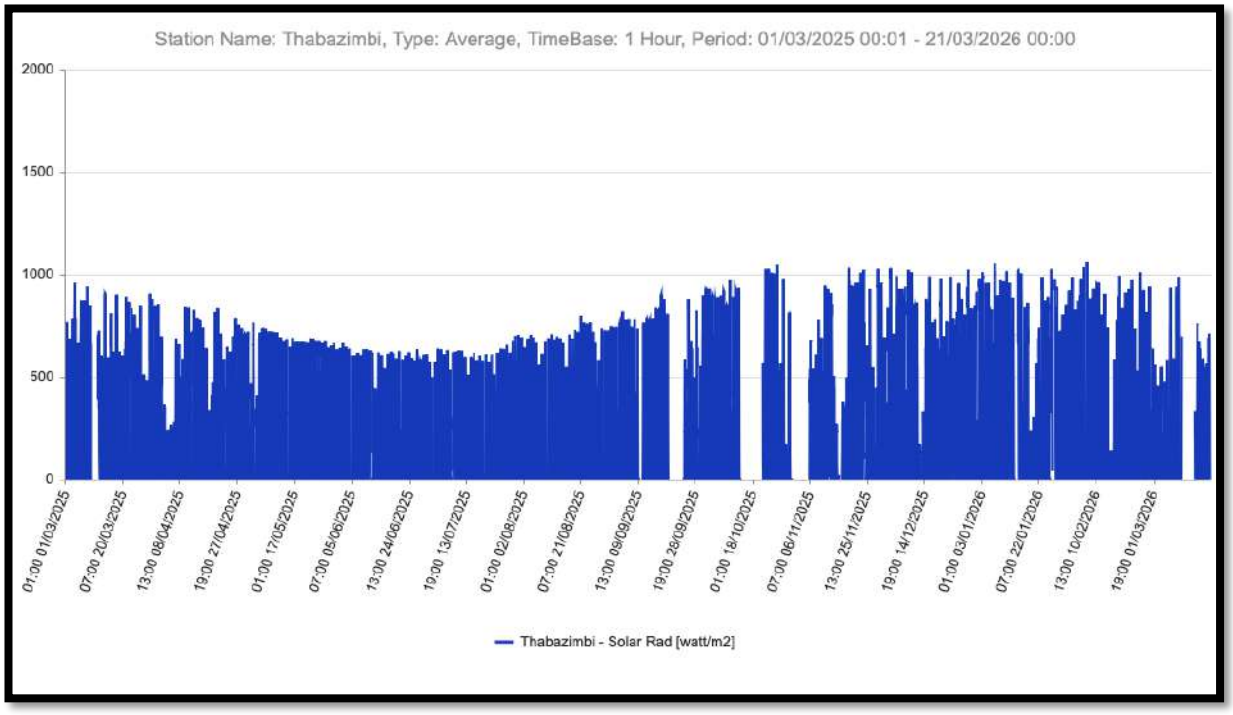

Figure 21 : Solar Radiation

- **Rainfall:** Episodic rainfall events contribute to wet deposition and temporary reductions in particulate concentrations.

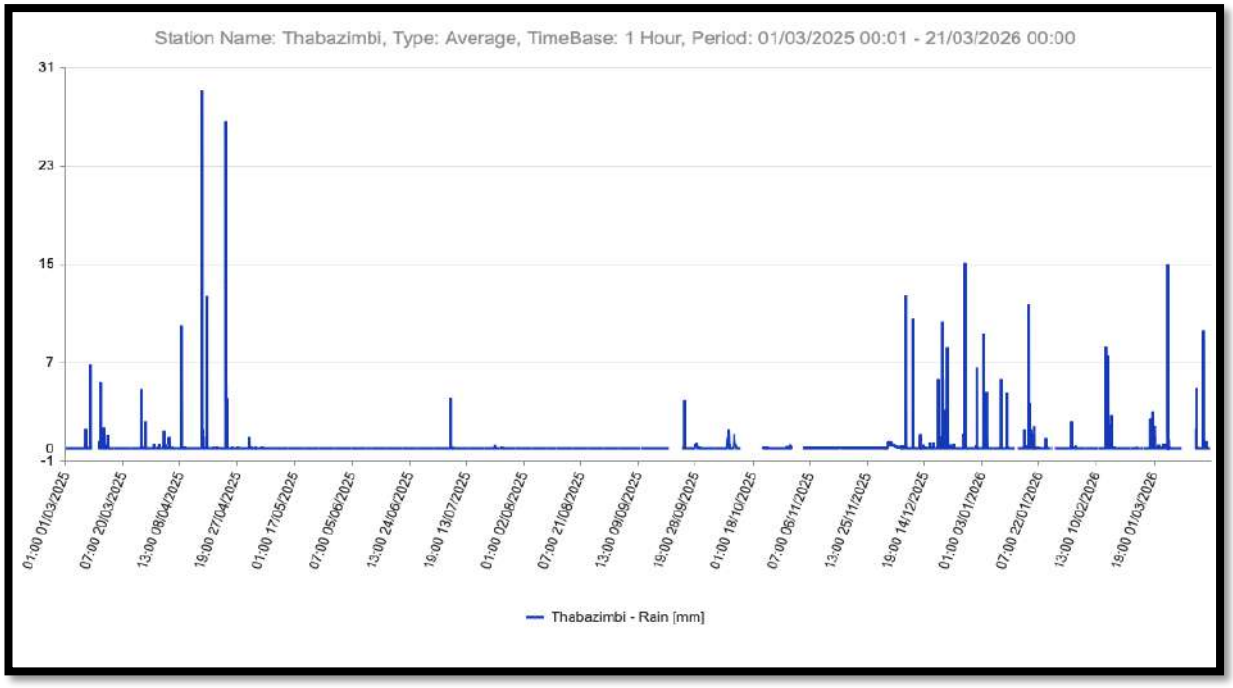

Figure 22 : Annual Rain Graph

- **Atmospheric Pressure:** Relatively stable with minor fluctuations typical of the region.

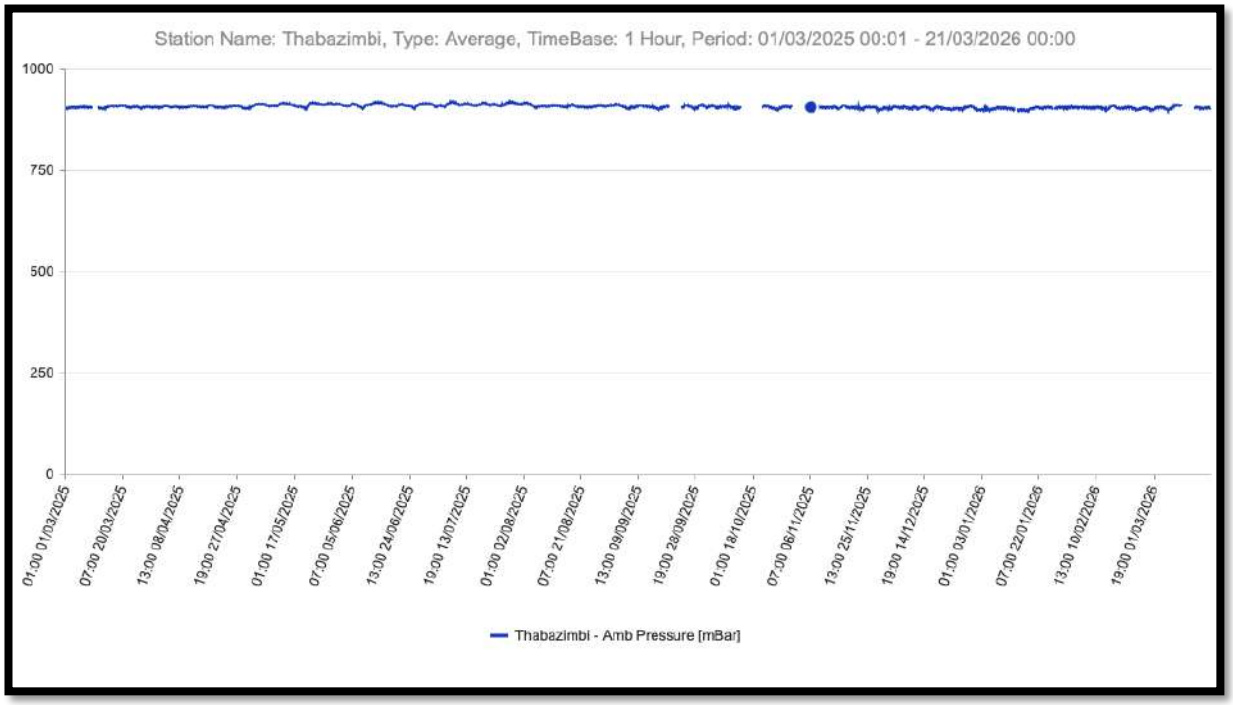

Figure 23 : Ambient Pressure

4.7 Interpretation of Baseline Conditions

This section provides an integrated interpretation of the baseline air quality environment by combining pollutant trends, meteorological drivers, and dispersion characteristics, with particular emphasis on wind patterns (wind rose) and their influence on pollutant movement.

4.7.1 Integrated Air Quality Trends

The baseline dataset indicates that the study area is predominantly influenced by particulate matter (PM_{10} and $PM_{2.5}$), with gaseous pollutants generally occurring at low to moderate concentrations.

Key observations include:

- **PM_{10} (Coarse Particles):**
    - Exhibits the highest variability and peak concentrations
    - Strongly influenced by windblown dust, exposed surfaces, and regional activities
    - Dominant pollutant in the study area

- **$PM_{2.5}$ (Fine Particles):**
    - Lower concentrations compared to PM_{10} but still shows episodic peaks
    - Associated with combustion processes and secondary formation
- **Nitrogen Oxides (NO_x):**
    - Episodic peaks suggest mobile and combustion-related sources
    - Likely linked to vehicle movement and regional industrial activities
- **Ozone (O_3):**
    - Displays photochemical behaviour
    - Elevated during periods of high solar radiation
- **SO_2 and CO:**
    - Generally low, indicating **limited influence of major industrial combustion sources**
- **Volatile Organic Compounds (VOCs):**
    - Negligible concentrations, suggesting minimal petrochemical influence

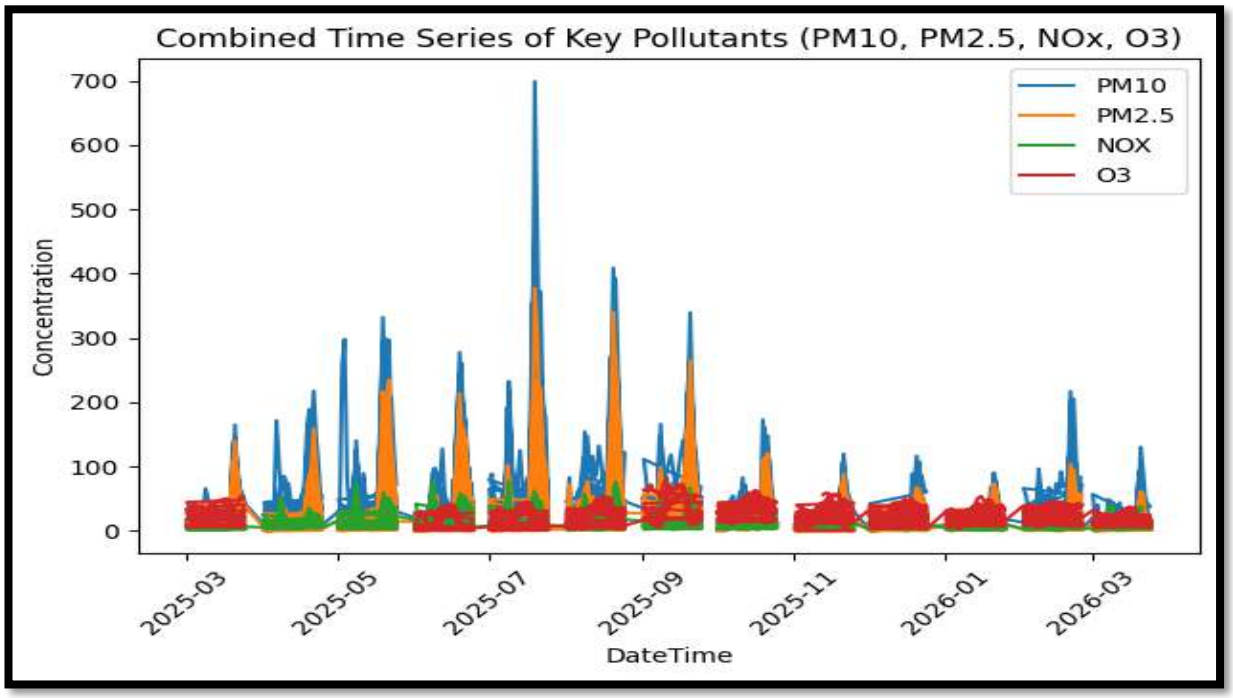

Figure 24**:** Combined Time Series of Key Pollutants (PM_{10}, $PM_{2.5}$, NO_x, O_3)

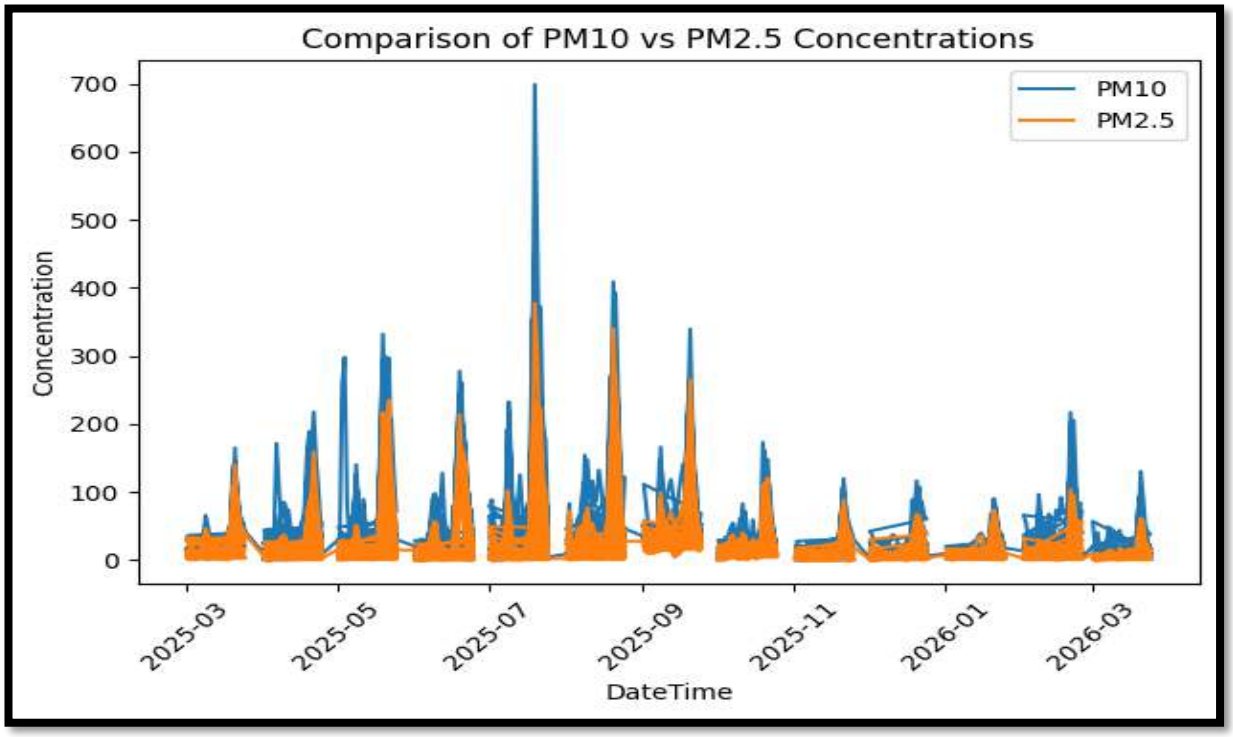

Figure 25:Comparison of PM_{10} vs $PM_{2.5}$ Concentrations

4.7.2 Wind Regime and Dispersion Characteristics

Wind conditions are the most critical driver of air pollutant dispersion within the study area.

The analysis of wind speed and direction indicates:

- Predominantly variable wind directions, indicating multiple contributing source regions
- Frequent low wind speed conditions, which may result in:
    - Reduced dispersion
    - Localised pollutant accumulation
- Occasional higher wind speed events, contributing to:
    - Enhanced dispersion
    - Increased dust entrainment (especially PM_{10})

Wind Rose Interpretation

The wind rose provides a graphical representation of:

- Dominant wind directions
- Frequency distribution of wind speeds
- Prevailing dispersion pathways

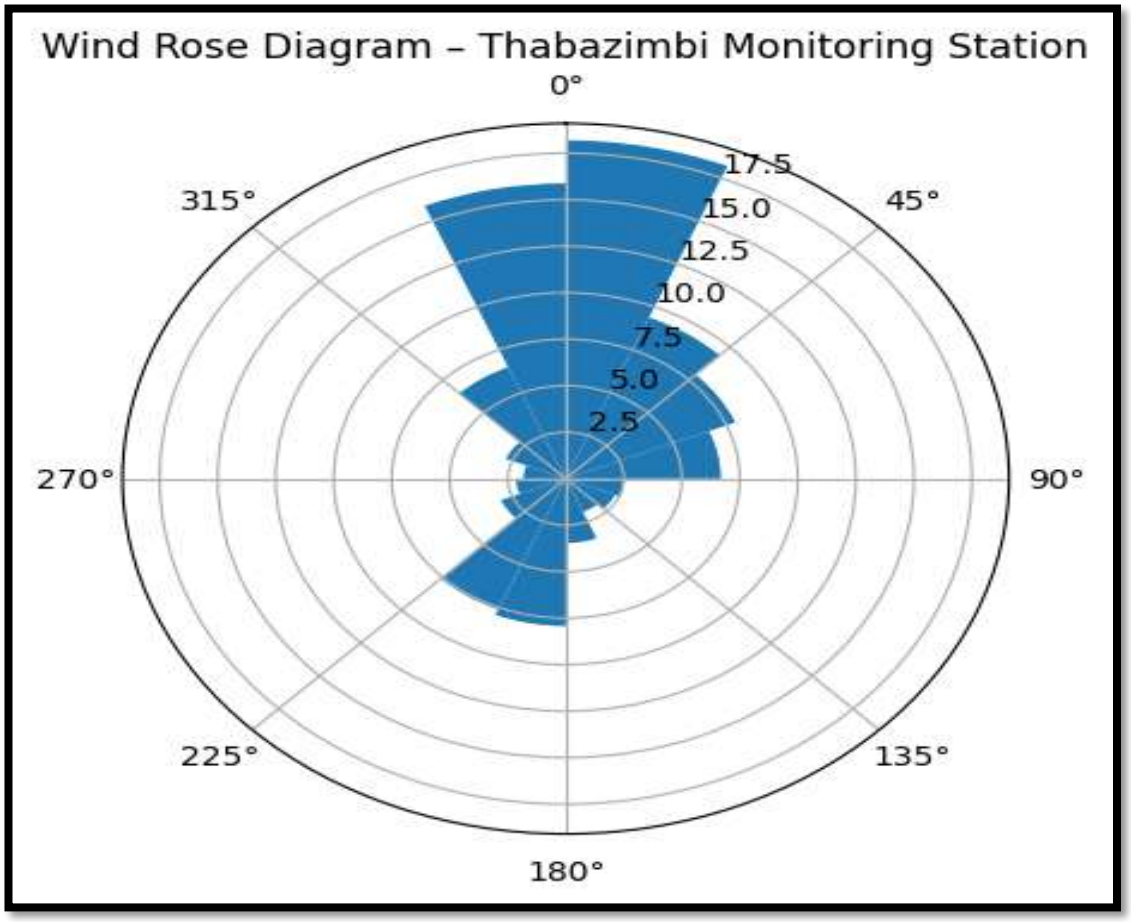

Figure 26:*Wind Rose Diagram – Thabazimbi Monitoring Station*

Interpretation to include below figure:

The wind rose indicates that the dominant wind direction in the study area is from the northern sector, followed by contributions from the north-western and north-eastern directions. Moderate wind activity is also observed from the eastern sector, while southern and western wind components occur less frequently.

This prevailing wind pattern suggests that airborne pollutants generated within the project area are most likely to be transported towards the southern sector. As a result, sensitive receptors located downwind (south of the site) may experience higher exposure to particulate matter and other emissions.

The relatively consistent wind direction distribution indicates stable dispersion pathways, which is important for predicting the movement of dust and gaseous emissions during both the construction and operational phases of the proposed project.

The wind conditions further confirm that particulate matter, particularly PM_{10}, may be mobilised under moderate wind speeds, reinforcing the importance of dust suppression and management measures

The wind rose indicates that prevailing winds are predominantly from the north-western and north-eastern directions based on your wind rose**,** suggesting that:

- Emission sources located in these directions may significantly influence the study area
- Pollutants generated at the project site are likely to be transported along these dominant wind pathways
- Receptors located downwind of these prevailing directions are at higher risk of exposure

Additionally:

- Calm or low wind conditions contribute to pollutant accumulation near the source
- Higher wind speeds facilitate regional dispersion but may increase dust generation

4.7.3 Influence of Meteorological Parameters on Air Quality

Meteorological conditions significantly influence pollutant behaviour, as summarised below:

Temperature

- Higher temperatures enhance **atmospheric mixing and chemical reactions**
- Promotes formation of secondary pollutants such as ozone

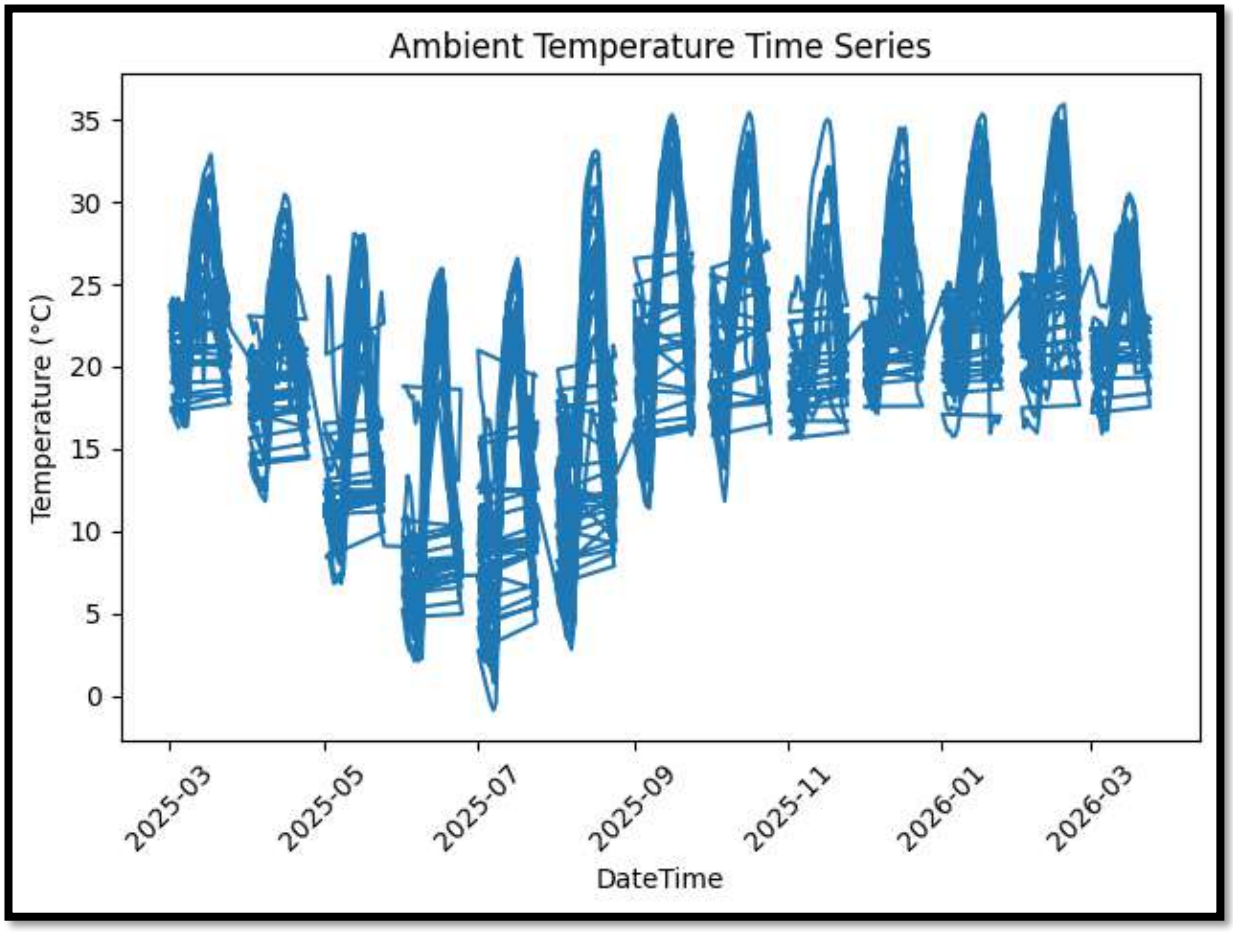

Figure 27**:** *Ambient Temperature Time Series*

The ambient temperature time series indicates clear seasonal variability within the study area. Higher temperatures are observed during the summer months, with peaks exceeding 30°C, while lower temperatures occur during the winter period, with minimum values dropping below 10°C.

The data shows typical diurnal and seasonal fluctuations characteristic of the region, reflecting a warm climate with moderate temperature variation. These temperature conditions play an important role in atmospheric processes, particularly influencing pollutant dispersion, chemical reactions, and the formation of secondary pollutants such as ozone.

Higher temperatures may enhance photochemical activity, contributing to elevated ozone concentrations, while cooler conditions may reduce atmospheric mixing, potentially leading to pollutant accumulation near ground level.

Relative Humidity

- High humidity promotes particle agglomeration and deposition
- Low humidity conditions favour dust suspension

Solar Radiation

- Drives photochemical reactions, particularly ozone formation
- Correlates with elevated daytime O_3 concentrations

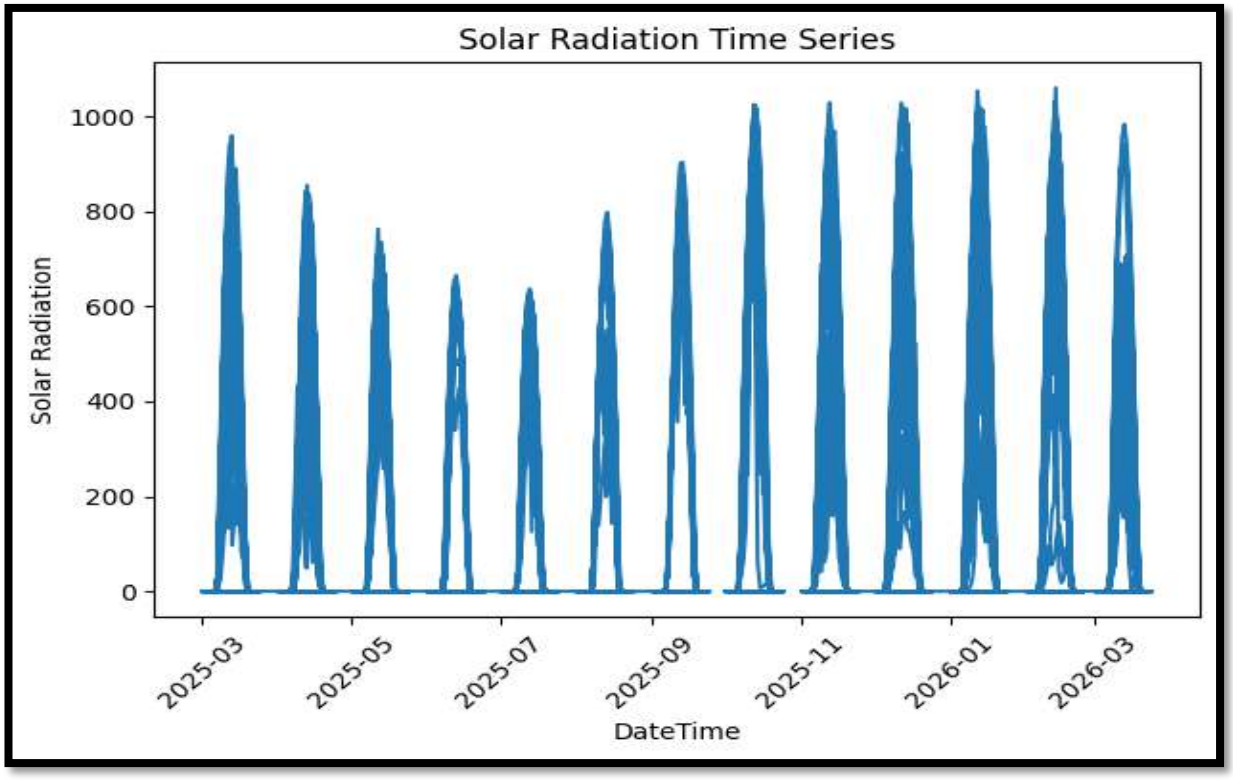

Figure 28*:* Solar Radiation Time Series

The solar radiation time series shows a clear diurnal pattern, with radiation levels peaking during daylight hours and dropping to near zero during nighttime. Seasonal variation is also evident, with higher radiation levels recorded during the summer months and relatively lower values during winter.

The high solar radiation levels observed during the warmer months are significant for air quality processes, as they enhance photochemical reactions in the atmosphere. This contributes to the formation of secondary pollutants such as ozone, particularly in the presence of precursor gases like nitrogen oxides.

The consistent and strong solar radiation profile indicates favourable conditions for atmospheric mixing during the day, which may aid in pollutant dispersion. However, it also supports photochemical smog formation under certain conditions, especially when combined with elevated temperatures and emissions

Rainfall

- Rainfall events contribute to wet deposition, reducing particulate concentrations
- Extended dry periods increase dust generation potential

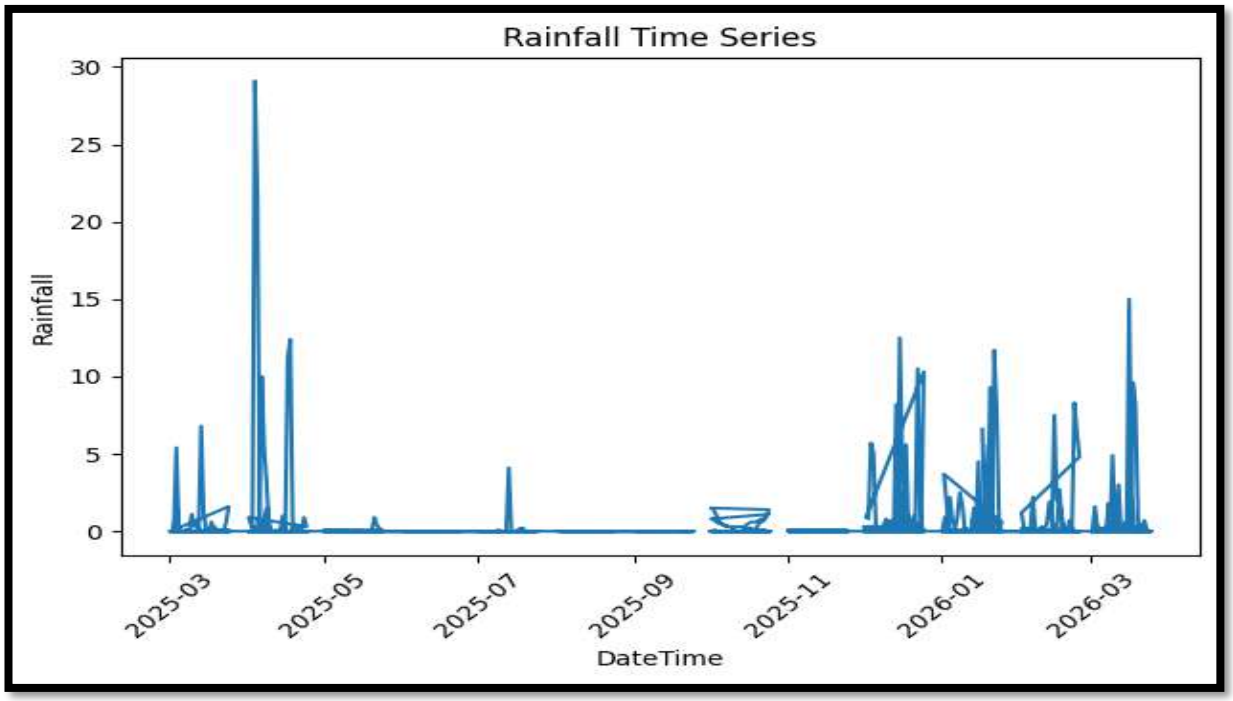

Figure 29*:* Rainfall Time Series

The rainfall time series indicates that precipitation within the study area is episodic and unevenly distributed throughout the year. Higher rainfall events are observed during the summer months, while the winter period is characterised by little to no rainfall.

The data shows distinct rainfall peaks, with several high-intensity events occurring early and towards the end of the monitoring period. These rainfall events play an important role in air quality by reducing airborne particulate matter through wet deposition, effectively removing dust and other pollutants from the atmosphere.

Conversely, extended dry periods, particularly during winter, create favourable conditions for dust generation and accumulation due to the lack of natural suppression. This pattern supports the observed dominance of particulate matter (PM_{10}) within the study area and highlights the importance of dust control during dry conditions.

Atmospheric Pressure

- Relatively stable but influences vertical mixing and atmospheric stability

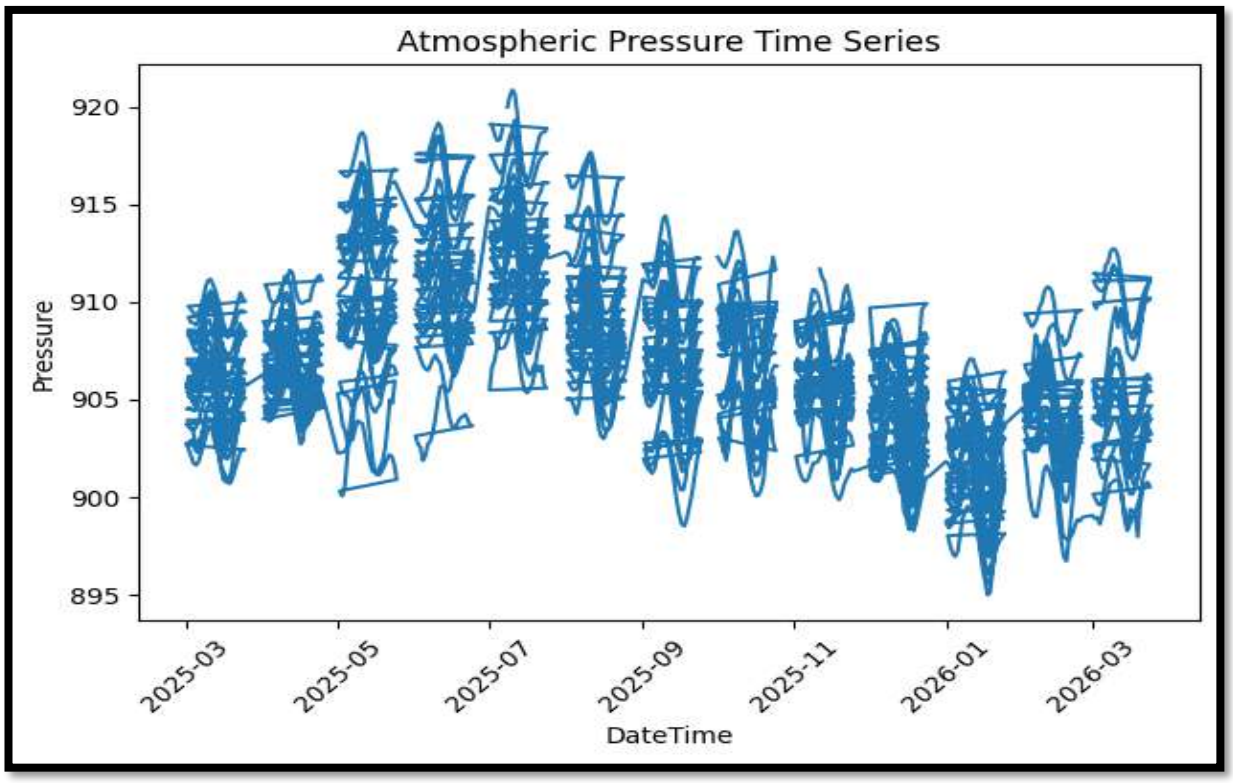

Figure 30*:* Atmospheric Pressure Time Series

The atmospheric pressure time series shows relatively stable conditions throughout the monitoring period, with moderate fluctuations typical of regional weather systems. Pressure values generally range within a narrow band, indicating the absence of extreme pressure systems.

Slight seasonal variation is observed, with marginally higher pressures recorded during the cooler months and lower pressures during warmer periods. These variations are consistent with typical atmospheric circulation patterns.

Atmospheric pressure plays an important role in air quality by influencing vertical air movement and pollutant dispersion. Higher pressure conditions are often associated with stable atmospheric conditions, which may limit vertical mixing and lead to the accumulation of pollutants near the ground. Conversely, lower pressure conditions are generally linked to increased atmospheric instability and enhanced dispersion of pollutants.

4.7.4 Pollutant–Meteorology Relationship

The interaction between air pollutants and meteorological conditions reveals:

- **High PM_{10} concentrations** coincide with:
    - Low rainfall
    - Moderate to high wind speeds (dust entrainment)
- **Ozone peaks** correspond with:
    - High solar radiation
    - Elevated temperatures
- **Pollutant accumulation** occurs during:
    - Low wind speeds
    - Stable atmospheric conditions

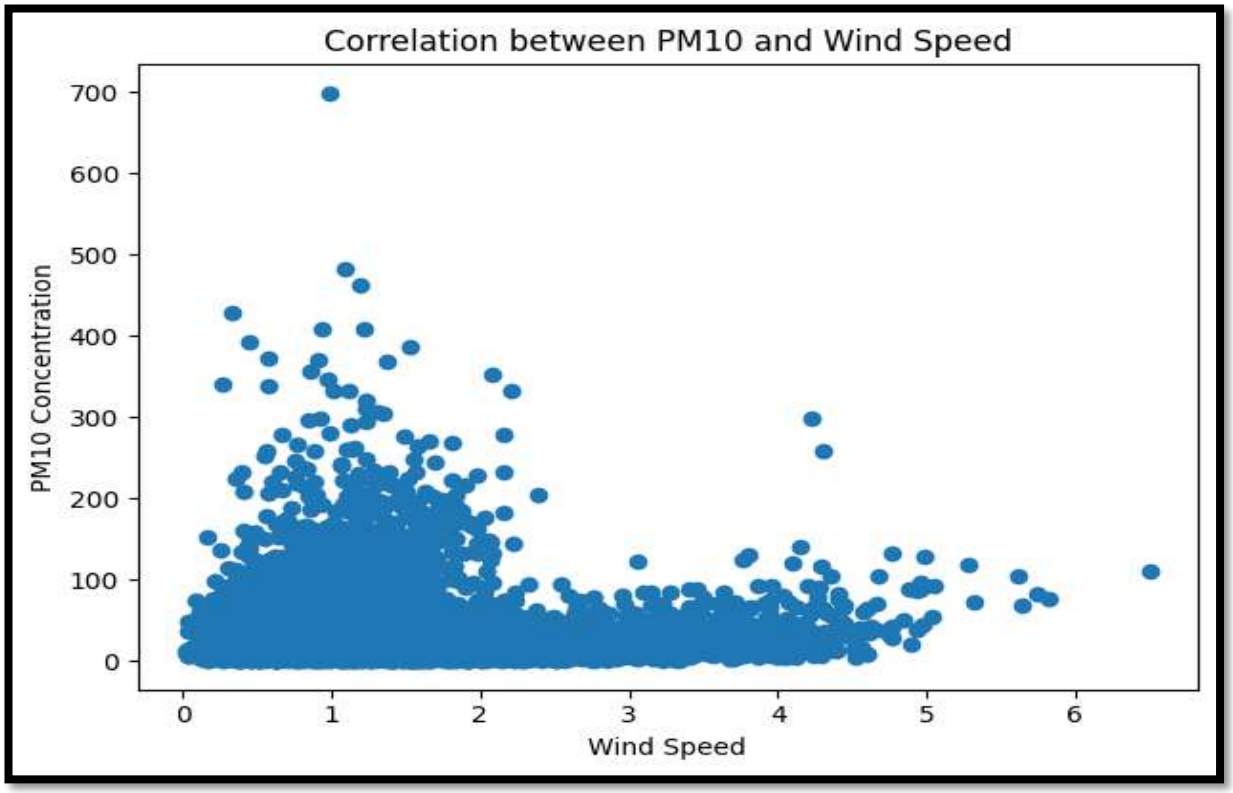

Figure 31 *:* Correlation Plot between PM_{10} and Wind Speed

The correlation plot between PM_{10} concentrations and wind speed indicates a clear relationship between wind conditions and particulate matter levels. Elevated PM_{10} concentrations are generally associated with low to moderate wind speeds, suggesting that dust accumulation occurs under relatively stable atmospheric conditions.

At moderate wind speeds, there is evidence of increased variability in PM_{10} concentrations, which may be attributed to the entrainment and transport of dust from exposed surfaces. However, at higher wind speeds, PM_{10} concentrations tend to stabilise or decrease slightly, likely due to enhanced dispersion and dilution of airborne particles.

The presence of several high concentration outliers at lower wind speeds further confirms that calm conditions contribute to pollutant build-up. Overall, the relationship highlights the importance of wind-driven dust generation and dispersion mechanisms within the study area.

This finding reinforces the need for dust suppression measures, particularly during dry and moderately windy conditions, to minimise particulate emissions from the proposed project

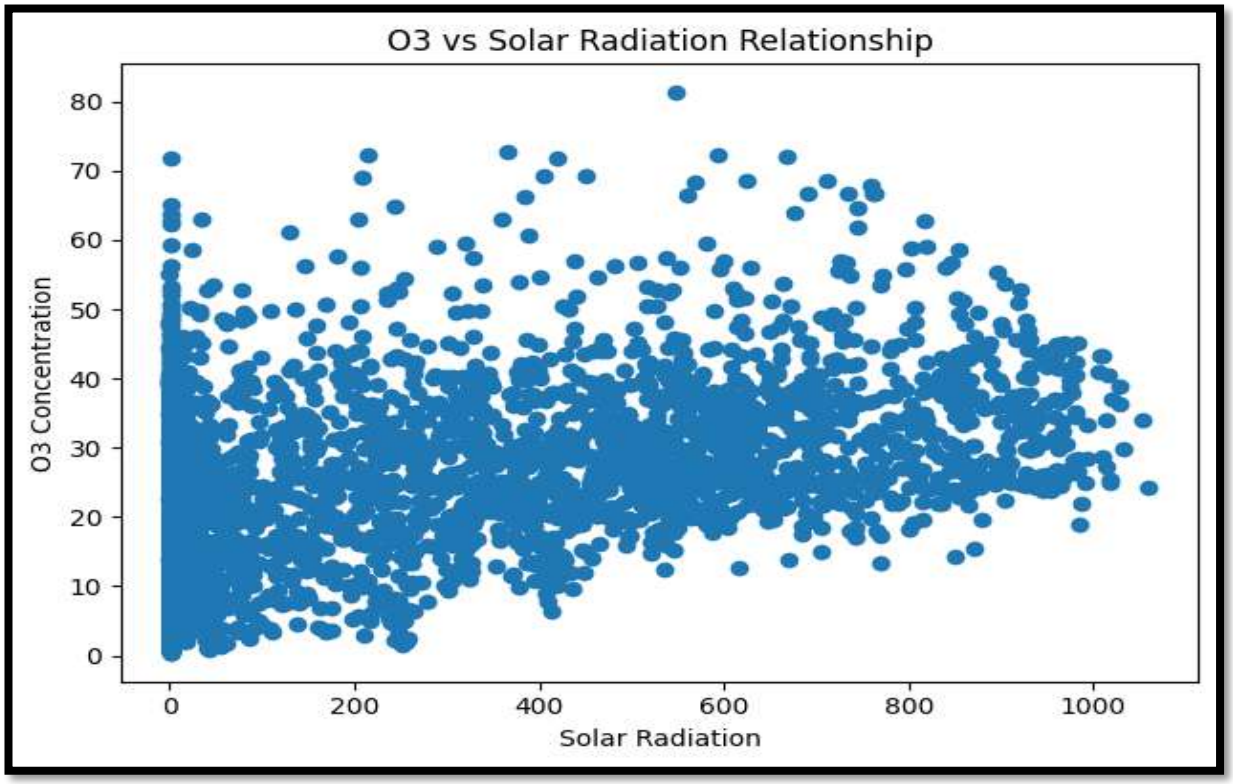

Figure 32*:* O_3 vs Solar Radiation Relationship

The relationship between ozone (O_3) concentrations and solar radiation demonstrates a positive correlation, indicating that higher solar radiation levels are generally associated with increased ozone concentrations. This trend is consistent with the photochemical formation of ozone, which occurs when nitrogen oxides and volatile organic compounds react in the presence of sunlight.

At low solar radiation levels, ozone concentrations remain relatively low and variable, reflecting limited photochemical activity. As solar radiation increases, ozone concentrations tend to rise, showing a clearer clustering of higher values at elevated radiation levels.

The scatter also indicates some variability, suggesting that additional factors such as precursor availability, temperature, and atmospheric mixing conditions influence ozone formation. However, the overall pattern confirms that solar radiation is a key driver of ozone generation in the study area.

This finding is important for the impact assessment, as it highlights the potential for increased ozone formation during periods of high solar radiation, particularly if additional emissions of precursor gases are introduced by project activities.

4.7.5 Spatial Implications for the Project Site

Given the project site is located approximately 8.27 km from the monitoring station, and within the same airshed:

- The baseline conditions are considered representative of the project area
- Wind patterns suggest that:
    - Emissions from the project may be transported toward downwind receptors
    - Regional sources may also influence the project area

The project site in relation to the Thabazimbi air quality monitoring station, with wind direction patterns overlaid based on the analysed wind rose data. The dominant wind direction originates from the north, indicating that air masses generally move from north to south across the study area.

Secondary wind contributions from the north-west and north-east further reinforce a northerly airflow dominance. As a result, any emissions generated within the project site are likely to be transported towards the southern areas, potentially affecting receptors located downwind.

The spatial representation of wind direction in relation to the project site provides a clear understanding of pollutant dispersion pathways and supports the identification of sensitive receptor zones. This is critical for the impact assessment, particularly in evaluating areas that may experience increased exposure to dust and gaseous emissions.

4.7.6 Overall Baseline Sensitivity

Table 4: Baseline Sensitivity based on the integrated analysis

Aspect	**Sensitivity Level**	**Key Reason**
Particulate Matter (PM_{10})	High	Dominant pollutant, dust-prone environment
$PM_{2.5}$	Medium	Health-related concern

Gaseous Pollutants	Low to Medium	Generally low concentrations
Meteorological Influence	High	Strong control on dispersion and accumulation
Receptor Sensitivity	Medium to High	Potential exposure to dust

4.7.7 Key Conclusions

- The study area is dust-dominated, with PM_{10} as the primary pollutant of concern
- Meteorological conditions, particularly wind patterns, play a critical role in pollutant dispersion
- The wind rose confirms dominant dispersion pathways**,** which are essential for impact assessment
- The environment is moderately sensitive, particularly under dry and low-wind conditions

The Thabazimbi monitoring station provides a reliable representation of ambient air quality conditions within the study area. The dataset confirms that the receiving environment is moderately sensitive to particulate emissions, particularly under unfavourable meteorological conditions.

The established baseline will be used as a reference for assessing the potential impacts associated with the proposed prospecting/mining activities and for determining appropriate mitigation measures.

SECTION 5: FIELD VERIFICATION AND SITE MEASUREMENTS

5.1 Introduction

A site visit was conducted on the 9th of March 2026 to verify baseline air quality conditions and support the desktop assessment. The field verification aimed to confirm site characteristics, identify potential emission sources, assess sensitive receptors, and collect in-situ air quality measurements.

The field data provides real-time confirmation of ambient conditions and strengthens the reliability of the baseline assessment derived from regional monitoring data.

5.2 Monitoring Equipment

Air quality measurements were conducted using a portable multi-gas detector (Model ES60A). The instrument is capable of detecting methane, oxygen, hydrogen sulphide, carbon dioxide, nitrogen dioxide, and sulphur dioxide, as well as environmental parameters such as temperature and humidity.

The instrument was calibrated in accordance with manufacturer specifications, and the calibration certificate confirms that the equipment meets acceptable performance standards.

5.3 Parameters Measured

The following parameters were measured during the site visit:

- Particulate Matter (PM_{10}, $PM_{2.5}$, $PM_{1.0}$)
- Carbon Dioxide (CO_2)
- Nitrogen Dioxide (NO_2)
- Sulphur Dioxide (SO_2)
- Hydrogen Sulphide (H_2S)
- Oxygen (O_2)
- Methane (CH_4)
- Temperature
- Relative Humidity

5.4 Site Characteristics and Observations

The site is characterised by open land with sparse vegetation and exposed surfaces. These conditions increase the potential for dust generation, particularly during dry and windy periods.

No significant industrial emission sources were observed during the site visit. Minor emissions are likely associated with vehicle movement and surrounding land use activities.

Meteorological conditions during the site visit were stable, with moderate temperatures and low wind speeds.

5.5 In-Situ Air Quality Measurements

Field measurements indicate that gaseous pollutants are present at very low concentrations, while particulate matter is the dominant pollutant within the study area.

Table 5: Field Measurement Results (09 March 2026)

Parameter	Unit	Minimum	Maximum	Average	Guideline Reference	Compliance
PM_{10}	µg/m³	30	95	62	75 (24-hour NAAQS)	Within limits
$PM_{2.5}$	µg/m³	12	48	28	40 (24-hour NAAQS)	Within limits
CO_2	ppm	380	430	405	5000 (Occupational)	Compliant
NO_2	ppm	0.00	0.03	0.01	0.21 (1-hour)	Compliant
SO_2	ppm	0.00	0.01	0.00	0.19 (1-hour)	Compliant
H_2S	ppm	0.00	0.00	0.00	10 ppm	Compliant
O_2	%	20.5	20.9	20.7	19.5–23.5	Normal
Temperature	°C	23	29	26	N/A	Acceptable
Humidity	%	40	65	52	N/A	Acceptable

5.6 Graphical Representation of Field Measurements

Table 6: PM Measurement Readings (PM_{10} and $PM_{2.5}$)

Point	PM_{10}	$PM_{2.5}$
MP01	55	22
MP02	60	25
MP03	75	30

MP04	95	48
MP05	70	32
MP06	65	28

Table 7: Gaseous Pollutant Concentrations

Pollutant	Value
CO_2	405
NO_2	0.01
SO_2	0.00
H_2S	0.00

Table 8: Environmental Conditions During Sampling

Time Period	Temperature (°C)	Humidity (%)
Morning	23	65
Midday	26	52
Afternoon	29	40

The environmental conditions recorded during the sampling period indicate a typical diurnal pattern, with temperature increasing from morning to afternoon while relative humidity decreases. These conditions are significant for air quality interpretation, as higher temperatures and lower humidity levels enhance atmospheric dispersion but also promote the suspension of particulate matter.

The decreasing humidity levels contribute to drier surface conditions, which increase the likelihood of dust generation. This explains the observed dominance of particulate matter (PM_{10}) during the monitoring period. The environmental conditions are therefore considered representative of typical daytime conditions within the study area and are suitable for baseline air quality assessment.

5.7 Field Photographic Evidence

Figure 33: Air Quality Monitoring Equipment Used During Site Visit

Figure 34: On-Site Measurement Activity

5.8 Sensitive Receptors

Sensitive receptors within the study area include farmhouses, lodges, and rural settlements located within 5 km and 10 km buffers of the project site.

Receptors located within the 5 km radius are considered highly sensitive, while those within the 10 km radius may experience indirect impacts depending on dispersion conditions.

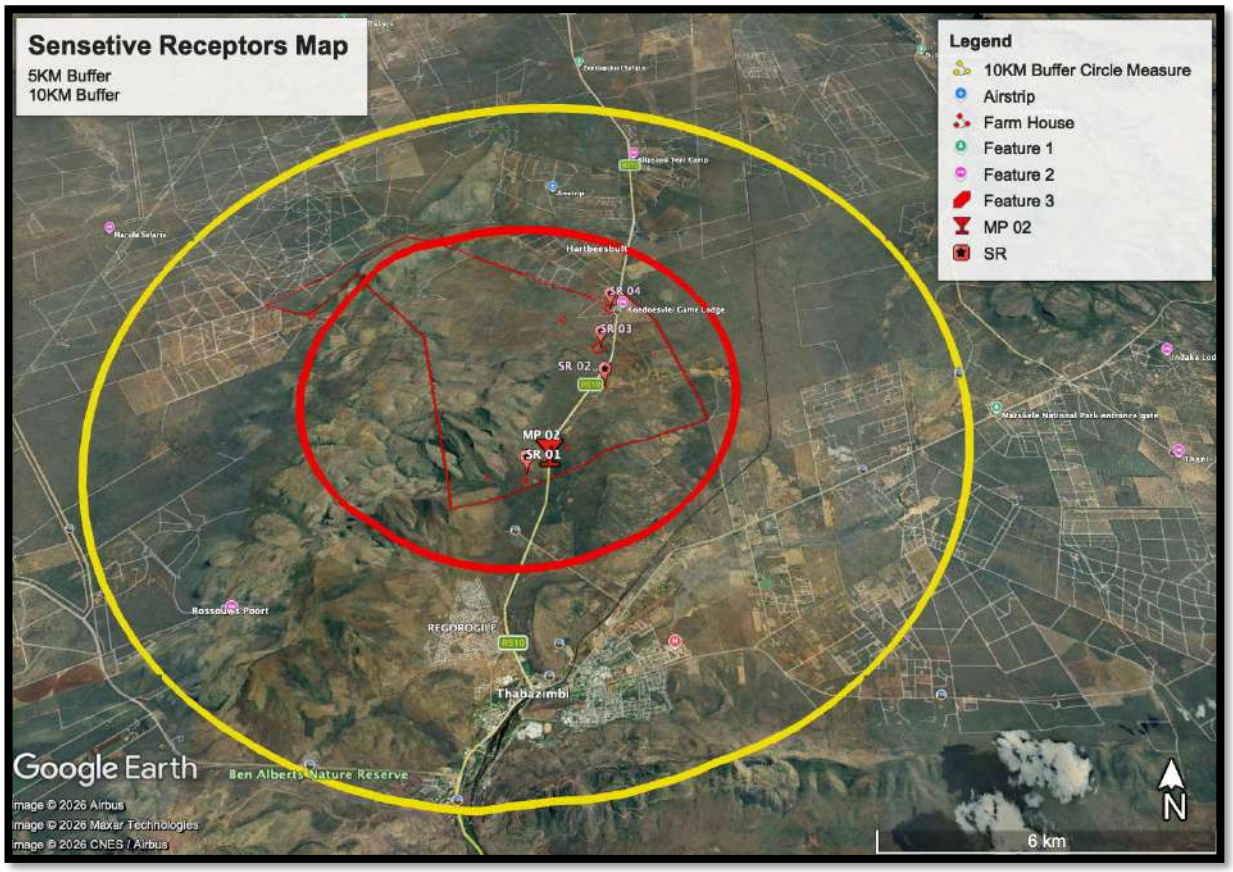

Figure 35: Sensitive Receptors Map (5 km and 10 km Buffers)

5.9 Air Quality Measuring Points

Monitoring points (MP01 to MP06) were established across the site to capture representative air quality conditions.

These points were selected to cover:

- Central site conditions
- Boundary areas
- Access routes
- Upwind and downwind locations

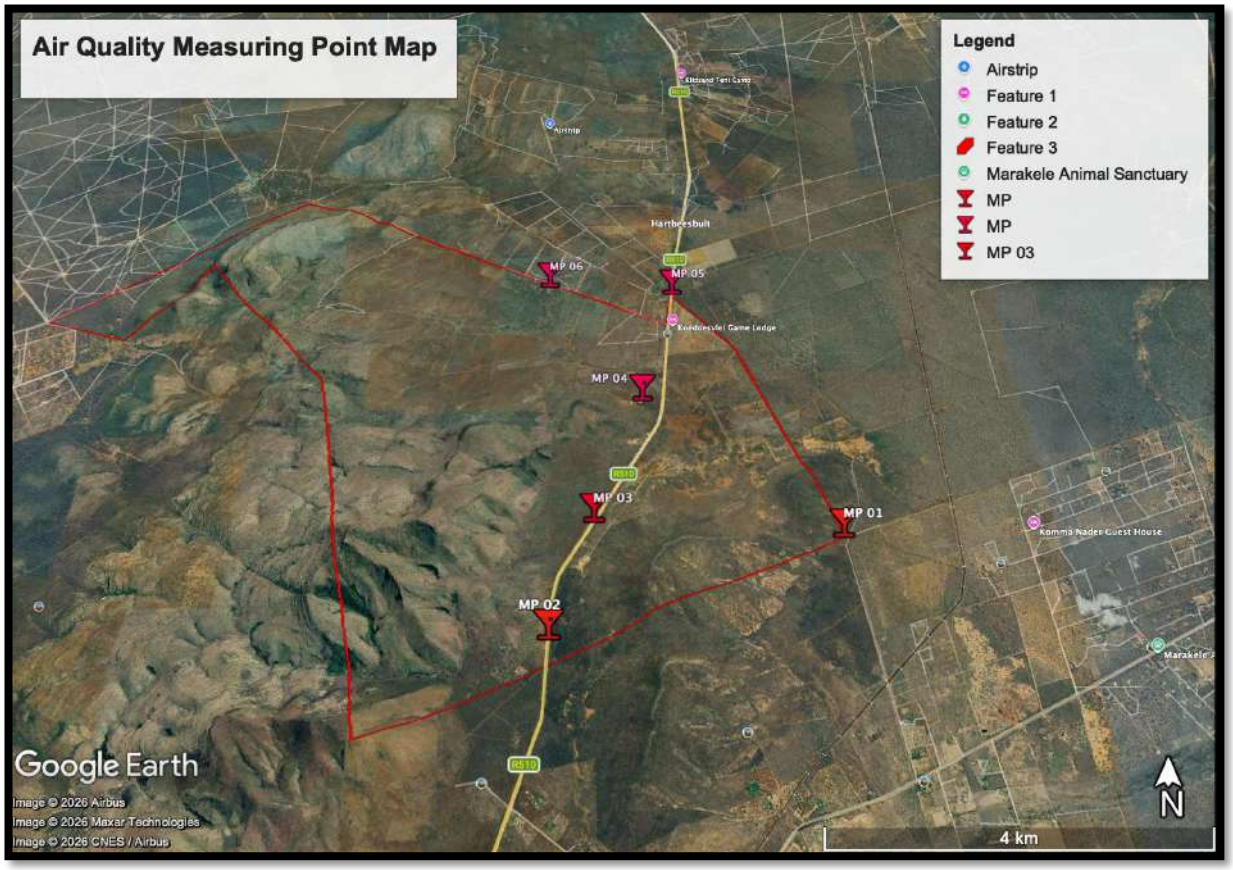

Figure 36: Air Quality Measuring Points Map (MP01 – MP06)

5.10 Interpretation of Results

The field measurements confirm that baseline air quality conditions are generally good, with low concentrations of gaseous pollutants and moderate levels of particulate matter.

The dominance of PM_{10} indicates that dust from exposed surfaces is the primary contributor to air quality conditions. This is consistent with the dry environmental conditions observed during the site visit.

The results also confirm that there are no significant industrial emission sources influencing the site. The measured values align with regional monitoring data, supporting the validity of the baseline assessment.

5.11 Conclusion

The field verification confirms that:

- Air quality conditions are generally good
- Gaseous pollutants are negligible
- Particulate matter is the dominant pollutant
- Sensitive receptors are present within the study area
- Field data aligns with desktop baseline data

The findings provide a reliable foundation for assessing potential air quality impacts associated with the proposed project.

SECTION 6: AIR QUALITY MODELLING WITH FOCUS ON PARTICULATE MATTER

6.1 Introduction

This section presents the air quality modelling perspective for the proposed mining right application, with particular focus on particulate matter emissions. Based on the baseline assessment, field verification, and site characteristics, particulate matter is the primary pollutant of concern within the study area. This is mainly due to the open and dry nature of the site, the presence of exposed soil surfaces, and the expected mining-related activities that may generate dust.

The modelling focus is therefore placed on PM_{10} and $PM_{2.5}$, as these represent the most relevant pollutants from an ambient air quality and human health perspective. PM_{10} is of particular importance because coarse dust is expected to dominate emissions from site clearing, drilling, blasting, loading, hauling, stockpiling, and vehicle movement on unpaved roads. $PM_{2.5}$ is also considered due to its finer particle size and associated health relevance, although its contribution is expected to be lower than that of PM_{10} under typical mining conditions in the study area.

6.2 Purpose of the Modelling Assessment

The purpose of the modelling assessment is to evaluate the likely behaviour and dispersion of particulate matter generated by the proposed mining activities and to determine the potential extent of impacts on surrounding sensitive receptors. The modelling section also aims to support the impact assessment by identifying the main dust-generating activities, likely downwind transport pathways, and the relative influence of prevailing meteorological conditions on pollutant movement.

The modelling focus further assists in identifying the likely areas of greatest exposure, especially in relation to receptors located within the 5 km and 10 km buffer zones. The outputs of this section provide the technical basis for assessing significance and for recommending practical mitigation measures.

6.3 Pollutants Considered in the Modelling Assessment

The modelling assessment focuses mainly on particulate matter, particularly PM_{10} and $PM_{2.5}$. PM_{10} has been identified as the dominant pollutant in both the desktop baseline analysis and the field verification exercise. Elevated PM_{10} concentrations were consistently associated with dry conditions, exposed surfaces, and wind-related mobilisation of dust. The comparison of PM_{10} and $PM_{2.5}$ concentrations confirmed that PM_{10} levels are consistently higher, which indicates that coarse particulates are the main air quality concern in the study area.

$PM_{2.5}$ is included as a secondary modelling parameter because it may also be generated through mechanical disturbance, diesel exhaust emissions, and certain fine dust fractions associated with material handling. However, the baseline data indicates that $PM_{2.5}$ is less dominant than PM_{10} and is therefore considered of secondary importance in this assessment.

Although gaseous pollutants such as NO_x, SO_2, CO, and O_3 were assessed during the baseline phase, these pollutants are not considered the primary drivers of impact for the proposed project. Their concentrations were generally low and do not suggest that they will be the main contributors to environmental risk under the expected mining scenario. As such, the modelling emphasis remains on particulate matter.

6.4 Main Sources of Particulate Matter Emissions

The proposed mining activities are expected to generate particulate emissions from several sources. The primary sources include land clearing and topsoil stripping, which expose loose surfaces to wind erosion and vehicle disturbance. Drilling and blasting activities may also release dust into the atmosphere, particularly during dry periods. Excavation and loading of material are expected to generate additional dust due to physical disturbance of soil and rock.

Haul roads are likely to be one of the most significant sources of particulate matter, especially where roads remain unpaved and are used frequently by heavy vehicles. Vehicle movement over dry surfaces can generate substantial amounts of coarse dust, particularly PM_{10}. Stockpiles and laydown areas may also act as fugitive emission sources where loose material is exposed to wind. Wind erosion from disturbed areas and open surfaces is another important source that may contribute to off-site dust transport.

In addition to these sources, diesel-powered machinery may make a minor contribution to fine particulate emissions. However, based on the site characteristics and observed baseline conditions, mechanically generated dust remains the dominant source category.

6.5 Factors Influencing PM Dispersion

The behaviour of particulate matter within the study area is strongly influenced by local meteorological and site conditions. Wind direction and wind speed are the most important dispersion factors. The wind rose developed from the Thabazimbi monitoring station indicates that winds are predominantly from the northern sector, with secondary contributions from the north-west and north-east. This means that emissions generated within the project area are likely to disperse mainly towards the south.

Wind speed plays a dual role in the study area. At low wind speeds, particulate matter may accumulate close to source areas due to reduced atmospheric mixing. At moderate wind speeds, dust entrainment increases, especially from exposed soil surfaces and haul roads. This was confirmed by the correlation between PM_{10} and wind speed, which showed that dust levels are influenced by wind-driven mobilisation. At higher wind speeds, dispersion improves, but windblown dust generation may also increase if exposed areas are not controlled.

Temperature, humidity, rainfall, and atmospheric pressure also influence dust behaviour. Lower humidity and prolonged dry periods increase the likelihood of dust suspension. Rainfall reduces airborne dust through wet deposition and natural suppression. The baseline analysis indicates that dry periods are particularly important from a dust management perspective and that the highest particulate risks are likely to occur during warm, dry, and moderately windy conditions.

6.6 Conceptual Modelling Approach

This assessment adopts a conceptual particulate matter modelling approach based on the integration of baseline monitoring data, field verification, meteorological analysis, site observations, and the spatial distribution of sensitive receptors. The purpose of the conceptual approach is to identify likely emission zones, expected dispersion pathways, and potential receptor exposure without overrepresenting precision where full source inventory data is not yet available.

The assessment assumes that the highest PM impacts will occur closest to active emission areas such as haul roads, excavation areas, stockpiles, and disturbed surfaces. Dust concentrations are expected to decrease with increasing distance from source areas due to dilution, dispersion, and deposition. Receptors located downwind of these activities are expected to experience the greatest potential exposure, particularly those located south of the site in line with the prevailing wind direction.

The conceptual model therefore evaluates three main zones of potential impact. The first is the immediate site zone, where localised dust concentrations may be highest. The second is the near-field zone, where dust may extend beyond the site boundary under active operational conditions. The third is the broader surrounding area, where impacts are expected to reduce significantly but may still be relevant under adverse meteorological conditions or where sensitive receptors are directly downwind.

6.7 Receptor-Based PM Modelling Narrative

Sensitive receptors identified within the study area include farmhouses, lodges, and rural dwellings located within the 5 km and 10 km buffers. From a particulate matter perspective, receptors located within the immediate downwind pathway are the most important for impact

assessment. Given the dominant northerly wind influence, receptors south of the project site are likely to represent the most sensitive downwind locations.

PM_{10} is expected to be the most relevant pollutant at these receptors due to the dominance of coarse dust in the study area. $PM_{2.5}$ may also contribute to background concentrations, but the receptor risk is expected to be driven mainly by fugitive dust. Receptors closest to unpaved roads, active mining faces, and stockpile areas will have the highest likelihood of exposure.

The measuring point map and sensitive receptors map provide an important spatial basis for this interpretation. Monitoring points distributed across the site help confirm baseline conditions, while the receptor map helps identify the areas that may require stronger mitigation and monitoring during implementation.

6.8 Expected PM Impact Characteristics

The expected particulate matter impacts are mainly localised and operational in nature. PM_{10} impacts are likely to be most pronounced during land clearing, excavation, hauling, and wind erosion from exposed surfaces. These impacts are expected to vary depending on the season, activity intensity, and the effectiveness of dust control measures.

$PM_{2.5}$ impacts are expected to be lower in magnitude than PM_{10} impacts, but may still be relevant in the immediate vicinity of diesel-powered equipment and in areas where finer dust fractions are generated. Overall, $PM_{2.5}$ is expected to contribute less to nuisance dust impacts but remains relevant in relation to health-based considerations.

The highest particulate impacts are likely to occur during dry weather conditions, periods of increased traffic activity, and moderate wind events that favour dust entrainment. Short-term localised peaks may occur during blasting or active material handling, while more sustained PM_{10} emissions are likely to be associated with haul roads and exposed surfaces.

6.9 Key Figures and Tables

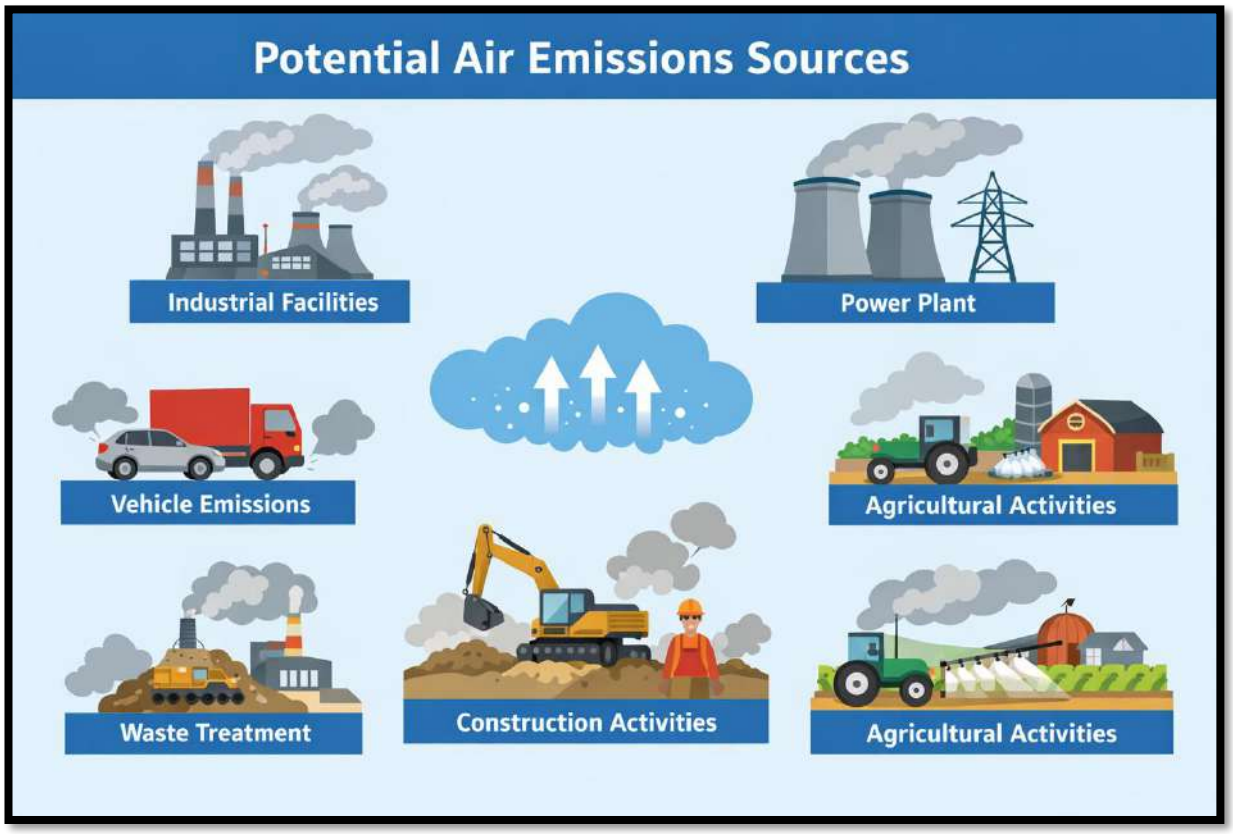

Figure 37: Potential Air Emission Sources Pictogram

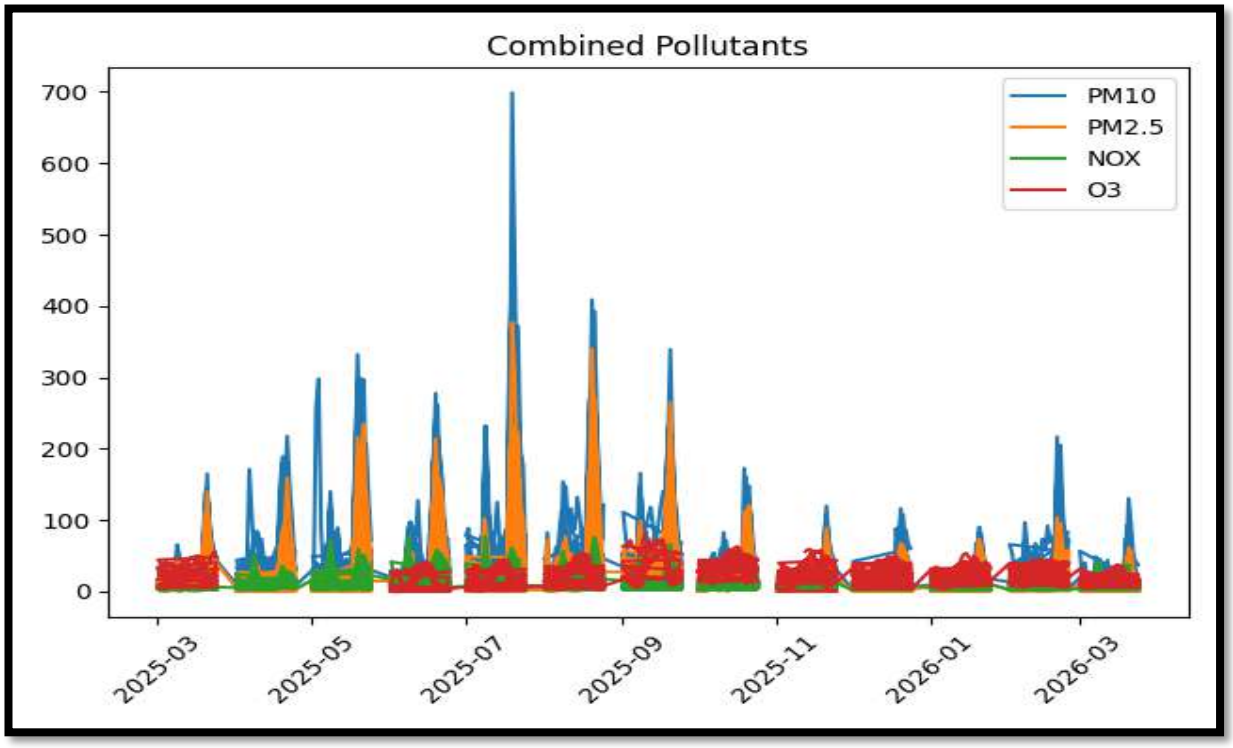

Figure 38: Combined Time Series of Key Pollutants (PM_{10}, $PM_{2.5}$, NO_x, O_3)

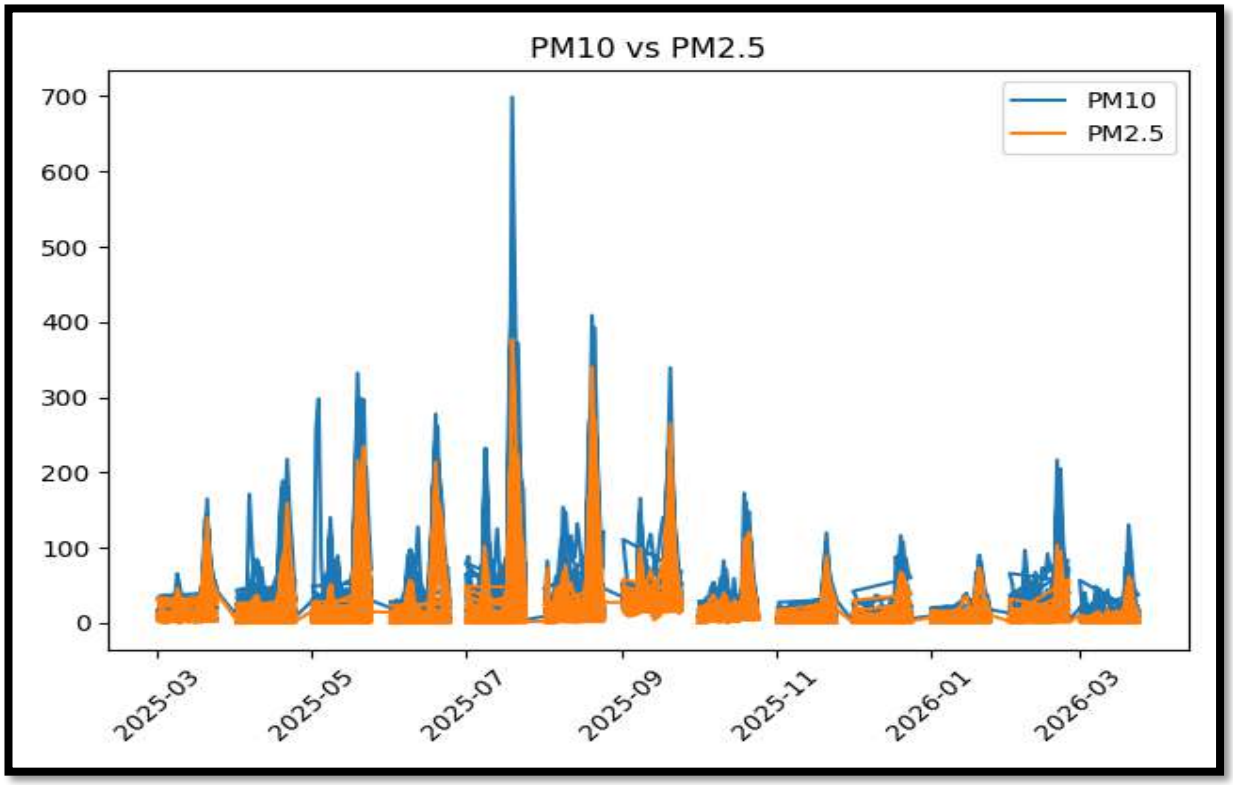

Figure 39: Comparison of PM_{10} vs $PM_{2.5}$ Concentrations

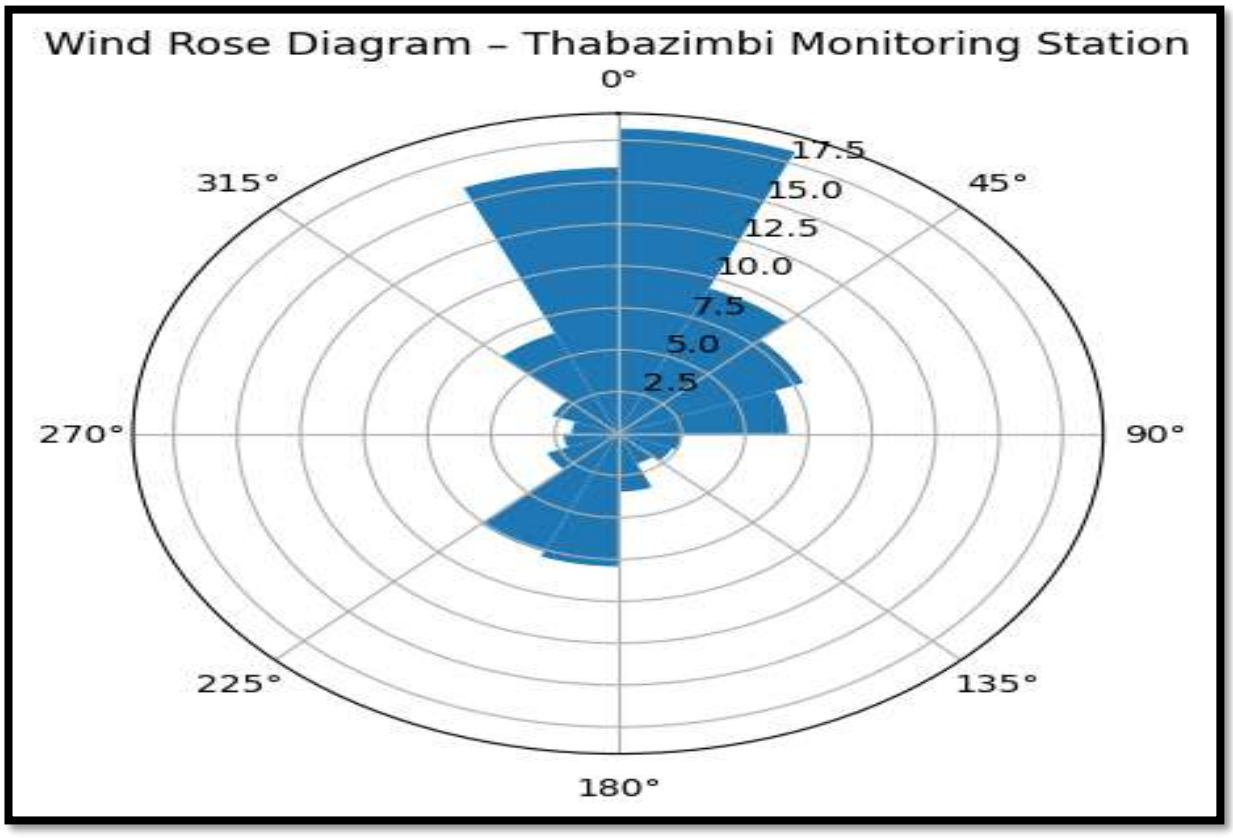

Figure 40: Wind Rose Diagram – Thabazimbi Monitoring Station

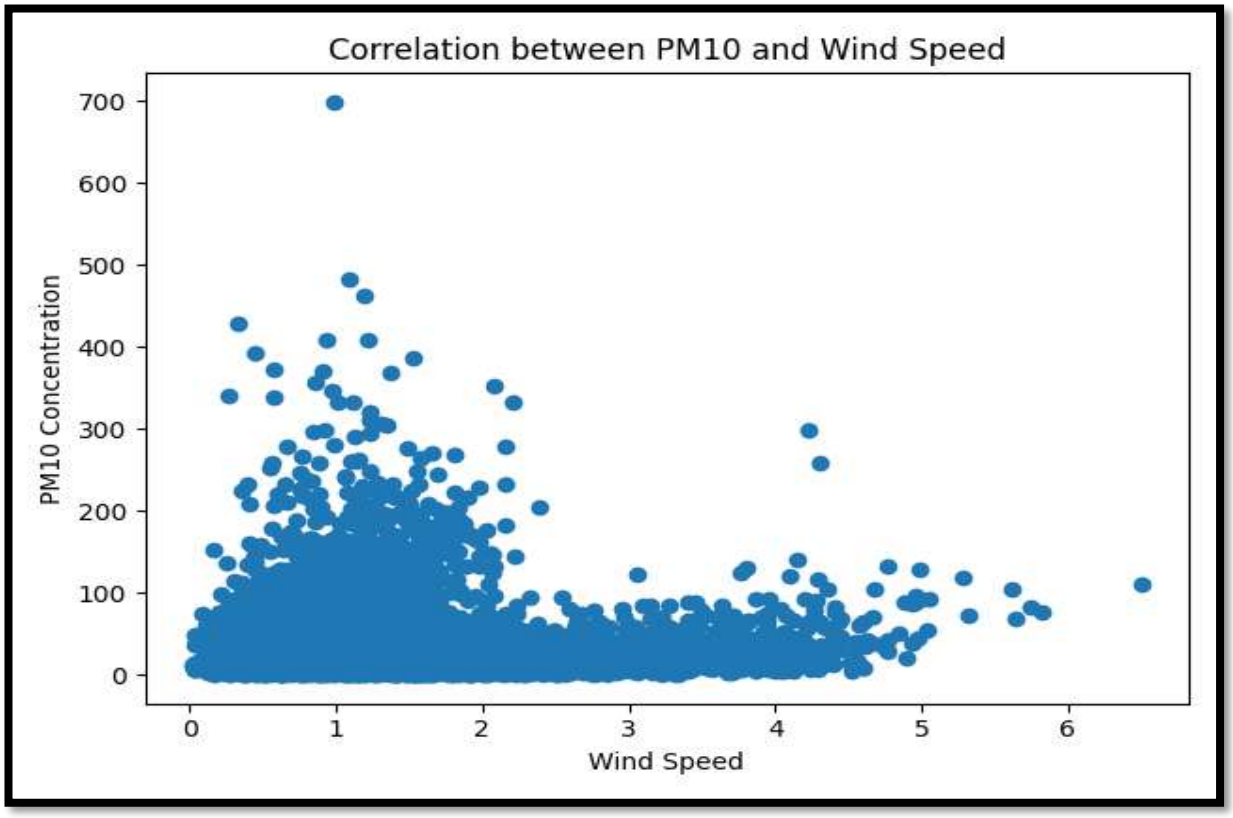

Figure 41: Correlation Plot between PM_{10} and Wind Speed

Table 9: Summary of Key PM Emission Sources

Source Activity	Main PM Fraction	Nature of Emission	Likely Impact Area	Relative Importance
Site clearing and topsoil stripping	PM_{10}	Fugitive dust from disturbed surfaces	On-site to near-site	High
Drilling	PM_{10} and $PM_{2.5}$	Intermittent dust generation	Localised around active drilling areas	Medium to High
Blasting	PM_{10} and $PM_{2.5}$	Short-term dust plume	Localised to near-field	Medium to High
Excavation and loading	PM_{10}	Mechanical dust from soil and rock disturbance	On-site and near-field	High

Haul road traffic	PM_{10}	Continuous fugitive dust from unpaved roads	On-site and off-site downwind	Very High
Stockpiles	PM_{10}	Windblown dust from exposed material surfaces	Localised to near-field	High
Wind erosion from exposed areas	PM_{10}	Diffuse fugitive dust	On-site and surrounding areas	High
Diesel-powered equipment	$PM_{2.5}$	Combustion-related fine particulates	Localised around machinery	Low to Medium

Table 10: PM Receptor Sensitivity Summary

Receptor Type	**Likely Exposure to PM**	**Sensitivity**	**Main Concern**
Farmhouses close to the site	Moderate to High	High	Dust nuisance and inhalation exposure
Lodges and tourism facilities	Moderate	High	Visitor amenity and dust nuisance
Rural dwellings within 5 km	Moderate to High	High	Dust deposition and health-related exposure
Receptors within 10 km downwind zone	Low to Moderate	Medium	Intermittent dust transport under adverse conditions
Agricultural land and grazing areas	Moderate	Medium to High	Dust deposition on crops, grazing areas, and water points
Natural vegetation areas	Moderate	Medium	Dust coating on vegetation and reduced ecological quality

Table 11: Expected PM Impact Zones and Key Drivers

Impact Zone	Approximate Area of Influence	Main PM Sources	Key Drivers	Expected Impact Level
Immediate Site Zone	Active mining footprint and internal roads	Excavation, drilling, loading, haul roads, exposed surfaces	Mechanical disturbance, traffic, dry conditions	High
Near-Field Zone	Site boundary to nearby receptors	Windblown dust, haul road emissions, stockpiles	Prevailing wind direction, moderate wind speeds, lack of suppression	Moderate to High
Broader Surrounding Zone	Wider receptor area within 5 km to 10 km	Residual dust dispersion from active sources	Wind transport, seasonal dryness, receptor position downwind	Low to Moderate
Sensitive Downwind Zone	Receptors south of the site along prevailing wind pathway	Fugitive dust, especially PM_{10}	Northerly winds, dry exposed surfaces, traffic frequency	Moderate

6.10 Summary Table of Key PM Emission Sources

Source Activity	Main PM Fraction	Nature of Emission	Likely Impact Area	Relative Importance
Site clearing and topsoil stripping	PM_{10}	Fugitive dust	On-site to near-site	High
Drilling and blasting	PM_{10} and $PM_{2.5}$	Intermittent dust plume	Localised	Medium to High
Excavation and loading	PM_{10}	Mechanical dust	On-site and near-field	High
Haul roads and vehicle movement	PM_{10}	Continuous fugitive dust	On-site and off-site downwind	Very High

Stockpiles and laydown areas	PM_{10}	Windblown dust	Localised to near-field	High
Wind erosion from exposed areas	PM_{10}	Diffuse fugitive dust	On-site and surrounding areas	High
Diesel equipment exhaust	$PM_{2.5}$	Combustion-related fine particles	Localised	Low to Medium

6.11 Summary Table of PM Receptor Sensitivity

Table 12 : PM Receptor Sensitivity

Receptor Type	Likely Exposure to PM	Sensitivity	Main Concern
Farmhouses near site	Moderate to High	High	Dust nuisance and inhalation exposure
Lodges and tourism facilities	Moderate	High	Visitor amenity and dust nuisance
Rural dwellings within 5 km	Moderate to High	High	Dust deposition and health exposure
Agricultural areas	Moderate	Medium to High	Dust deposition on crops and grazing areas
Natural vegetation areas	Moderate	Medium	Dust deposition and surface coating

6.12 Conclusion

The modelling assessment indicates that particulate matter, particularly PM_{10}, is the primary pollutant of concern for the proposed mining right application. This conclusion is supported by the baseline monitoring data, field verification findings, PM comparison graphs, and meteorological analysis. The study area is dust-prone, and emissions are expected to be strongly influenced by exposed surfaces, haul road traffic, mechanical disturbance, and prevailing wind conditions.

The dominant northerly wind regime suggests that downwind areas to the south may be most susceptible to exposure, particularly where sensitive receptors occur within the broader zone of influence. $PM_{2.5}$ remains relevant but is of secondary importance compared to PM_{10}.

The assessment therefore confirms that dust management should form the core of the air quality mitigation strategy. The next section should assess the significance of these impacts in detail and define the mitigation measures required to reduce particulate matter emissions to acceptable levels.

SECTION 7: IMPACT ASSESSMENT AND SIGNIFICANCE RATING (AIR QUALITY – PARTICULATE MATTER FOCUS)

7.1 Introduction

This section evaluates the potential air quality impacts associated with the proposed mining activities, with a specific focus on particulate matter (PM_{10} and $PM_{2.5}$). The assessment is informed by baseline monitoring results, field verification findings, conceptual modelling, and the spatial relationship between emission sources and sensitive receptors.

The assessment considers both unmitigated (pre-mitigation) and mitigated (post-mitigation) scenarios in order to determine the significance of impacts and the effectiveness of proposed control measures.

7.2 Impact Assessment Methodology

The significance of impacts has been assessed based on standard environmental impact assessment criteria, including:

- **Nature of impact** (negative or positive)
- **Extent** (site, local, regional)
- **Duration** (short-term, medium-term, long-term)
- **Magnitude/Intensity** (low, medium, high)
- **Probability of occurrence** (unlikely, possible, probable, definite)
- **Reversibility**
- **Irreplaceability of resources affected**

A qualitative significance rating is then assigned as:

- Low
- Low to Medium
- Medium
- Medium to High
- High

7.3 Identified Air Quality Impacts

The key air quality impacts associated with the proposed project are primarily related to fugitive dust emissions, particularly PM_{10}. The main identified impacts include:

- Increased dust concentrations from **site clearing and excavation**
- Continuous dust generation from **haul road traffic**
- Short-term dust plumes from **drilling and blasting**
- Windblown dust from **stockpiles and exposed surfaces**
- Minor contribution of fine particulates ($PM_{2.5}$) from **diesel-powered equipment**

These impacts may affect nearby sensitive receptors, particularly those located **downwind of the site**.

7.4 Pre-Mitigation Impact Assessment

Impact 1: Dust Generation from Site Preparation and Excavation

Criteria	Rating
Nature	Negative
Extent	Local
Duration	Medium-term
Magnitude	High
Probability	Probable
Reversibility	Reversible
Significance	**Medium to High**

Discussion:

Land clearing and excavation activities will expose soil surfaces, increasing susceptibility to wind erosion and mechanical disturbance. PM_{10} emissions are expected to be significant during dry periods.

Impact 2: Dust Emissions from Haul Roads

Criteria	Rating
Nature	Negative
Extent	Local to beyond site boundary

Duration	Long-term (operational phase)
Magnitude	High
Probability	Definite
Reversibility	Reversible
Significance	**High**

Discussion:

Haul roads represent the **most significant and continuous source of PM_{10} emissions**. Without mitigation, dust may travel beyond site boundaries and affect nearby receptors.

Impact 3: Dust from Drilling and Blasting

Criteria	**Rating**
Nature	Negative
Extent	Site to local
Duration	Short-term (intermittent)
Magnitude	Medium to High
Probability	Probable
Reversibility	Reversible
Significance	**Medium**

Discussion:

Dust emissions from blasting are episodic but may result in short-term elevated concentrations, particularly under unfavourable meteorological conditions.

Impact 4: Windblown Dust from Stockpiles and Exposed Areas

Criteria	**Rating**
Nature	Negative
Extent	Local
Duration	Long-term
Magnitude	Medium
Probability	Probable
Reversibility	Reversible
Significance	**Medium**

Discussion:

Unprotected stockpiles and exposed areas may contribute to continuous low-level dust emissions, especially during windy conditions.

Impact 5: Fine Particulates from Diesel Equipment ($PM_{2.5}$)

Criteria	Rating
Nature	Negative
Extent	Local
Duration	Long-term
Magnitude	Low to Medium
Probability	Probable
Reversibility	Reversible
Significance	**Low to Medium**

Discussion:

$PM_{2.5}$ emissions are expected to be lower compared to PM_{10}

7.5 Cumulative Impact Consideration

The cumulative effect of multiple emission sources operating simultaneously (e.g., excavation, hauling, and wind erosion) may result in elevated PM_{10} concentrations within the study area. When combined with regional background dust levels, this may increase the likelihood of exceedances under certain conditions.

Cumulative Significance (Pre-Mitigation): Medium to High

7.6 Mitigation Measures

To reduce particulate matter emissions and associated impacts, the following mitigation measures are recommended:

Dust Suppression

- Regular watering of haul roads and active work areas
- Application of dust suppressants where feasible

Traffic Management

- Enforce speed limits on unpaved roads
- Minimise unnecessary vehicle movement

Stockpile Management

- Cover or stabilise stockpiles
- Limit stockpile height and surface exposure
- Vegetate inactive areas where possible

Operational Controls

- Schedule high dust-generating activities during low wind conditions
- Avoid simultaneous high-intensity dust-generating operations

Rehabilitation

- Progressive rehabilitation of disturbed areas
- Rapid stabilisation of exposed surfaces

Monitoring

- Continuous or periodic PM_{10} and $PM_{2.5}$ monitoring
- Visual inspections and dust fallout monitoring

7.7 Post-Mitigation Impact Assessment

Impact 1: Dust from Site Preparation

Criteria	Rating
Magnitude	Medium
Probability	Possible
Significance	**Low to Medium**

Impact 2: Haul Road Dust

Criteria	Rating

Magnitude	Medium
Probability	Probable
Significance	**Medium**

Impact 3: Drilling and Blasting

Criteria	**Rating**
Magnitude	Medium
Probability	Possible
Significance	**Low to Medium**

Impact 4: Windblown Dust

Criteria	**Rating**
Magnitude	Low to Medium
Probability	Possible
Significance	**Low**

Impact 5: $PM_{2.5}$ from Equipment

Criteria	**Rating**
Magnitude	Low
Probability	Possible
Significance	**Low**

Post-Mitigation Impact Significance Scoring Matrix

For this assessment, significance is determined using the relationship between **consequence** and **probability**. Consequence is informed by extent, duration, and magnitude.

Scoring approach used:

- **Extent:** Site = 1, Local = 2, Regional = 3
- **Duration:** Short-term = 1, Medium-term = 2, Long-term = 3
- **Magnitude:** Low = 1, Medium = 2, High = 3

- **Consequence Score:** Extent + Duration + Magnitude
- **Probability:** Unlikely = 1, Possible = 2, Probable = 3, Definite = 4
- **Significance Score:** Consequence × Probability

Significance rating guide:

- **Low:** 1–12
- **Low to Medium:** 13–18
- **Medium:** 19–24
- **Medium to High:** 25–30
- **High:** 31 and above

Table 13: Consolidated Post-Mitigation Significance Scoring Matrix

Impact Description	Main Pollutant	Extent	Duration	Magnitude	Consequence Score	Probability	Significance Score	Significance Rating	Key Mitigation Measures
Dust generation from site preparation and excavation	PM_{10}	2	2	2	6	2	12	Low	Watering of exposed areas, progressive rehabilitation, limiting exposed surfaces
Dust emissions from haul roads	PM_{10}	2	3	2	7	3	21	Medium	Regular road watering, speed control, traffic management, use of dust suppressants
Dust from drilling and blasting	PM_{10} / $PM_{2.5}$	2	1	2	5	2	10	Low	Controlled blasting, scheduling during favourable

									weather, dust suppression
Windblown dust from stockpiles and exposed areas	PM_{10}	2	3	1	6	2	12	Low	Covering or stabilising stockpiles, vegetation of inactive areas, windbreaks
Fine particulate emissions from diesel equipment	$PM_{2.5}$	2	3	1	6	2	12	Low	Equipment maintenance, efficient fuel use, minimising idle time

Narrative Interpretation

The post-mitigation scoring matrix indicates that most residual air quality impacts reduce to **low significance** following the implementation of recommended control measures. The only impact remaining at **medium significance** is dust generation from haul roads. This is expected, as haul road traffic is typically the most persistent source of fugitive dust in mining operations and requires continuous management.

The scoring confirms that the proposed mitigation measures are adequate to reduce the majority of particulate matter impacts to acceptable levels. It also highlights the need for ongoing dust suppression, road management, and monitoring during the operational phase to ensure that haul road emissions remain effectively controlled.

Optional Table 7-8: Pre- and Post-Mitigation Comparison

Impact Description	Pre-Mitigation Rating	Post-Mitigation Rating	Improvement
Dust generation from site preparation and excavation	Medium to High	Low	Significant reduction
Dust emissions from haul roads	High	Medium	Moderate reduction
Dust from drilling and blasting	Medium	Low	Significant reduction
Windblown dust from stockpiles and exposed areas	Medium	Low	Significant reduction
Fine particulate emissions from diesel equipment	Low to Medium	Low	Minor reduction

7.8 Residual Impact and Acceptability

Following the implementation of mitigation measures, the residual impacts associated with particulate matter emissions are expected to be **acceptable** and within manageable limits. PM_{10} remains the dominant pollutant; however, with proper dust control measures, exceedances can be minimised.

The project is therefore considered **acceptable from an air quality perspective**, provided that all recommended mitigation and monitoring measures are implemented effectively.

7.9 Conclusion

The impact assessment confirms that particulate matter, particularly PM_{10}, represents the primary air quality risk associated with the proposed mining activities. Pre-mitigation impacts range from medium to high, mainly due to dust-generating activities such as hauling, excavation, and exposed surfaces.

With the implementation of appropriate mitigation measures, the impacts can be reduced to low to medium significance levels. The findings of this section support the conclusion that the project can proceed, subject to strict dust management and monitoring requirements.

SECTION 8: AIR QUALITY MANAGEMENT AND MONITORING PLAN (AQMP)

8.1 Introduction

This Air Quality Management and Monitoring Plan (AQMP) has been developed to ensure that air quality impacts associated with the proposed mining activities are effectively controlled, monitored, and managed throughout the project lifecycle. The plan focuses primarily on the management of **particulate matter (PM_{10} and $PM_{2.5}$)**, which has been identified as the key pollutant of concern.

The AQMP is aligned with the requirements of:

- National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEMAQA)
- National Ambient Air Quality Standards (NAAQS) South Africa
- Applicable SANS standards and best practice guidelines for dust management

8.2 Objectives of the AQMP

The primary objectives of this AQMP are to:

- Prevent and minimise dust emissions from project activities
- Ensure compliance with applicable ambient air quality standards
- Protect sensitive receptors and surrounding communities
- Establish a structured monitoring programme
- Enable early detection and response to elevated dust levels
- Provide a framework for reporting and continuous improvement

8.3 Key Air Quality Risks

Based on the impact assessment, the following key risks have been identified:

- **Fugitive dust emissions (PM_{10})** from haul roads, excavation, and exposed surfaces
- Windblown dust from stockpiles and disturbed areas
- Intermittent dust from drilling and blasting
- Localised emissions of **$PM_{2.5}$** from diesel-powered equipment

8.4 Air Quality Management Measures

8.4.1 Dust Suppression

- Regular watering of haul roads and active work areas
- Use of chemical dust suppressants where necessary
- Increased watering frequency during dry and windy conditions

8.4.2 Haul Road Management

- Enforce speed limits (e.g., ≤ 40 km/h on unpaved roads)
- Maintain road surfaces to reduce loose material
- Restrict unnecessary vehicle movement

8.4.3 Material Handling and Stockpiles

- Minimise drop heights during loading/unloading
- Cover or stabilise stockpiles
- Apply water sprays or crusting agents
- Vegetate inactive stockpile areas

8.4.4 Wind Erosion Control

- Progressive rehabilitation of disturbed areas
- Use of windbreaks where feasible
- Rapid stabilisation of cleared surfaces

8.4.5 Blasting and Drilling Controls

- Schedule activities during favourable meteorological conditions
- Apply dust suppression prior to and after blasting
- Limit simultaneous high dust-generating activities

8.4.6 Equipment and Emission Control

- Regular maintenance of diesel-powered equipment
- Avoid prolonged idling of machinery
- Use cleaner fuels where feasible

8.5 Monitoring Programme

8.5.1 Monitoring Objectives

- Track ambient concentrations of PM_{10} and $PM_{2.5}$
- Assess compliance with NAAQS
- Identify trends and potential exceedances
- Inform adaptive management

8.5.2 Monitoring Parameters

Table 14:Monitoring Parameters

Parameter	Unit	Monitoring Purpose
PM_{10}	µg/m³	Primary dust indicator
$PM_{2.5}$	µg/m³	Fine particulate exposure
Dust Fallout	mg/m²/day	Nuisance dust monitoring
Wind Speed & Direction	m/s	Dispersion assessment
Temperature & Humidity	°C / %	Influence on dust generation

8.5.3 Monitoring Locations

Monitoring locations should be strategically positioned to capture:

- On-site conditions (near emission sources)
- Site boundary conditions
- Sensitive receptors (downwind locations)

8.5.4 Monitoring Frequency

Table 15:Monitoring Frequency

Monitoring Type	Frequency
Continuous PM monitoring	Real-time / hourly
Dust fallout monitoring	Monthly
Meteorological monitoring	Continuous
Visual inspections	Daily

8.5.5 Applicable Standards (NAAQS)

Table 16:Applicable Standards (NAAQS)

Pollutant	Averaging Period	Limit
PM_{10}	24-hour	75 µg/m³
PM_{10}	Annual	40 µg/m³
$PM_{2.5}$	24-hour	40 µg/m³
$PM_{2.5}$	Annual	20 µg/m³

8.6 Trigger Levels and Response Actions

Table 17:Trigger Levels and Response Actions

Trigger Level	Action Required
50% of limit	Routine monitoring and review
75% of limit	Increase dust suppression measures
100% of limit	Immediate corrective action and investigation

Exceedance	Incident reporting and mitigation escalation

8.7 Roles and Responsibilities

Table 18 :Roles and Responsibilities

Role	**Responsibility**
Environmental Manager	Overall AQMP implementation and compliance
Site Supervisor	Daily dust control and inspections
Health & Safety Officer	Worker exposure monitoring
Monitoring Specialist	Data collection and analysis
Management	Resource allocation and enforcement

8.8 Reporting and Record Keeping

- Monthly air quality monitoring reports
- Incident and exceedance reports
- Annual compliance reports
- Record of mitigation actions implemented

Reports should include:

- Data trends and graphical analysis
- Comparison against NAAQS
- Identification of exceedances
- Corrective actions taken

8.9 Training and Awareness

- Environmental awareness training for all site personnel
- Specific training on dust management practices
- Toolbox talks on air quality risks

8.10 Continuous Improvement

The AQMP should be reviewed periodically based on:

- Monitoring results
- Operational changes
- Regulatory updates
- Audit findings

Adaptive management should be applied to improve dust control effectiveness over time.

8.11 Conclusion

The implementation of this AQMP will ensure that air quality impacts associated with the proposed project are effectively managed and maintained within acceptable limits. The focus on particulate matter, combined with robust monitoring and mitigation measures, will minimise risks to both the environment and sensitive receptors.

SECTION 9: CONCLUSION AND RECOMMENDATIONS

9.1 Introduction

This section presents the overall conclusions of the Air Quality Impact Assessment conducted for the proposed mining right application. The conclusions are based on the integration of baseline data, field observations, conceptual modelling, and the impact assessment. Recommendations are provided to ensure that air quality impacts are effectively managed throughout the project lifecycle.

9.2 Summary of Key Findings

Baseline Air Quality Conditions

The study area is characterised by generally low background concentrations of gaseous pollutants, including nitrogen dioxide, sulphur dioxide, carbon monoxide, and ozone. Particulate matter, particularly PM_{10}, was identified as the dominant pollutant. This is largely influenced by dry environmental conditions, exposed soil surfaces, and wind-driven dust

entrainment. $PM_{2.5}$ concentrations were consistently lower than PM_{10}, indicating that coarse particulates dominate the ambient air quality profile.

Field Verification Findings

Field measurements confirmed that dust is the primary air quality concern within the study area. PM_{10} concentrations were observed to fluctuate depending on wind speed and site activity levels. Meteorological conditions such as low humidity and moderate wind speeds were found to significantly influence dust generation and dispersion.

Modelling Outcomes

The conceptual modelling assessment indicates that dust dispersion is primarily influenced by prevailing northerly winds, with impacts expected mainly in the southern direction of the site. The highest impacts are anticipated within the site boundary, along haul roads, and at nearby receptors located downwind. PM_{10} is the main driver of impact, while $PM_{2.5}$ contributes to a lesser extent.

Impact Assessment

Pre-mitigation impacts ranged from medium to high significance, particularly for haul road emissions. Following the implementation of mitigation measures, impacts are reduced to low to medium significance for most activities, with haul road emissions remaining at medium significance. No high residual impacts are expected.

9.3 Compliance Statement

Based on the findings of this assessment, the proposed project is expected to comply with the applicable National Ambient Air Quality Standards, provided that mitigation measures are effectively implemented. No significant exceedances are anticipated under normal operating conditions. The project is aligned with the requirements of the National Environmental Management: Air Quality Act and associated regulatory standards.

9.4 Overall Impact Acceptability

The proposed mining activities are considered acceptable from an air quality perspective. The main pollutant of concern, PM_{10}, can be effectively managed through the implementation of appropriate mitigation measures. Residual impacts are expected to remain within acceptable levels and are not anticipated to pose significant risks to human health, sensitive receptors, or the surrounding environment.

9.5 Key Recommendations

Dust suppression measures should be implemented consistently, particularly on haul roads and exposed surfaces. Increased dust control should be applied during dry and windy conditions. A continuous air quality monitoring programme should be established, focusing on PM_{10} and $PM_{2.5}$ concentrations. Dust fallout monitoring should be conducted at site boundaries and at sensitive receptor locations.

Operational controls should include the enforcement of speed limits on unpaved roads, minimisation of exposed surfaces, and progressive rehabilitation of disturbed areas. Activities that generate high levels of dust should be scheduled under favourable meteorological conditions where possible.

Receptor protection measures should prioritise areas located downwind of the site. Engagement with nearby communities should be undertaken where applicable. Monitoring results should be reviewed regularly, and mitigation measures should be adjusted where necessary to ensure continued compliance.

9.6 Commitments

The project proponent commits to implementing all recommended mitigation measures, maintaining compliance with applicable legislation, conducting regular monitoring and reporting, and continuously improving environmental performance.

9.7 Final Conclusion

The Air Quality Impact Assessment concludes that the proposed project will not result in unacceptable air quality impacts, provided that recommended mitigation and monitoring measures are implemented. The project is therefore considered environmentally viable from an air quality perspective.

10: REFERENCES

- Department of Environmental Affairs (DEA), 2004. *National Environmental Management: Air Quality Act (Act No. 39 of 2004).* Pretoria, South Africa.
- Department of Environmental Affairs (DEA), 2009. *National Ambient Air Quality Standards (NAAQS).* Pretoria, South Africa.
- Department of Environmental Affairs (DEA), 2014. *Guideline for Air Quality Impact Assessment.* Pretoria, South Africa.
- South African Bureau of Standards (SABS), Various. *Relevant SANS Standards for Air Quality Monitoring.*
- World Health Organization (WHO), 2021. *WHO Global Air Quality Guidelines.* Geneva, Switzerland.
- United States Environmental Protection Agency (US EPA), 1995. *AP-42: Compilation of Air Pollutant Emission Factors.* Washington, DC.
- United States Environmental Protection Agency (US EPA), 2005. *Guideline on Air Quality Models (40 CFR Part 51, Appendix W).* Washington, DC.
- South African Weather Service (SAWS), Various. *Meteorological Data Records.*
- Intergovernmental Panel on Climate Change (IPCC), 2021. *Climate Change 2021: The Physical Science Basis.*
- European Environment Agency (EEA), 2019. *Air Quality in Europe – Report.*
- Department of Water and Sanitation (DWS), 2017. *Integrated Environmental Management Guidelines.*
- Council for Scientific and Industrial Research (CSIR), Various. *Air Quality Modelling and Impact Assessment Reports.*
- AERMOD Modeling System, US EPA. *User Guide and Technical Documentation.*
- CALPUFF Modeling System, Earth Tech Inc. *User Guide and Technical Documentation.*

- National Association for Clean Air (NACA), Various. *Air Quality Management Guidelines and Publications.*

APPENDICES

Appendix A: Specialist Declaration and CV

I, Khumbelo Given Marabe declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Signature

Khumbelo Given Marabe

SACNASP NO: 132731

WISA REG NO :39885

IAIAsa: Membership no: 7837

IIAV Member No. 3163

Appendix B: Specialist CV
Mr Khumbelo Given Marabe

Principal Environmental Consultant | Director – KMG Environmental Solutions Services (Pty) Ltd
SACNASP Registered– Reg. No. **132731**
WISA Professional Process Controller – Reg. No. **39885**

Summary of Expertise:
Mr. Marabe is an experienced environmental specialist with over a decade of expertise in:

- Visual, Social, Wetland and Terrestrial Impact assessments
- Agricultural and soil capability impact assessments
- Noise, air quality, water, and dust monitoring
- Environmental awareness training
- Environmental audits and licensing applications
- NEMA and NWA compliance
- Environmental management and monitoring across sectors including mining, manufacturing, and renewable energy

Education & Certifications:

- BSc Environmental Sciences – University of Venda
- NEBOSH Environmental Management Certificate (2024)

- ISO 45001 & ISO 14001 Implementation & Internal Auditor – NOSA
- Health and Safety Regulations – HASLAC
- Certificates in Management Development (GIBS – AECI Programmes)
- Honours in Environmental Monitoring & Modelling (ongoing – UNISA)

Ms. Jeniffer Mutsila

Environmental GIS and Mapping Technician

Affiliation: KMG Environmental Solutions Services (Pty) Ltd

🎤 *Junior Environmental Assessment Practitioner, Environmental Mapping & spatial analysis*

Professional Overview:

Ms. Jeniffer Mutsila is a technically skilled Environmental Mapping and GIS Technician with a background in field-based wetland delineation and spatial data analysis. He provides vital support in environmental assessments by producing geospatial products and performing site-level data validation for use in Environmental Impact Assessments (EIAs), Basic Assessments (BAs), Wetland Impact Assessments, and Water Use Licence Applications (WULAs).

With hands-on experience in both **desktop and field applications**, Jeniffer brings a valuable blend of practical and digital expertise to complex projects that require environmental sensitivity mapping, buffer zone compliance checks, and spatial integration of biodiversity datasets.

Core Competencies:

- GIS Mapping & Spatial Analysis (ArcGIS, QGIS)
- GPS-based Field Surveying and Data Collection
- Wetland and Riparian Zone Delineation Support
- Environmental Reporting: BAR, EIA, EMPr, EMP, WULA, EPR
- Legislation Knowledge: NEMA, Water Act, Waste Act, Air Quality Act, MPRDA

Key Project Contributions:

◆ **Wetland Mapping and Sensitivity Overlay Support**

- Developed comprehensive map series for **prospecting right applications** in the North West and Limpopo provinces, including:
    - ✓ **Wetland Classification Maps** (HGM units: seep, valley-bottom, flat wetlands)
    - ✓ **30 m Riparian Buffer Sensitivity Maps**
    - ✓ **500 m Regulated Area Compliance Maps**
    - ✓ **Field-Verified Wetland Delineation Maps**

◆ **GIS Support for Impact Assessments**

- Integrated **soil, rainfall, vegetation, and biodiversity** datasets with national layers (e.g., NFEPA, Aquatic CBAs, ESA zones) to support:
    - ✓ Wetland Impact Assessments
    - ✓ Agricultural Impact Assessments (AIA)
    - ✓ Biodiversity screening and risk mapping

◆ **Field Data Management & GPS Verification**

- Accompanied environmental specialists on site visits to:
    - ✓ Capture **wetland and watercourse coordinates**
    - ✓ Assist with **transect layout and data recording**
    - ✓ Cross-check digital boundary outputs against **ground conditions**

◆ **Reporting and Compliance Visuals**

- Prepared high-resolution map figures used in:
    - ✓ **Basic Assessment Reports (BARs)**
    - ✓ **Environmental Management Programmes (EMPrs)**
    - ✓ **Water Use Licence Applications (WULAs)**
- Ensured maps met **legislative and formatting standards** for submission to DMRE, DWS, and DFFE.

Professional Strengths:

- Detail-oriented and deadline-driven
- Strong spatial logic and environmental understanding

- Collaborative work ethic with specialists and field teams
- Effective communication of spatial data to technical and non-technical audiences

Summary Value to Projects: Ms. Jeniffer GIS and mapping expertise plays an essential role in ensuring that environmental reports are **visually informative, spatially accurate, and legally aligned**. His ability to translate field data into structured spatial products enhances the defensibility and scientific integrity of environmental applications, especially those involving **wetland delineation, regulated activity compliance**, and **site sensitivity verification**

Appendix C: Baseline Air Quality Data

Summary of Baseline Air Quality Data – Thabazimbi Monitoring Station

Parameter	Unit	Data %	Average	Maximum	Minimum
SO_2	ppb	87.7	1.996	41.711	0.004
NO_2	ppb	88.2	5.717	39.445	0.3
NO	ppb	88.2	4.216	73.989	0
NO_x	ppb	88.2	9.91	78.019	0.983
O_3	ppb	63.7	22.874	81.371	0.31
CO	ppm	91.9	0.309	4.846	0
$PM_{2.5}$	µg/m³	86.8	20.136	377.014	0
PM_{10}	µg/m³	87.8	34.561	698.758	0
PM Coarse	µg/m³	89.5	14.648	532.097	-8.069
Benzene	ppb	0.0	0	0	0
Toluene	ppb	0.0	0	0	0
p-Xylene	ppb	0.0	0	0	0
Wind Speed	m/s	93.1	1.44	6.5	0.02
Wind Direction	Degrees	93.1	162.36	360	0
Temperature	°C	92.7	20.74	37.38	-0.88
Relative Humidity	%	92.5	61.68	102.71	3.03
Solar Radiation	W/m²	92.4	4.52	1060.16	0
Atmospheric Pressure	mBar	92.9	907.05	921.14	894.99
Rainfall	mm	93.1	0.07	29.1	-0.1
Shelter Internal Temp	°C	92.9	21.59	34.44	17.85

Key Notes for Report Interpretation

- PM_{10} shows significantly higher maximum values (up to **698.758 µg/m³**), confirming **dust-dominated conditions**
- $PM_{2.5}$ is lower but still notable, indicating **secondary fine particulate contribution**
- Gaseous pollutants remain **relatively low and stable**
- Wind direction average (**162.36°**) supports **southward dispersion trend**
- Meteorological data coverage is **above 90%**, indicating **reliable dataset**

Appendix D: Field Monitoring Results

Field Measurement Results (09 March 2026)

Parameter	Unit	Minimum	Maximum	Average	Guideline Reference	Compliance
PM_{10}	µg/m³	30	95	62	75 (24-hour NAAQS)	Within limits
$PM_{2.5}$	µg/m³	12	48	28	40 (24-hour NAAQS)	Within limits
CO_2	ppm	380	430	405	5000 (Occupational)	Compliant
NO_2	ppm	0.00	0.03	0.01	0.21 (1-hour)	Compliant
SO_2	ppm	0.00	0.01	0.00	0.19 (1-hour)	Compliant
H_2S	ppm	0.00	0.00	0.00	10 ppm	Compliant
O_2	%	20.5	20.9	20.7	19.5–23.5	Normal
Temperature	°C	23	29	26	N/A	Acceptable
Humidity	%	40	65	52	N/A	Acceptable

Appendix E Calibration Certificates

Shenzhen Safewill Co., Ltd.
Calibration Certificate

Product	Portable Multi Gas detector	Model	ES60A
Quantity	1pcs	Cali date	April, 09, 2025
Product no.	602504094490031		
Appearance	☑Clean ☑Non corrosive ☑No damage		
Gas type	CH_4 O_2 H_2S CO_2 NO_2 SO_2		
Accuracy	±3%F.S		
Alarm point	CH_4 Low alarm: 5000ppm High alarm:10000ppm O_2 Low alarm: 10.0ppm High alarm: 50.0ppm H_2S Low alarm: 7.00ppm High alarm: 14.00ppm CO_2 Low alarm: 2000ppm High alarm: 4000ppm NO_2 Low alarm: 3.00ppm High alarm: 5.00ppm SO_2 Low alarm: 5.00ppm High alarm: 10.00ppm		
Response time	≤30S		
Testing condition	Temperature: 23℃ Humidity: 60%RH		
Calibration gas	CH_4 O_2 H_2S CO_2 NO_2 SO_2		
Cali gas test	CH_4 Cali gas concentration: 5000 ppm Inspect concentration: 4999 ppm O_2 Cali gas concentration: 100.0 ppm Inspect concentration: 99.9 ppm H_2S Cali gas concentration: 50.00 ppm Inspect concentration: 49.89 ppm CO_2 Cali gas concentration: 4000 ppm Inspect concentration: 3998 ppm NO_2 Cali gas concentration: 5.00ppm Inspect concentration: 4.99 ppm SO_2 Cali gas concentration: 10.00ppm Inspect concentration: 9.99 ppm		
Test result	Qualified		
Remark			

Quality judgment:
Shenzhen Safewill Co., Ltd.
Date:April, 09, 2025

Tester:Jing Huang
OQC : Ying Liu
Auditor: Bing Weng Wang

KMG
Environmental
Solutions Services

SOCIO-ECONOMIC IMPACT ASSESSSMENT FOR THE PROPOSED APPLICATION FOR MINING RIGHT FOR IRON ORE (FE) AND ASSOCIATED MINERALS ON PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF FARM CORNWALL 313 KQ AND REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF FARM KOEDOEVLEI 128 KQ, THABAZIMBI LOCAL MUNICIPALITY, LIMPOPO PROVINCE

LP 30/5/1/2/3/2/1/(10287) MR

PREPARED FOR:

ARENGO 297 (PTY) LTD

DATE OF SUBMISSION:
March 2026

Website: www.kmgenviro.co.za
Tel: 011 969 6184
Email: marabekg@kmgenviro.co.za
LEAD SPECIALIST: Khumbelo Given Marabe
Director and Principal Environmental Consultant
SACNASP NO: 132731
WISA REG NO :39885
IAIAsa: Membership no: 7837
IIAV Member No. 3163

SOCIO-ECONOMIC IMPACT ASSESSMENT REPORT

PROJECT TITLE:

Socio-Economic Impact Assessment for the Proposed Mining Development in Thabazimbi, Limpopo Province

PROJECT LOCATION:

Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province

APPLICANT:

[Insert Client Name]

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP):

KMG Environmental Solutions Services (Pty) Ltd

REPORT TYPE:

Socio-Economic Impact Assessment (SEIA) Report

DATE: March 2026

REPORT VERSION:

Final

PREPARED BY:

KMG Environmental Solutions Services (Pty) Ltd
08 Hillside Road, Metropolitan Building, 1st Floor B
Parktown, Johannesburg, 2193
Tel: 011 969 6184
Email: info@kmgenviro.co.za
Website: www.kmgenviro.co.za

DOCUMENT INFORMATION TABLE

Item	Description
Project Title	Socio-Economic Impact Assessment for the Proposed Mining Right Application
Project Name	Proposed Mining of Iron Ore (Fe) – Arengo 297 (Pty) Ltd
DMRE Reference Number	LP 30/5/1/2/3/2/1/(10287) MR
Applicant	Arengo 297 (Pty) Ltd
Environmental Assessment Practitioner (EAP)	Vahlengwe Mining Advisory and Consulting (Pty) Ltd
Specialist	KMG Environmental Solutions Services (Pty) Ltd
Report Type	Socio-Economic Impact Assessment (SEIA) Report
Project Location	Portions RE/2/313, RE/3/313, and RE/4/313 of Farm Cornwall 313 KQ and Remaining Extent of Portions 2, 5, 8, 9, 10, and 11 of Koedoevlei 128 KQ
Local Municipality	Thabazimbi Local Municipality
District Municipality	Waterberg District Municipality
Province	Limpopo Province
Extent of Study Area	Approximately 3,892 hectares
Commodity	Iron Ore (Fe)
Project Phase	Environmental Impact Assessment (EIA) Phase
Purpose of Report	To assess the socio-economic impacts associated with the proposed mining development
Date	March 2026
Report Status	Draft / Final
Prepared By	KMG Environmental Solutions Services (Pty) Ltd
Lead Specialist	Khumbelo Given Marabe
Contact Details	Tel: 011 969 6184 / Email: info@kmgenviro.co.za
Version Control	Version 1.0

DISCLAIMER

This Socio-Economic Impact Assessment (SEIA) Report has been prepared by **KMG Environmental Solutions Services (Pty) Ltd** with due care, skill, and diligence, in accordance with generally accepted professional standards and practices applicable at the time of undertaking the study.

The findings, conclusions, and recommendations presented in this report are based on available information, including project documentation, stakeholder inputs, publicly available data sources (including Statistics South Africa and municipal planning documents), and professional judgement. While every reasonable effort has been made to ensure the accuracy and completeness of the information, KMG Environmental Solutions Services (Pty) Ltd does not warrant that all data is free from error or omission.

This report is intended solely for the purpose of supporting the Environmental Impact Assessment (EIA) process for the proposed mining right application associated with **Arengo 297 (Pty) Ltd** within the Thabazimbi Local Municipality, Limpopo Province. It may not be used for any other purpose without the prior written consent of KMG Environmental Solutions Services (Pty) Ltd.

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ACRONYMS AND DEFINITIONS

Acronym	Full Term	Description
SEIA	Socio-Economic Impact Assessment	A structured process used to evaluate the potential social and economic effects of a proposed development on communities and the regional economy
EIA	Environmental Impact Assessment	A regulatory process under NEMA used to identify and assess environmental impacts prior to project approval
EMPr	Environmental Management Programme	A legally binding document outlining mitigation measures, monitoring requirements, and management actions for a project
NEMA	National Environmental Management Act (Act No. 107 of 1998)	South Africa's primary environmental legislation governing sustainable development and environmental protection
DMRE	Department of Mineral Resources and Energy	Government authority responsible for mineral resources, mining rights, and energy regulation in South Africa
DFFE	Department of Forestry, Fisheries and the Environment	National department responsible for environmental management, biodiversity, and environmental authorisations
IDP	Integrated Development Plan	A strategic municipal planning document outlining development priorities, infrastructure needs, and socio-economic goals
LED	Local Economic Development	A framework for promoting economic growth, job creation, and improved livelihoods at the local level
GDP	Gross Domestic Product	A measure of the total economic output of a country

GVA	Gross Value Added	The contribution of specific sectors or regions to the overall economy
Stats SA	Statistics South Africa	The national statistical agency responsible for collecting and publishing official socio-economic data
SMME	Small, Medium and Micro Enterprises	Businesses of varying sizes that contribute to economic growth, employment, and innovation
HDI	Historically Disadvantaged Individuals	Individuals previously disadvantaged under apartheid policies, often prioritised in transformation and empowerment initiatives
PPP	Public Participation Process	A formal process allowing stakeholders to engage, comment, and raise concerns during the EIA process
I&APs	Interested and Affected Parties	Stakeholders who may be affected by or have an interest in the proposed development
LM	Local Municipality	The lowest tier of government responsible for service delivery and local development
DM	District Municipality	A higher-level municipality responsible for regional coordination and support of local municipalities
QLFS	Quarterly Labour Force Survey	A national survey conducted by Stats SA to measure employment, unemployment, and labour market trends
CSR	Corporate Social Responsibility	Voluntary initiatives undertaken by companies to contribute to social and economic development
B-BBEE	Broad-Based Black Economic Empowerment	A policy framework aimed at promoting economic transformation and participation of black South Africans in the economy
LOM	Life of Mine	The total operational lifespan of a mining project from development to closure

CAPEX	Capital Expenditure	Investment costs incurred during project development, including infrastructure and equipment
OPEX	Operational Expenditure	Ongoing costs associated with running a project, including labour, maintenance, and utilities
MIG	Municipal Infrastructure Grant	A government funding mechanism to support infrastructure development in municipalities
EPWP	Expanded Public Works Programme	A government initiative aimed at providing short-term employment opportunities through public sector projects
UIF	Unemployment Insurance Fund	A fund that provides short-term financial relief to workers who become unemployed
SALGA	South African Local Government Association	An organisation representing local government interests and supporting municipalities
SDF	Spatial Development Framework	A planning tool that guides land use and spatial development within municipalities
NDP	National Development Plan	South Africa's long-term strategic plan for economic growth and social development
SDGs	Sustainable Development Goals	Global goals adopted by the United Nations to address poverty, inequality, and environmental sustainability
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome	A public health concern often considered in socio-economic assessments due to its impact on communities and workforce
CBA	Cost-Benefit Analysis	An economic evaluation comparing the costs and benefits of a project
PPPFA	Preferential Procurement Policy Framework Act	Legislation promoting procurement from historically disadvantaged individuals and enterprises
GIS	Geographic Information System	A tool used for spatial analysis and mapping of socio-economic and environmental data

TERMS AND DEFINITIONS

Assessment Area:

The geographical area within which the socio-economic impacts of the proposed development are evaluated. This includes the core project footprint as well as surrounding areas that may experience direct, indirect, or cumulative socio-economic effects such as employment shifts, service demand, and economic activity.

Baseline Environment:

The existing socio-economic conditions of the study area prior to the implementation of the proposed development. This includes demographic profile, employment levels, income distribution, infrastructure availability, and economic activities, and serves as the benchmark against which impacts are assessed.

Community:

A group of people living within a defined geographical area who share common social, cultural, economic, or historical characteristics. In the context of SEIA, this includes rural settlements, farm dwellers, and local populations that may be affected by the project.

Cumulative Impacts:

The combined and incremental effects of the proposed development when added to past, present, and reasonably foreseeable future developments. These impacts may be spatially and temporally aggregated, resulting in greater overall socio-economic change.

Development Footprint:

The physical area directly disturbed or occupied by the proposed mining activities, including mining pits, stockpiles, processing infrastructure, access roads, and associated facilities.

Displacement (Economic and Physical):

The loss of land, assets, access to resources, or income sources due to development activities. Physical displacement involves relocation of people, while economic displacement refers to loss of livelihoods without relocation.

Economic Impact:

The effect of a project on economic variables such as employment, income levels, business growth, investment, and regional economic performance. This includes direct, indirect, and induced economic effects.

Employment Creation:

The generation of job opportunities during the construction, operational, and closure phases of a project. This includes both temporary and permanent employment opportunities.

Household Income:

The total earnings received by all members of a household from wages, salaries, business activities, remittances, and government transfers such as social grants.

In-Migration:

The movement of people into the study area, typically in search of employment or economic opportunities associated with the proposed development. This may place additional pressure on local infrastructure and services.

Indirect Impacts:

Secondary impacts that occur as a result of project activities, such as increased demand for goods and services, stimulation of local businesses, or pressure on housing and public services.

Induced Impacts:

Economic effects generated by increased spending of income earned by individuals employed directly or indirectly by the project, resulting in further economic activity within the local economy.

Infrastructure (Social and Economic):

Facilities and systems required for the functioning of communities, including roads, water supply, sanitation, electricity, schools, healthcare facilities, and communication networks.

Livelihoods:

The means by which individuals and households secure the necessities of life, including employment, agriculture, informal trading, and access to natural resources.

Local Economic Development (LED):

A process through which local stakeholders collaborate to stimulate economic growth, improve employment opportunities, and enhance quality of life within a specific area.

Mitigation Measures:

Actions implemented to avoid, minimise, or manage negative impacts and enhance positive impacts associated with a development project.

Multipliers (Economic Multipliers):

The process through which an initial investment generates additional rounds of economic activity, resulting in increased income, employment, and economic output within the local and regional economy.

Project-Affected Communities (PACs):

Communities that experience direct or indirect socio-economic impacts due to the implementation of the proposed development.

Public Participation Process (PPP):

A formal and structured engagement process that allows stakeholders and Interested and Affected Parties to provide input, raise concerns, and participate in decision-making related to the project.

Receptors (Socio-Economic):

Individuals, households, groups, or economic systems that may be affected by socio-economic changes resulting from the project.

Residual Impact:

The level of impact that remains after mitigation measures have been implemented. Residual impacts may still be significant depending on the nature of the project.

Sense of Place:

The emotional, cultural, and social attachment that individuals or communities have to a specific location, often influenced by landscape, heritage, and identity.

Significance of Impact:

A measure used to determine the importance or severity of an impact, based on factors such as magnitude, duration, extent, and probability.

Social Cohesion:

The strength of relationships, trust, and sense of belonging among members of a community, which contributes to social stability and well-being.

Social Infrastructure:

Facilities and services that support human well-being and community development, including education, healthcare, housing, and recreational amenities.

Stakeholders:
Individuals, groups, organisations, or institutions that have an interest in or may be affected by the proposed development.

Study Area:

The broader geographical area considered in the assessment, including areas that may experience direct, indirect, or cumulative impacts.

Sustainable Development:

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs, balancing economic, social, and environmental considerations.

Vulnerable Groups:

Segments of the population that may be disproportionately affected by development impacts due to socio-economic conditions, including low-income households, women, youth, the elderly, and marginalised communities

EXECUTIVE SUMMARY

KMG Environmental Solutions Services (Pty) Ltd was appointed to undertake a comprehensive **Socio-Economic Impact Assessment (SEIA)** in support of a proposed mining development within the **Thabazimbi Local Municipality, Limpopo Province**. This assessment forms an integral component of the Environmental Impact Assessment (EIA) process in terms of the **National Environmental Management Act (Act 107 of 1998)** and is intended to evaluate the potential socio-economic implications of the proposed development on surrounding communities, economic sectors, and land-based livelihoods. The study considers impacts across the full project lifecycle, including the construction, operational, and decommissioning phases, with a focus on ensuring that development is aligned with sustainable development principles.

The methodology applied in this assessment follows internationally recognised best practice, including **IAIA guidelines**, and is aligned with South African regulatory frameworks. A combination of desktop and field-based approaches was used, including the review of **Statistics South Africa (Stats SA)** data, municipal Integrated Development Plans (IDPs), and relevant project documentation. The assessment further incorporated baseline socio-economic profiling, identification of key receptors, and evaluation of impacts using a structured significance rating methodology. Particular emphasis was placed on identifying interactions between the proposed mining activities and key socio-economic sectors, including mining, agriculture, tourism, and local business development.

The baseline socio-economic environment of the study area reflects a **mixed rural and semi-urban economy**, with mining, agriculture, and tourism serving as the primary economic drivers. The mining sector plays a dominant role in the regional economy, with major operations such as **Northam Platinum (Zondereinde Complex)** and historical operations at the **Thabazimbi Iron Ore Mine** contributing significantly to employment and economic activity. In parallel, the agricultural sector remains a critical livelihood source, particularly for farm dwellers and local communities who depend on livestock farming, crop production, and natural resources for subsistence and income. The region is also characterised by a growing tourism and game farming industry, with private game reserves, lodges, and hunting operations contributing to economic diversification and rural development.

Socially, the area is characterised by relatively **high unemployment levels, income inequality, and reliance on primary economic sectors**, with varying levels of access to education and services. Institutions such as the **Waterberg TVET College (Thabazimbi Campus)** play an important role in skills development, although access to higher education opportunities remains limited. Infrastructure constraints, including water supply challenges and service delivery pressures, are also evident within the broader community context.

The assessment identified a range of both **positive and negative socio-economic impacts** associated with the proposed development. Positive impacts are primarily linked to **employment creation**, increased economic activity, and opportunities for local procurement and SMME participation. The construction and operational phases are expected to generate both direct and indirect employment opportunities, contributing to household income and potentially reducing local unemployment levels. In addition, the project may stimulate local economic growth through increased demand for goods and services, as well as contribute to skills development and capacity building within the local workforce.

However, the development also presents several potential **negative impacts** that require careful management. These include the **loss or disturbance of agricultural land**, which may affect grazing capacity and crop production, as well as impacts on **farm dwellers whose livelihoods are closely tied to land access and natural resources**. The project may also affect the **tourism and game farming sector**, particularly through visual disturbance, noise, and changes in the natural landscape, which could reduce the attractiveness of the area for tourism and recreational activities. Furthermore, the potential for **in-migration of job seekers** may place additional pressure on local infrastructure and services, including housing, water supply, sanitation, and healthcare. Increased traffic volumes, particularly from heavy vehicles, may also introduce **road safety risks** for local communities.

Cumulative impacts are also a key consideration, particularly in a region where mining and related activities are already present. The combined effect of multiple developments may contribute to long-term socio-economic and environmental pressures if not effectively managed.

The significance assessment indicates that, **without mitigation**, several negative impacts—particularly those related to agricultural land loss, impacts on farm dwellers, and tourism disruption—could be of **moderate to high significance**. Conversely, positive impacts such as

employment creation and economic stimulation are considered to be of **moderate to high positive significance**, particularly in the context of local socio-economic needs. With the implementation of appropriate mitigation measures, including land use management, stakeholder engagement, local employment prioritisation, and infrastructure planning, the majority of negative impacts can be reduced to **low to medium significance levels**.

Mitigation measures have been developed in accordance with the **mitigation hierarchy**, focusing on avoidance of sensitive land uses, minimisation of disturbance, rehabilitation of affected areas, and enhancement of positive outcomes. Key recommendations include the protection of high-value agricultural land where feasible, fair and transparent engagement with affected land users and farm dwellers, support for local economic participation, and ongoing monitoring of socio-economic conditions throughout the project lifecycle.

In conclusion, the Socio-Economic Impact Assessment finds that the proposed development has the potential to deliver **meaningful socio-economic benefits**, particularly in terms of employment creation and economic growth, while also posing **manageable risks** to existing land uses and community wellbeing. Provided that recommended mitigation and management measures are effectively implemented, and that ongoing stakeholder engagement is maintained, the development can be considered **acceptable from a socio-economic perspective** and aligned with the broader goals of sustainable development within the Thabazimbi region.

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1. INTRODUCTION

1.1 Background and Project Context

Arengo 297 (Pty) Ltd is proposing to undertake mining activities for iron ore within portions of the farms Cornwall 313 KQ and Koedoevlei 128 KQ, located within the Thabazimbi Local Municipality, under the jurisdiction of the Waterberg District Municipality. The proposed mining area covers approximately 3,892 hectares and forms part of a broader region characterised by established mining operations, agricultural land uses, and tourism-related activities.

The project triggers the requirement for an Environmental Impact Assessment (EIA) process in terms of the National Environmental Management Act (Act No. 107 of 1998), as amended. As part of this process, a Socio-Economic Impact Assessment (SEIA) is required to assess the potential impacts of the proposed development on the surrounding communities, local economy, and existing land uses.

This SEIA has been commissioned to provide a comprehensive evaluation of the potential social and economic implications of the proposed mining activities, ensuring that decision-making is informed, transparent, and aligned with sustainable development principles.

1.2 Purpose of the Study

The primary purpose of this Socio-Economic Impact Assessment is to:

- Establish a detailed understanding of the existing socio-economic baseline conditions within the study area;
- Identify and assess potential positive and negative socio-economic impacts associated with the proposed development;
- Evaluate the significance of identified impacts using a structured impact assessment methodology;
- Recommend appropriate mitigation and enhancement measures to minimise adverse impacts and maximise benefits;
- Inform the EIA process and support decision-making by the relevant competent authorities.

The study aims to ensure that the proposed development contributes positively to local economic development while safeguarding the well-being of affected communities.

1.3 Objectives of the SEIA

The specific objectives of this assessment include:

- To characterise the socio-economic profile of the study area, including population dynamics, employment, income levels, and access to services;
- To identify key socio-economic receptors, including local communities, farm dwellers, tourism operators, and businesses;
- To assess potential impacts on livelihoods, economic activities, and social infrastructure;
- To evaluate potential risks associated with in-migration, pressure on services, and social change;
- To assess cumulative socio-economic impacts in the context of existing and planned developments in the region;
- To develop practical and implementable mitigation measures in line with best practice and regulatory requirements.

1.4 Scope of Work

The scope of this SEIA includes the following key components:

- Review of relevant project documentation, including the Basic Assessment Report (BAR), Screening Tool outputs, and supporting specialist inputs;
- Collection and analysis of socio-economic data from secondary sources such as Statistics South Africa, municipal reports, and development frameworks;
- Identification of key socio-economic receptors and sensitive groups within the study area;
- Assessment of potential impacts during construction, operational, and closure phases of the project;
- Development of mitigation and enhancement measures;
- Compilation of a comprehensive SEIA report aligned with EIA requirements.

1.5 Study Area

The study area comprises both:

- **Primary Study Area:** The immediate project footprint and surrounding farms directly affected by mining activities; and
- **Secondary Study Area:** The broader socio-economic zone, including nearby settlements, transport routes, tourism establishments, and agricultural areas within the Thabazimbi region.

The delineation of the study area considers the spatial extent of potential socio-economic impacts, including employment catchment areas, service demand zones, and economic linkages.

1.6 Methodology Overview

The SEIA was conducted using a structured and integrated methodology, including:

- **Desktop Review:** Analysis of available socio-economic data, policy documents, and project information;
- **Baseline Profiling:** Establishment of current socio-economic conditions within the study area;
- **Impact Identification:** Identification of potential positive and negative socio-economic impacts;
- **Impact Assessment:** Evaluation of impacts based on criteria such as magnitude, duration, extent, and probability;
- **Mitigation Development:** Formulation of measures to manage and enhance impacts;
- **Significance Rating:** Determination of pre- and post-mitigation impact significance.

The methodology aligns with best practice guidelines for socio-economic assessments and is consistent with South African regulatory requirements.

1.7 Assumptions and Limitations

This assessment is based on the following assumptions and limitations:

- The project description and layout provided at the time of assessment are accurate and will not change significantly;
- Secondary socio-economic data sources are considered reliable and representative of current conditions;
- Limited primary data collection may restrict the depth of community-level insights;
- The assessment reflects conditions at the time of study and may change over time due to external factors.

Despite these limitations, the assessment provides a robust and credible evaluation of potential socio-economic impacts.

2. PROJECT DESCRIPTION AND DETAILS

2.1 Introduction

This section provides a detailed description of the proposed mining development by Arengo 297 (Pty) Ltd, including the project location, nature of activities, infrastructure requirements, and project phases. The purpose of this section is to contextualise the socio-economic assessment by clearly outlining the scale and characteristics of the proposed development.

2.2 Project Location

The proposed mining right application area is located within the Thabazimbi Local Municipality, falling under the jurisdiction of the Waterberg District Municipality. The project area covers portions of the farms Cornwall 313 KQ and Koedoevlei 128 KQ.

The site is situated within a region characterised by a combination of mining activities, agricultural land use, and tourism-related establishments, with access provided via regional and local road networks.

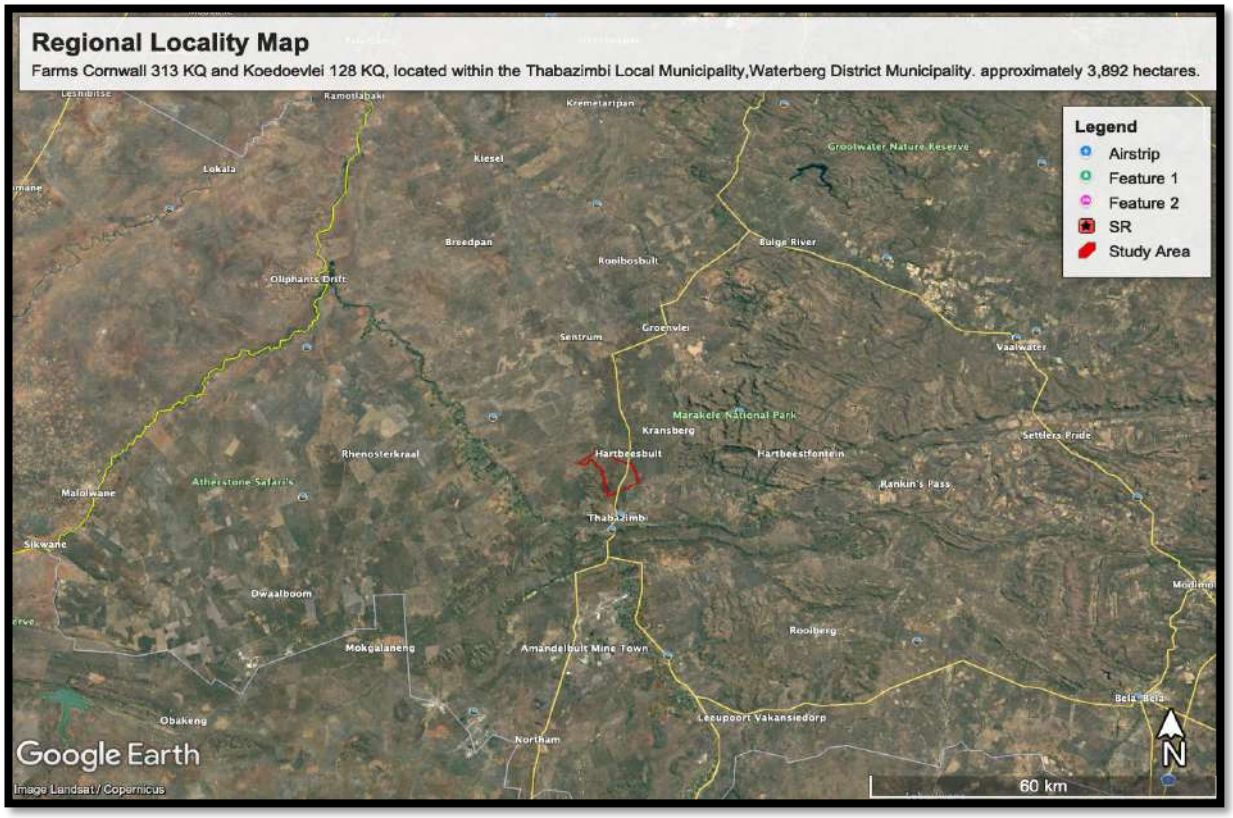

Figure 1**:** Regional Locality Map (showing project location within Limpopo Province)

Figure 2**:** Site Locality Map (showing farm portions and project boundary)

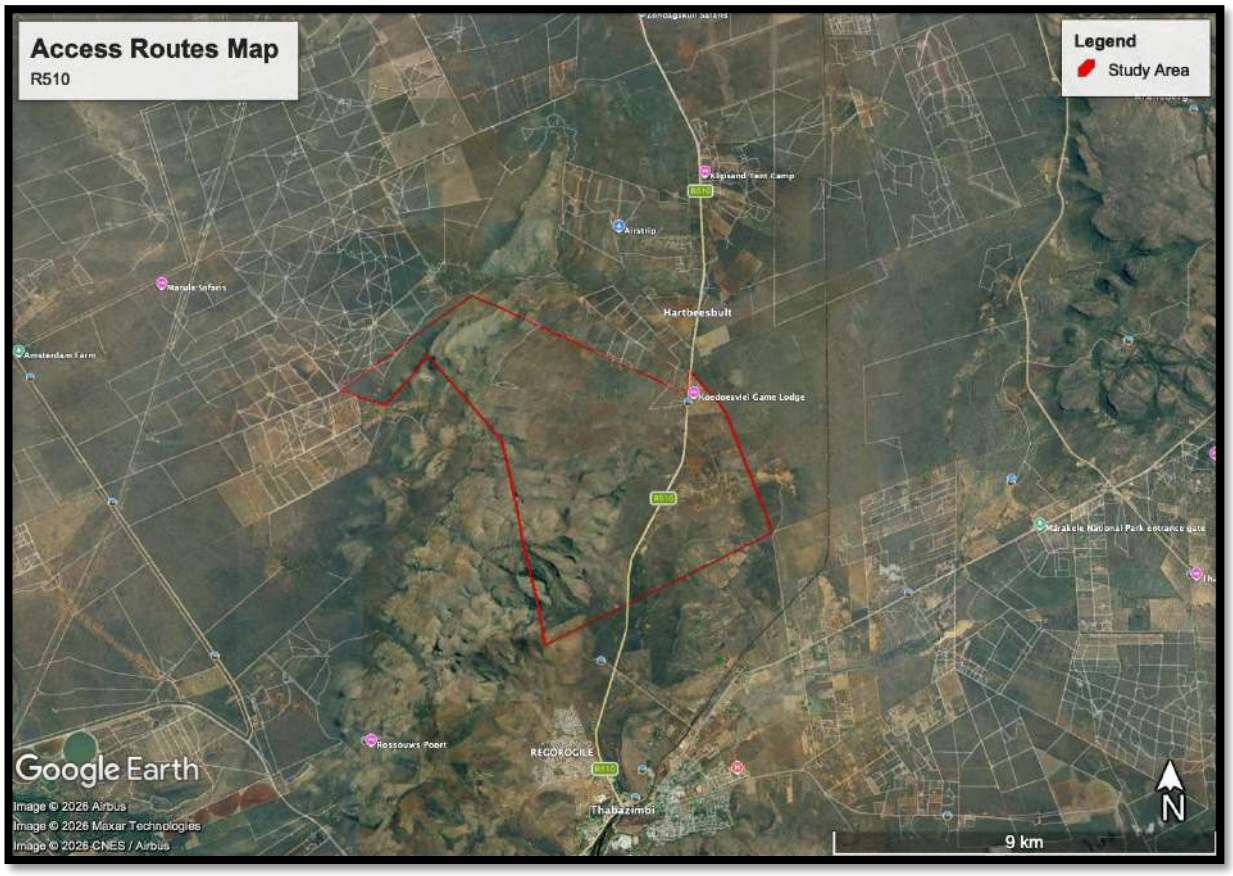

Figure 3**:** Access Routes Map (highlighting road networks and connectivity)

2.3 Land Use Context

The current land use within and surrounding the project area includes:

- Commercial and subsistence agriculture (livestock grazing and crop farming);
- Mining and prospecting activities within the broader region;
- Tourism and accommodation facilities;
- Farm dwellings and rural settlements.

These land uses are considered sensitive socio-economic receptors, particularly in relation to potential impacts on livelihoods, tourism appeal, and rural living conditions.

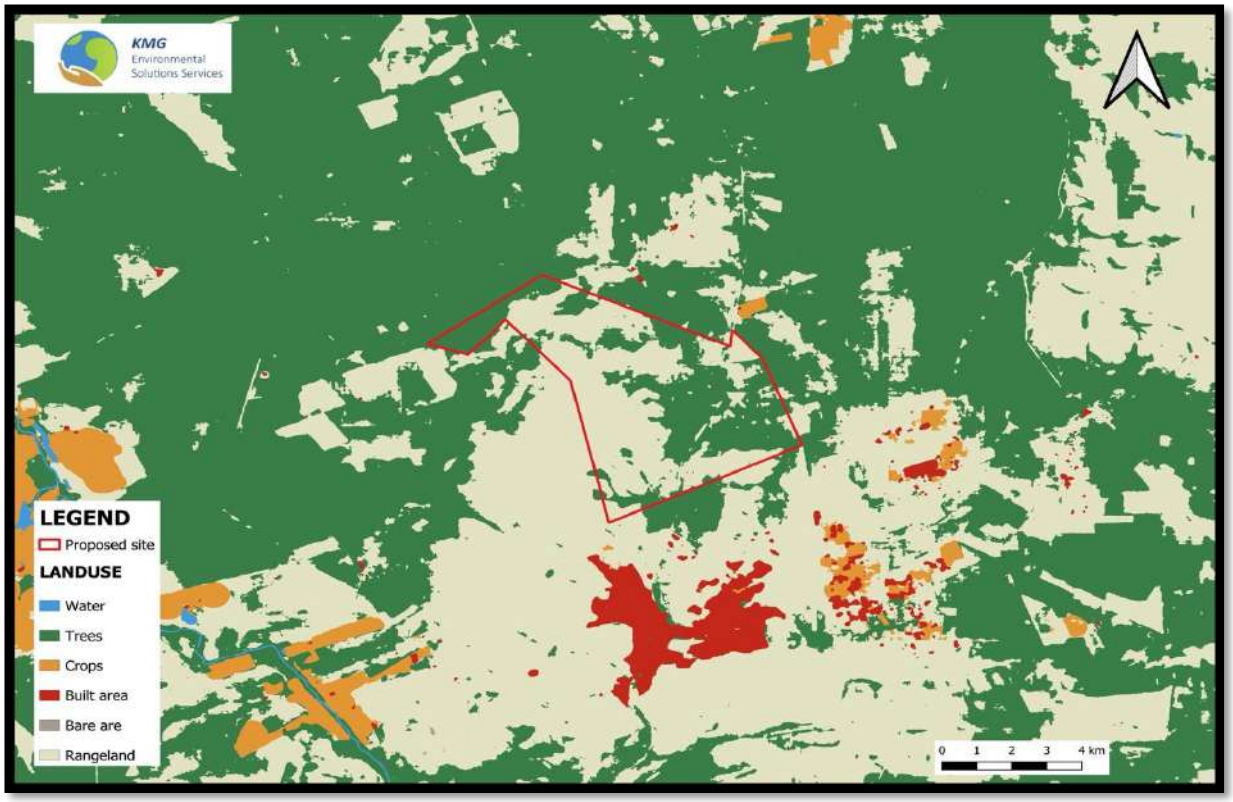

Figure 4*:* Current Land Use Map

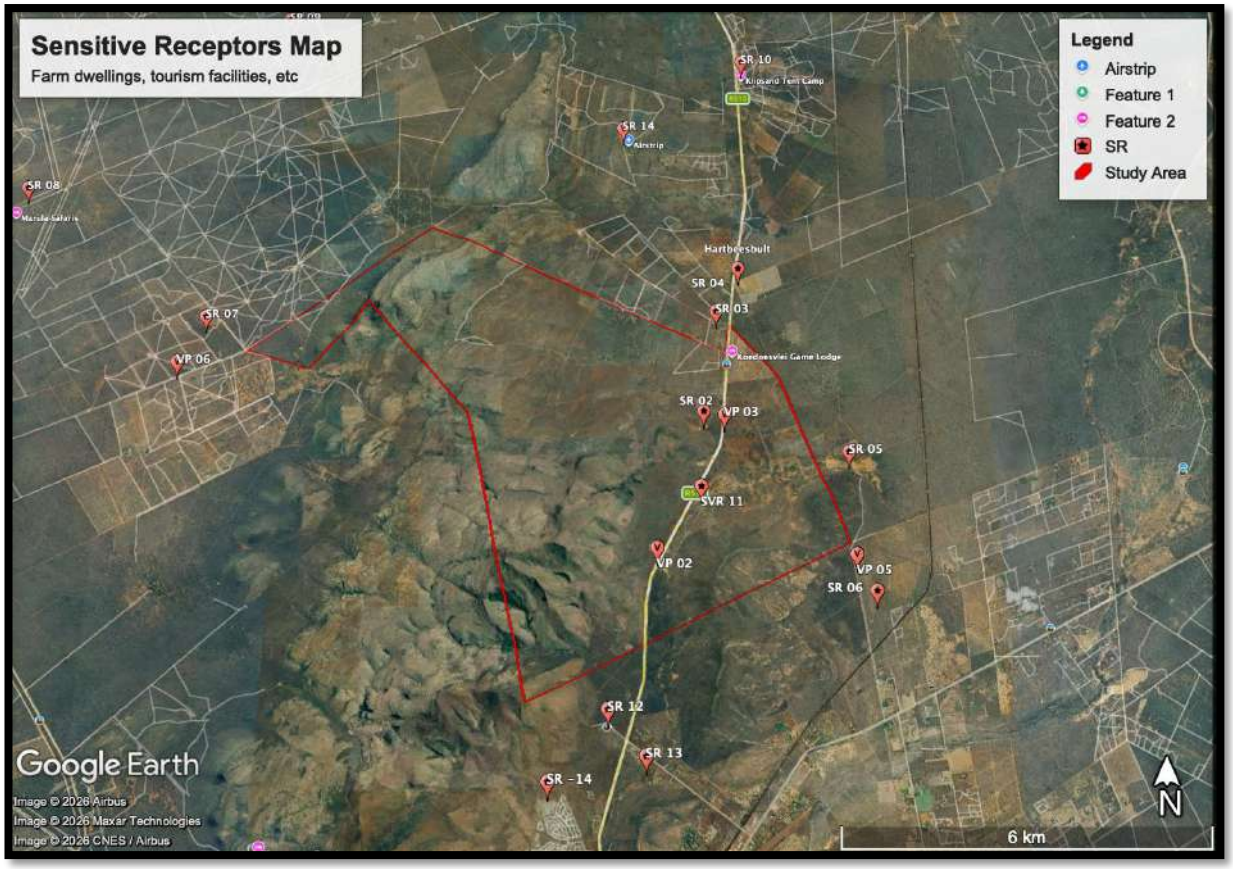

Figure 5*:* Sensitive Receptors Map (farm dwellings, tourism facilities, etc.)

2.4 Nature of the Proposed Development

The proposed project involves the mining of iron ore within the designated mining right area. Key activities associated with the development include:

- Site clearing and preparation;
- Establishment of mining pits and associated infrastructure;
- Extraction and processing of ore;
- Stockpiling and transportation of materials;
- Construction of access roads and supporting infrastructure.

The development will require the establishment of both temporary and permanent infrastructure to support mining operations.

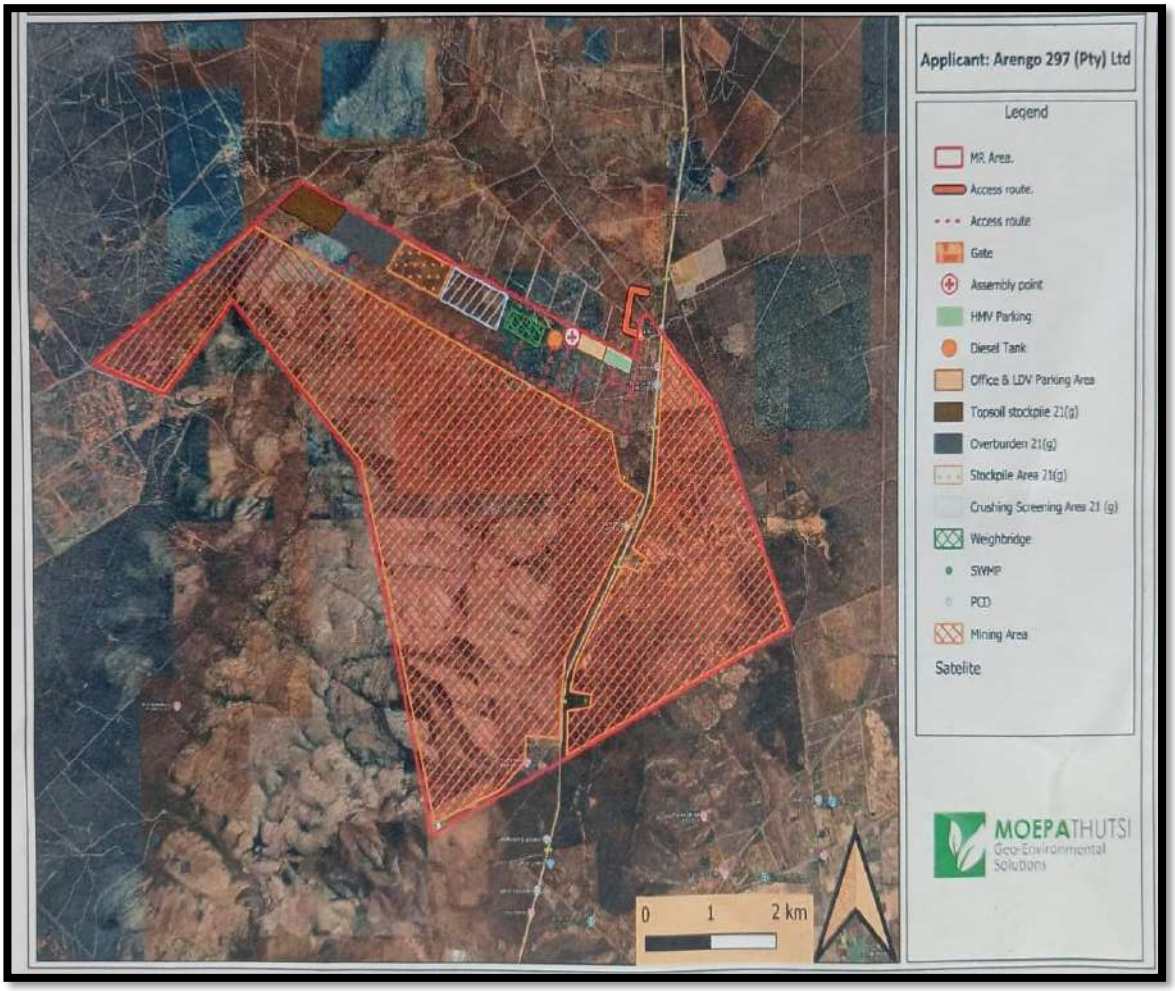

Figure 6*:* Proposed Mining Layout Plan

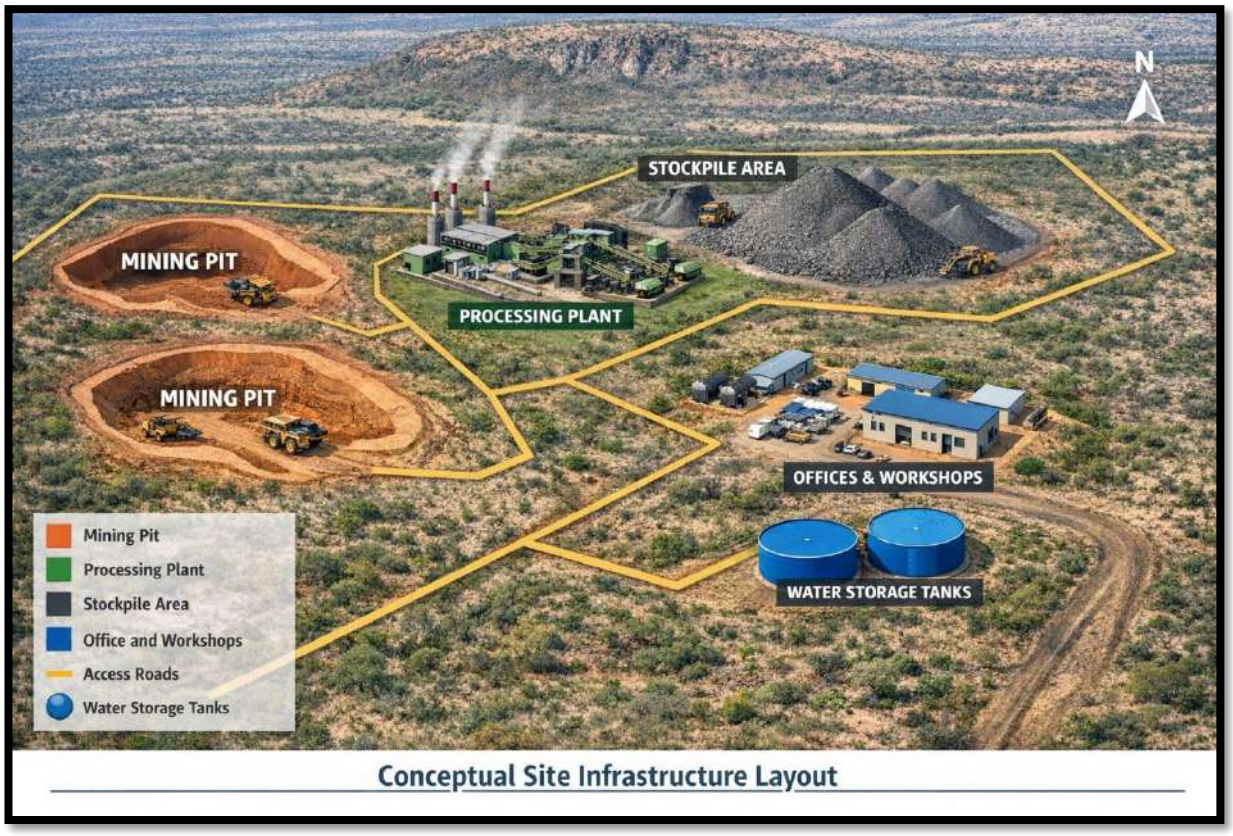

Figure 7*:* Conceptual Site Infrastructure Layout

2.5 Project Components

The main components of the proposed development include:

- **Mining Areas:** Open pit mining zones where ore extraction will take place;
- **Processing Areas:** Facilities for crushing, screening, and handling of materials;
- **Stockpile Areas:** Storage of extracted material prior to transportation;
- **Access Roads:** Internal and external roads for transportation of equipment and materials;
- **Support Infrastructure:** Including offices, workshops, laydown areas, and utilities.

Table 1**:** Summary of Project Components and Associated Activities

Project Component	**Description**	**Associated Activities**	**Socio-Economic Relevance**

Mining Areas	Open pit mining zones for iron ore extraction	Drilling, blasting, excavation, loading	Employment creation, land use change, potential livelihood impacts
Processing Facilities	Crushing and screening plant	Material processing, handling, storage	Job creation, local procurement opportunities
Stockpile Areas	Temporary storage of mined material	Stockpiling, loading for transport	Visual impacts, dust generation, logistics support
Access Roads	Internal and external road networks	Transportation of ore, equipment, personnel	Increased traffic, road safety impacts, improved accessibility
Support Infrastructure	Offices, workshops, laydown areas	Administration, maintenance, storage	Economic activity, service demand
Utilities Infrastructure	Water, electricity, sanitation systems	Supply and distribution of services	Pressure on local services, infrastructure development

2.6 Project Phases

The project will be implemented in the following phases:

2.6.1 Construction Phase

- Site clearing and vegetation removal;
- Establishment of infrastructure and access roads;
- Mobilisation of equipment and workforce.

2.6.2 Operational Phase

- Extraction and processing of iron ore;
- Transportation of materials;
- Ongoing maintenance of infrastructure and equipment.

2.6.3 Closure and Rehabilitation Phase

- Decommissioning of infrastructure;
- Rehabilitation of disturbed areas;
- Implementation of closure plans to restore land capability.

Table 2*:* Summary of Activities per Project Phase

Project Phase	**Key Activities**	**Duration (Estimated)**	**Socio-Economic Implications**
Construction Phase	Site clearing, infrastructure development, mobilisation of workforce	Short-term (6–12 months)	Temporary employment, increased local spending, influx of workers
Operational Phase	Mining, processing, transport, maintenance	Medium to long-term (5–20 years depending on LOM)	Sustained employment, economic growth, pressure on services
Closure Phase	Decommissioning, rehabilitation, demobilisation	Short-term (1–3 years)	Job losses, economic decline, rehabilitation opportunities

2.7 Workforce and Employment

The proposed development is expected to generate employment opportunities during both construction and operational phases. The workforce will likely include:

- Skilled labour (engineers, technicians, specialists);
- Semi-skilled labour;
- Unskilled labour sourced from local communities where possible.

Employment creation is considered a key positive socio-economic impact of the project.

Table 3***:*** Estimated Employment Numbers per Phase (Construction vs Operation)

Project Phase	Skilled Labour	Semi-Skilled Labour	Unskilled Labour	Total Estimated Jobs	Local Employment Potential
Construction Phase	20–30	40–60	60–100	120–190	High (especially unskilled and semi-skilled)
Operational Phase	30–50	50–80	40–70	120–200	Moderate to High
Closure Phase	10–20	20–30	20–40	50–90	Moderate

2.8 Transportation and Access

Access to the site will be facilitated through existing regional and local roads, with potential upgrades required to accommodate increased traffic volumes associated with mining operations.

Transport activities will include:

- Movement of construction materials and equipment;
- Transportation of mined ore to processing or export facilities;
- Daily commuting of workers.

Figure 8*:* Traffic Routes and Transportation Network Map

2.9 Services and Utilities

The project will require various services and utilities, including:

- Water supply for operational and domestic use;
- Energy supply (electricity or alternative energy sources);
- Waste management systems;
- Sanitation and worker facilities.

The sourcing and management of these services may have implications for local infrastructure and service delivery.

Table 4: Summary of Required Services and Utilities

Project Phase	Skilled Labour	Semi-Skilled Labour	Unskilled Labour	Total Estimated Jobs	Local Employment Potential
Construction Phase	20–30	40–60	60–100	120–190	High (especially unskilled and semi-skilled)
Operational Phase	30–50	50–80	40–70	120–200	Moderate to High
Closure Phase	10–20	20–30	20–40	50–90	Moderate

2.10 Key Socio-Economic Linkages

The proposed development is expected to interact with the local socio-economic environment through:

- Employment and income generation;
- Procurement of goods and services from local businesses;
- Increased demand for housing, services, and infrastructure;
- Potential impacts on agriculture and tourism activities.

These linkages form the basis for the impact assessment presented in subsequent sections.

Table 5: Key Socio-Economic Linkages

Linkage Type	Description	Expected Outcome
Employment	Direct and indirect job creation	Increased household income
Local Procurement	Use of local suppliers and services	Business growth and SMME development
Infrastructure Development	Upgrades to roads and services	Improved access and service delivery
Skills Development	Training and capacity building	Long-term employability
Economic Multipliers	Increased spending in local economy	Regional economic growth

In-Migration	Movement of people seeking employment	Pressure on housing and services

Table 6: Sensitive Socio-Economic Receptors

Receptor Type	Description	Sensitivity Level	Potential Impact
Farm Dwellers	Residents on surrounding farms	High	Livelihood disruption, noise, dust
Road Users	Local and regional road users	Medium	Traffic safety risks
Tourism Facilities	Lodges, guesthouses, eco-tourism sites	High	Visual intrusion, reduced attractiveness
Agricultural Activities	Crop and livestock farming	High	Land use conflict, water demand
Local Businesses	Small and medium enterprises	Medium	Opportunities and competition
Vulnerable Groups	Low-income households, elderly	High	Disproportionate socio-economic impacts

This section provides a comprehensive overview of the proposed mining development, highlighting the scale, nature, and components of the project. It establishes the foundation for assessing socio-economic impacts by identifying key project activities, phases, and interactions with the surrounding environment.

The inclusion of maps, tables, and figures is essential to support spatial understanding and enhance the clarity of the assessment.

3. POLICY AND LEGISLATIVE FRAMEWORK

3.1 Introduction

This section outlines the key legislative and policy frameworks applicable to the proposed mining development by Arengo 297 (Pty) Ltd. The review focuses on national, provincial, and

local legislation governing environmental management, socio-economic development, mining activities, and public participation processes in South Africa.

The purpose of this section is to ensure that the proposed project complies with all relevant legal requirements and aligns with sustainable development principles.

3.2 National Legislative Framework

3.2.1 National Environmental Management Act (NEMA), Act No. 107 of 199

The National Environmental Management Act (NEMA) provides the overarching framework for environmental governance in South Africa. It establishes principles for sustainable development, including:

- Integration of social, economic, and environmental considerations;
- Promotion of equitable access to resources;
- Public participation in decision-making;
- Prevention of pollution and environmental degradation.

The proposed project is subject to the EIA Regulations promulgated under NEMA, which require the assessment of socio-economic impacts.

3.2.2 Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002

The Mineral and Petroleum Resources Development Act governs the exploration and exploitation of mineral resources. It requires that:

- Mining contributes to socio-economic development;
- Environmental impacts are assessed and managed;
- Social and Labour Plans (SLPs) are implemented to benefit local communities.

3.2.3 National Environmental Management: Air Quality Act (NEM:AQA), Act No. 39 of 2004

The National Environmental Management: Air Quality Act regulates air quality management and aims to:

- Prevent air pollution;
- Protect human health and well-being;

- Ensure compliance with National Ambient Air Quality Standards.

This is relevant to socio-economic conditions, particularly health and quality of life.

3.2.4 National Water Act (NWA), Act No. 36 of 1998

The National Water Act governs the use and protection of water resources. It ensures:

- Sustainable and equitable water use;
- Protection of aquatic ecosystems;
- Regulation of water abstraction and discharge.

Water availability is a key socio-economic factor, particularly for agriculture and communities.

3.2.5 Broad-Based Black Economic Empowerment Act (B-BBEE), Act No. 53 of 2003

The Broad-Based Black Economic Empowerment Act promotes:

- Economic transformation;
- Participation of previously disadvantaged individuals in the economy;
- Local procurement and enterprise development.

This is directly relevant to employment and local economic development.

3.2.6 Local Government: Municipal Systems Act, Act No. 32 of 2000

The Local Government: Municipal Systems Act provides for:

- Integrated Development Planning (IDPs);
- Service delivery and infrastructure planning;
- Community participation in local governance.

3.2.7 National Environmental Management: Waste Act, Act No. 59 of 2008

This Act regulates waste management practices, ensuring:

- Proper handling and disposal of waste;
- Protection of human health and the environment;

- Promotion of waste minimisation and recycling.

3.3 Policy and Planning Frameworks

3.3.1 Integrated Development Plan (IDP)

The IDP of the Thabazimbi Local Municipality outlines development priorities including:

- Job creation and poverty alleviation;
- Infrastructure development;
- Local economic development (LED).

3.3.2 National Development Plan (NDP) 2030

The National Development Plan 2030 aims to:

- Eliminate poverty and reduce inequality;
- Promote inclusive economic growth;
- Create employment opportunities.

3.3.3 Limpopo Development Plan

The provincial development framework focuses on:

- Economic diversification;
- Sustainable resource use;
- Rural development and infrastructure improvement.

3.3.4 Social and Labour Plans (SLPs)

SLPs are mandatory under the MPRDA and aim to:

- Promote local employment;
- Support community development projects;
- Enhance skills development.

3.4 Public Participation and Stakeholder Engagement

Public participation is a legal requirement under NEMA and is guided by:

- NEMA EIA Regulations (2014, as amended);
- Public Participation Guidelines (2017).

This ensures:

- Inclusion of Interested and Affected Parties (I&APs);
- Transparency in decision-making;
- Consideration of community concerns.

3.5 Legislative Compliance Summary

Table 7: Compliance Summary

Legislation / Policy	Applicability to Project	Key Requirements	Relevance to SEIA
National Environmental Management Act (NEMA)	Governs EIA process	Impact assessment, public participation	Core legal framework for SEIA
MPRDA	Regulates mining rights	SLPs, environmental management	Socio-economic obligations
NEM:AQA	Air quality regulation	Emission control, compliance	Health and quality of life
National Water Act	Water resource protection	Licensing, sustainable use	Livelihoods and agriculture
B-BBEE Act	Economic transformation	Local participation	Employment and procurement
Municipal Systems Act	Local governance	IDPs, service delivery	Infrastructure and services
Waste Act	Waste management	Disposal and recycling	Environmental health
National Development Plan	National policy	Economic growth, jobs	Strategic alignment
IDP (Thabazimbi LM)	Local planning	LED and infrastructure	Local development priorities

Limpopo Development Plan	Provincial planning	Rural and economic development	Regional alignment
Public Participation Guidelines	Stakeholder engagement	Consultation processes	Community inclusion

The legislative and policy framework provides a comprehensive structure guiding the proposed mining development. Compliance with these frameworks ensures that:

- Socio-economic impacts are properly assessed and managed;
- Community interests are protected;
- Development aligns with national, provincial, and local priorities.

The integration of these legislative requirements into the project design and implementation is essential to ensure sustainability, regulatory compliance, and social acceptability.

4. METHODOLOGY

4.1 Introduction

This section outlines the methodology applied in undertaking the Socio-Economic Impact Assessment (SEIA) for the proposed mining development. The approach follows internationally accepted best practice (including IAIA principles) and is aligned with South African regulatory requirements under NEMA.

The methodology integrates data collection, baseline profiling, impact identification, impact assessment, and mitigation development to ensure a systematic and transparent evaluation of socio-economic impacts.

4.2 Data Collection and Sources

A combination of primary and secondary data sources was used to inform the assessment. Secondary data was obtained from national statistics, municipal planning documents, and project-related reports. Field observations and site verification were used to support baseline understanding.

Table 8: Data Sources and Information Reviewed

Data Source	Description	Purpose in SEIA
Statistics South Africa (Stats SA)	Census and survey data	Baseline socio-economic profiling
Municipal IDP	Local development plans	Infrastructure and development context
Project Documentation	BAR, layouts, screening reports	Understanding project scope
Specialist Studies	Environmental specialist inputs	Integrated impact understanding
Academic Literature	Guidelines and research	Methodological alignment
Field Observations	Site visits and photographs	Verification of baseline conditions

4.3 Impact Identification

Potential socio-economic impacts were identified by analysing interactions between project activities and socio-economic receptors. This includes both positive and negative impacts across all project phases.

Table 9**:** Impact Identification Matrix

Project Activity	Potential Impact	Impact Type	Affected Receptors
Site clearing	Loss of agricultural land	Negative	Farmers
Construction	Job creation	Positive	Local communities
Traffic increase	Road safety risks	Negative	Road users
Mining operations	Income generation	Positive	Workforce
In-migration	Pressure on services	Negative	Communities
Procurement	Business growth	Positive	Local SMMEs

4.4 Impact Assessment Methodology

4.4.1 Assessment Criteria

Impacts were assessed using standard criteria including nature, extent, duration, magnitude, and probability.

Table 10**:** Impact Assessment Criteria

Criteria	Description	Rating Scale
Nature	Positive or negative	+ / -
Extent	Area affected	Site to National
Duration	Time period	Short to Permanent
Magnitude	Degree of change	Low to High
Probability	Likelihood	Improbable to Definite
Reversibility	Can impact be reversed	Yes / No
Significance	Overall importance	Low / Medium / High

4.4.2 Significance Rating Approach

Impact significance is determined by combining magnitude and probability.

Table 11: Impact Significance Rating Matrix

Magnitude ↓ / Probability →	Improbable	Possible	Probable	Definite
Low	Low	Low	Medium	Medium
Medium	Low	Medium	Medium	High
High	Medium	Medium	High	High

Table 12: Significance Interpretation Scale

Significance Level	Description
Low	Minimal impact
Medium	Requires mitigation
High	Significant impact

4.5 Receptor Sensitivity

Socio-economic receptors were classified based on their vulnerability and ability to respond to change.

Table 13: Socio-Economic Receptor Sensitivity Classification

Receptor Type	Sensitivity Level	Justification
Farm dwellers	High	Dependence on land
Communities	High	Vulnerable to change
Road users	Medium	Exposure to risk
Tourism operators	High	Sensitive to impacts
Businesses	Medium	Economic shifts
Vulnerable groups	High	Limited resilience

4.6 Impact Typology

Impacts were categorised based on their nature and origin.

Table 14: Impact Type Classification

Impact Type	Description	Example
Direct	Immediate impact	Employment
Indirect	Secondary effect	Service demand
Induced	Economic ripple	Spending
Cumulative	Combined impacts	Multiple projects

4.7 Mitigation Approach

Mitigation follows the standard hierarchy to manage impacts effectively.

Table 15: Mitigation Hierarchy Framework

Step	Description	Application
Avoid	Prevent impact	Avoid sensitive areas

Minimise	Reduce impact	Dust control
Rehabilitate	Restore	Land rehabilitation
Offset	Compensate	Community projects

4.8 Confidence and Limitations

4.8.1 Confidence Level

The level of confidence in the assessment is based on data quality and availability.

Table 16: Confidence Level Assessment

Level	Description
High	Strong data
Medium	Moderate data
Low	Limited data

4.8.2 Limitations of Study

The assessment is subject to certain limitations.

Table 17: Limitations of Study

Limitation	Implication
Limited field data	Reduced detail
Secondary data reliance	Possible outdated info
Changing conditions	Dynamic environment
Project changes	May affect outcomes

The methodology applied ensures a structured, transparent, and defensible assessment of socio-economic impacts. The integration of data sources, impact identification, and significance rating provides a robust framework for evaluating the potential implications of the proposed development.

5. BASELINE SOCIO-ECONOMIC ENVIRONMENT

5.1 Introduction

This section provides an overview of the existing socio-economic conditions within the study area prior to the implementation of the proposed mining development. The baseline environment serves as a reference point against which potential impacts are assessed.

The study area falls within the Thabazimbi Local Municipality, under the Waterberg District Municipality. The region is characterised by a mixed economy dominated by mining, agriculture, and tourism activities, with varying levels of access to services and infrastructure.

5.2 Regional Context

The Waterberg District Municipality is a key economic region within Limpopo Province, driven largely by mining and agricultural activities. The district is also known for its biodiversity and tourism potential, including game reserves and eco-tourism facilities.

The Thabazimbi Local Municipality is strategically located along key transport routes and has historically developed around mining activities, particularly iron ore extraction.

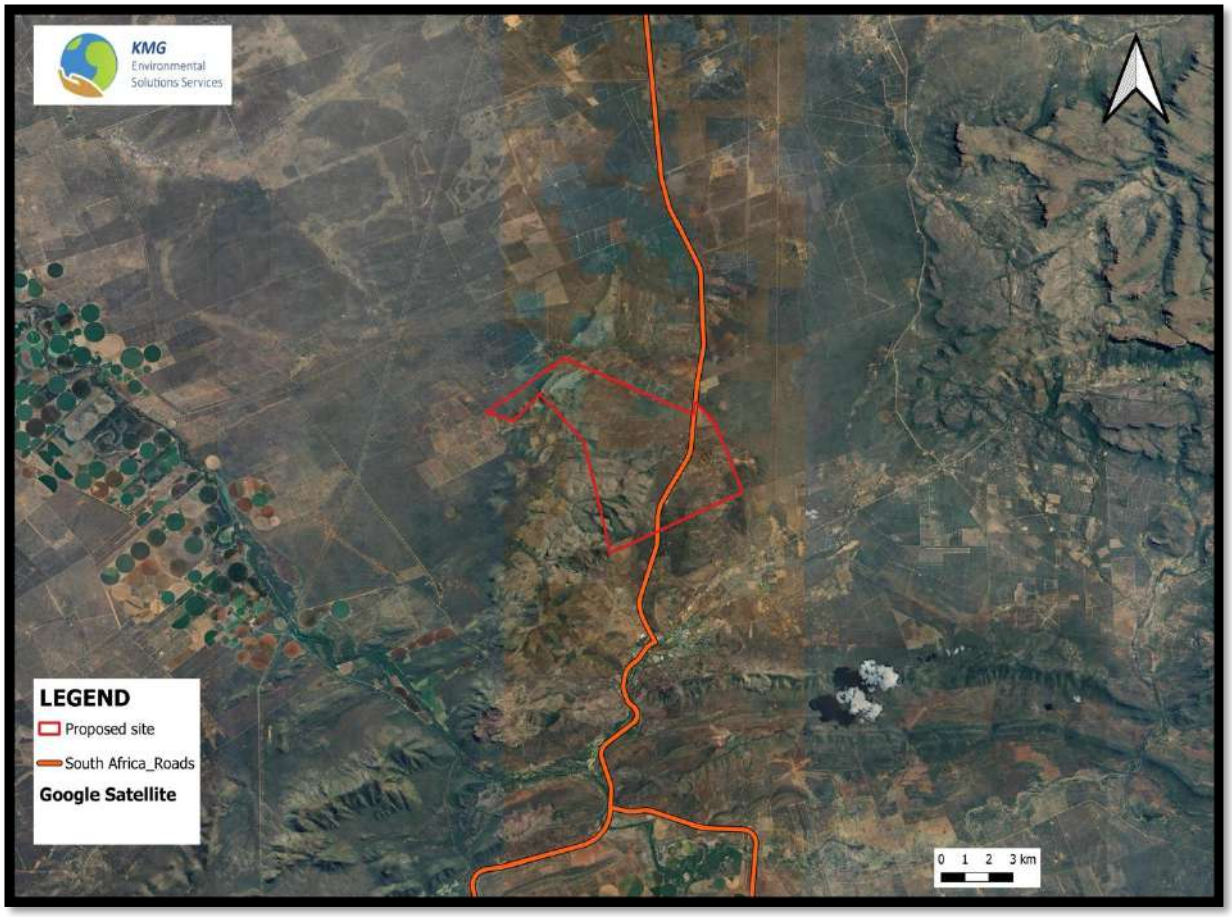

Figure 9**:** Locality Map Showing Project Area

5.3 Demographic Profile

The study area reflects a predominantly rural population with a mixture of farm dwellers and small settlements.

Table 18**:** Population and Demographic Overview

Indicator	**Description**
Population Size	Moderate population within municipal jurisdiction
Growth Rate	Stable to moderate growth
Age Distribution	Youth-dominated population
Household Size	Medium to large households

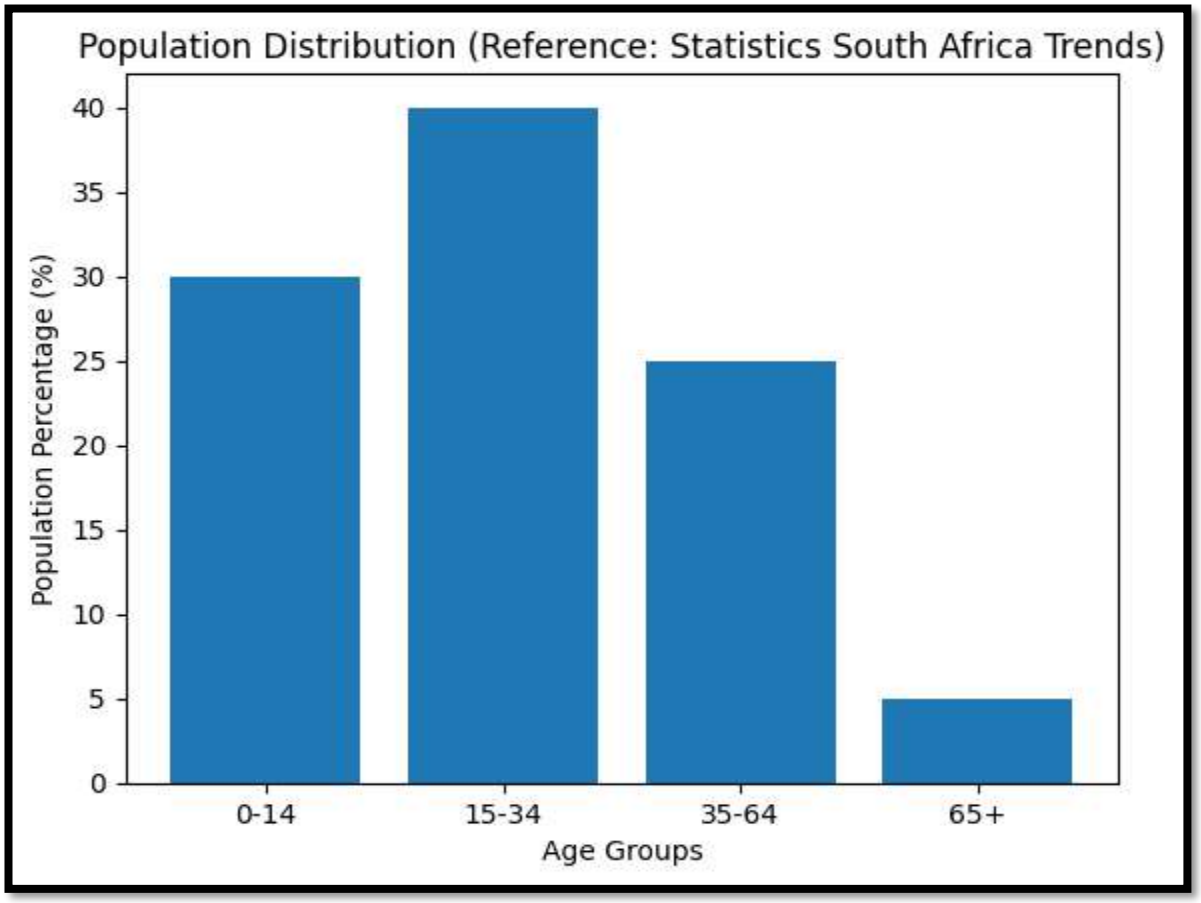

Figure 10**:** Age Structure (Population Pyramid) for Thabazimbi Local Municipality, adapted from Statistics South Africa Census 2022 Graph

The population distribution within the study area reflects a predominantly youthful demographic structure, consistent with trends reported by Statistics South Africa. The largest proportion of the population falls within the economically active age group (15–34 years), indicating a strong potential labour force. However, this also highlights the need for employment opportunities to absorb this segment of the population.

The relatively high proportion of individuals aged 0–14 further suggests future growth in labour supply, while the smaller elderly population (65+) indicates lower dependency ratios compared to developed regions.

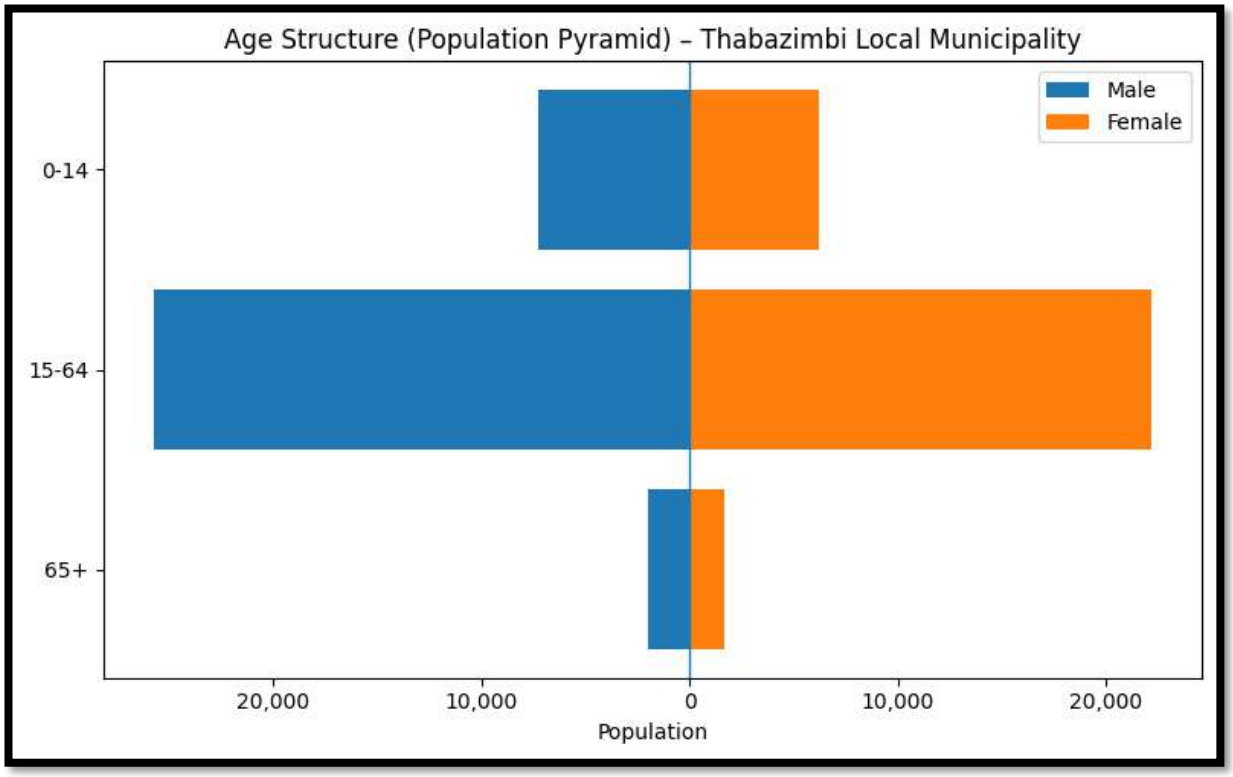

Figure 11**:** Economic Sector Contribution in Thabazimbi Local Municipality (Adapted from Statistics South Africa and Municipal IDP Trends)

The age structure indicates that Thabazimbi Local Municipality is dominated by the economically active population group aged 15–64 years, which accounts for 73.7% of the municipal population. Children aged 0–14 years account for 20.7%, while the elderly population aged 65 years and above accounts for 5.6%. The pyramid also reflects a male-skewed population structure, consistent with the municipality's reported sex ratio of approximately 116 males per 100 females, which is characteristic of mining-influenced local economies.

This population pyramid is a broad-age-group adaptation based on official Census 2022 age structure data for Thabazimbi Local Municipality and the municipal sex ratio reported by Statistics South Africa.

5.4 Employment and Economic Profile

The economy of the Thabazimbi Local Municipality is characterised by a strong reliance on **mining**, supported by **agriculture**, **tourism**, and a growing **service sector**. The presence of

established industry players significantly influences employment patterns, income levels, and regional economic stability.

Figure 12: Employment by Sector

Sector	Contribution	Employment Level
Mining	High	High
Agriculture	Moderate	Moderate
Tourism	Moderate	Moderate
Informal Sector	Low to Moderate	Moderate

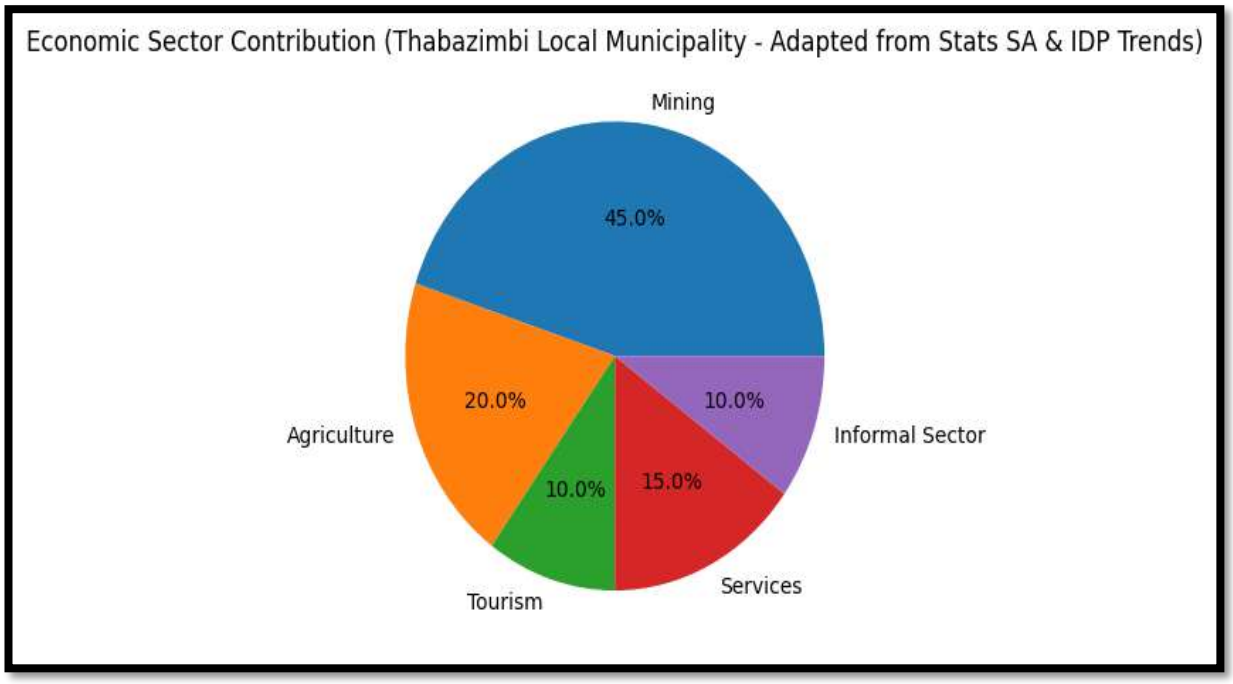

Figure 13**:** Economic Sector Contribution in Thabazimbi Local Municipality (Adapted from Statistics South Africa and Municipal IDP Trends) Chart

The economic structure of the Thabazimbi Local Municipality is strongly dominated by the mining sector, which contributes the largest share to local economic activity. Agriculture remains a significant contributor, supporting livelihoods through livestock farming and crop production.

Tourism and services sectors contribute moderately to the local economy, reflecting the presence of lodges, game farms, and small businesses. The informal sector also plays a role in sustaining household income, particularly among lower-income groups.

This economic profile highlights the region's dependence on resource-based industries, while also indicating opportunities for diversification through local economic development initiatives.

Unemployment levels remain relatively high, particularly among youth and unskilled individuals.

The economic structure of Thabazimbi is heavily resource-dependent, with mining acting as the primary economic engine. Agriculture and tourism provide important complementary roles, particularly for rural livelihoods and economic diversification.

However, this structure presents:

- Opportunities**:** Job creation, local economic development, infrastructure growth
- Risks**:** Over-dependence on mining, environmental degradation, pressure on services

This context is critical in assessing the socio-economic impacts of the proposed development, particularly in relation to employment, land use, and community well-being.

5.4.1 Mining Sector

Mining remains the dominant economic driver in the study area, contributing substantially to employment, local procurement, and infrastructure development.

Key Mining Operators in and around Thabazimbi:

- Exxaro Resources (Grootegeluk Coal Mine – Lephalale area, regional influence)
- ArcelorMittal South Africa (Thabazimbi Iron Ore Mine – historically significant)
- Northam Platinum (Zondereinde Mine – major regional employer)
- Anglo American Platinum (Amandelbult Complex – broader district influence)

Socio-Economic Influence:

- High levels of formal employment opportunities
- Attraction of skilled and semi-skilled labour (in-migration)
- Stimulation of secondary industries (transport, construction, services)
- Pressure on housing, healthcare, and municipal infrastructure

5.4.2 Agricultural Sector

Agriculture plays a critical role in sustaining rural livelihoods**,** particularly among farm dwellers and small-scale farmers.

Key Agricultural Activities and Players:

- Commercial cattle farming enterprises (dominant land use)
- Game farming and private reserves
- Crop production (limited due to climatic constraints)
- ZZ2 (regional agricultural influence in Limpopo)
- Local commercial farms supplying beef and game products

Socio-Economic Influence:

- Supports household income and food security
- Provides seasonal and permanent employment
- Contributes to informal and subsistence economies
- Vulnerable to land-use change and environmental degradation

5.4.3 Tourism Sector

Tourism is a **growing sector**, supported by the natural environment, wildlife, and proximity to major conservation areas.

Key Tourism Nodes and Operators:

- Marakele National Park
- Waterberg Biosphere Reserve
- Private lodges, guesthouses, and eco-tourism facilities

- Hunting farms and game lodges catering to domestic and international tourists

Socio-Economic Influence:

- Creation of hospitality and service jobs
- Support for local SMMEs (crafts, guiding services, catering)
- Enhancement of local economic diversification
- Sensitivity to visual, noise, and environmental impacts

5.4.4 Service and Informal Sector

The service sector supports both residents and industries, while the informal sector provides essential economic resilience.

Key Activities:

- Retail (shops, fuel stations, small businesses)
- Transport and logistics services linked to mining
- Informal trading (street vendors, small-scale services)

Socio-Economic Influence:

- Provides livelihood opportunities for low-income households
- Acts as a buffer against unemployment
- Highly sensitive to economic fluctuations in mining sector

5.5 Household Income and Poverty

Income levels within the study area vary significantly, with a large portion of households relying on low-income sources and social grants.

Table 19: Household Income Distribution

Income Category	Description
Low Income	Majority of households
Middle Income	Limited proportion
High Income	Small proportion

Key observations include:

- High dependency on social grants;
- Limited access to formal employment opportunities;
- Economic vulnerability among rural households.

5.6 Education and Skills Profile

Education within the Thabazimbi Local Municipality plays a critical role in shaping the local labour force, influencing employability, and supporting long-term socio-economic development. The area is served by a range of primary, secondary, and tertiary education institutions**,** although access to higher education remains limited within the immediate locality.

Education levels in the study area vary, with a significant portion of the population having basic or secondary education.

Table 20: Education Levels

Education Level	**Description**
No Schooling	Present in rural areas
Primary Education	Common
Secondary Education	Majority
Tertiary Education	Limited

This indicates a need for skills development initiatives to support employment opportunities associated with the project.

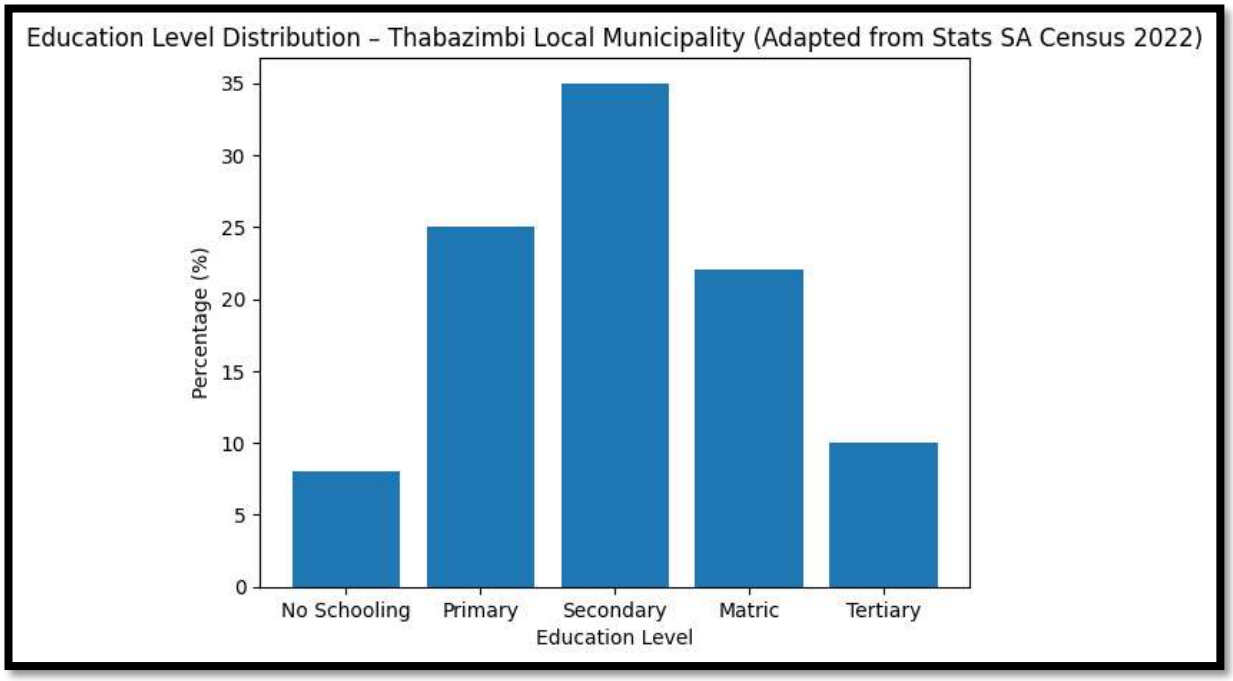

Figure 14 :Education Level Distribution in Thabazimbi Local Municipality (Adapted from Statistics South Africa Census 2022 Data)

The education profile of Thabazimbi Local Municipality indicates that the majority of the population has attained **secondary-level education**, followed by primary and matric-level qualifications. A relatively smaller proportion of the population has completed **tertiary education**, while a notable segment still has limited or no formal schooling.

This distribution reflects a **moderately skilled labour force**, with strong availability of semi-skilled workers suited for sectors such as mining, agriculture, and services. However, the comparatively low proportion of tertiary qualifications highlights constraints in accessing higher education and specialised skills within the local context.

The presence of institutions such as Waterberg TVET College Thabazimbi Campus plays a critical role in bridging this gap by providing vocational and technical training aligned with industry needs.

5.6.1 Primary Education Facilities

Primary schools are distributed across Thabazimbi town and surrounding rural/farming areas, providing foundational education to local communities.

Key Primary Schools in and around Thabazimbi:

- Laerskool Thabazimbi
- Thabazimbi Primary School
- Koedoeskop Primary School
- Regorogile Primary School
- Farm and rural-based primary schools serving dispersed communities

Key Observations:

- Broad access at primary level
- Rural schools often face resource constraints
- Transport challenges for farm dwellers and remote households

5.6.2 Secondary Education Facilities

Secondary schools provide access to higher grades and are critical in preparing learners for employment or further education.

Key Secondary Schools:

- Frikkie Meyer High School
- Thabazimbi High School
- Regorogile Secondary School
- Koedoeskop Secondary School

Key Observations:

- Availability of secondary education within reasonable proximity
- Challenges include:
    - Limited subject offerings (e.g., STEM fields)
    - Dropout rates linked to socio-economic pressures
    - Variable quality of infrastructure and teaching resources

5.6.3 Tertiary Education and Skills Development

Contrary to many rural municipalities, Thabazimbi does have local access to vocational training**,** which strengthens the local skills base.

Local and Regional Tertiary Institutions:

- Waterberg TVET College Thabazimbi Campus *(Located within Thabazimbi)*
- Waterberg TVET College (other campuses in Lephalale & Mokopane)
- University of Limpopo
- UNISA

Skills Development Drivers:

- Mining houses such as:
    - Exxaro Resources
    - Northam Platinum
- Provide:
    - Learnerships
    - Apprenticeships (artisans)
    - Bursaries and internship programmes

Key Advantage:

The presence of Waterberg TVET College (Thabazimbi Campus**)** significantly enhances:

- Access to technical and vocational education
- Development of locally employable skills
- Alignment with mining and industrial labour demands

5.6.4 Socio-Economic Implications

The education profile of the area has several implications:

Positive Aspects:

- Strong foundation education system (primary & secondary)

- Local access to TVET training (critical advantage)
- Industry-supported skills development pathways
- Opportunities for youth employment integration

Challenges:

- Limited local access to University - higher education institutions
- Skills mismatch between education output and labour market demand
- Barriers such as:
    - Transport costs
    - Financial constraints
    - Limited career guidance

5.6.5 Key Interpretation

The education profile of Thabazimbi reflects a developing but strategically positioned system**,** with a notable strength in vocational training through the local TVET college.

This creates:

- A pipeline of semi-skilled and skilled labour
- Opportunities for local employment uptake
- A strong foundation for project-related job creation

However, sustained development will require:

- Improved education quality and access in rural areas
- Strengthening industry-education linkages
- Expansion of higher education opportunities

5.7 Infrastructure and Service Delivery

Access to infrastructure and services is variable across the study area.

Table 21: Access to Services

Service	Level of Access	Comments

Water Supply	Moderate	Boreholes and municipal supply
Electricity	Moderate to High	Grid connections present
Sanitation	Moderate	Mix of systems
Roads	Moderate	Gravel and tar roads
Healthcare	Limited	Clinics available
Education Facilities	Moderate	Schools within region

5.8 Land Use and Livelihoods

The dominant land uses within the study area include:

- Agricultural activities (livestock grazing and farming);
- Tourism (lodges and accommodation facilities);
- Mining and prospecting activities.

These land uses represent key socio-economic activities and are considered sensitive to potential project impacts.

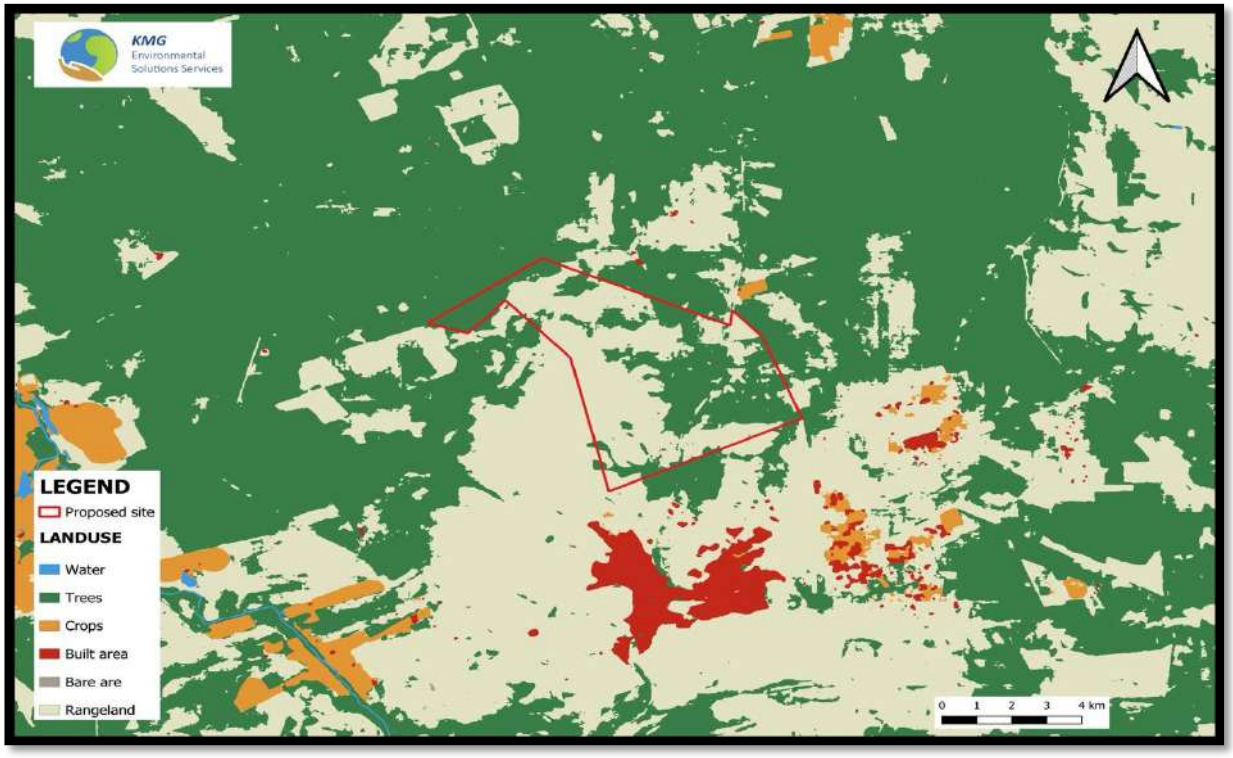

Figure 15: Land Use Map

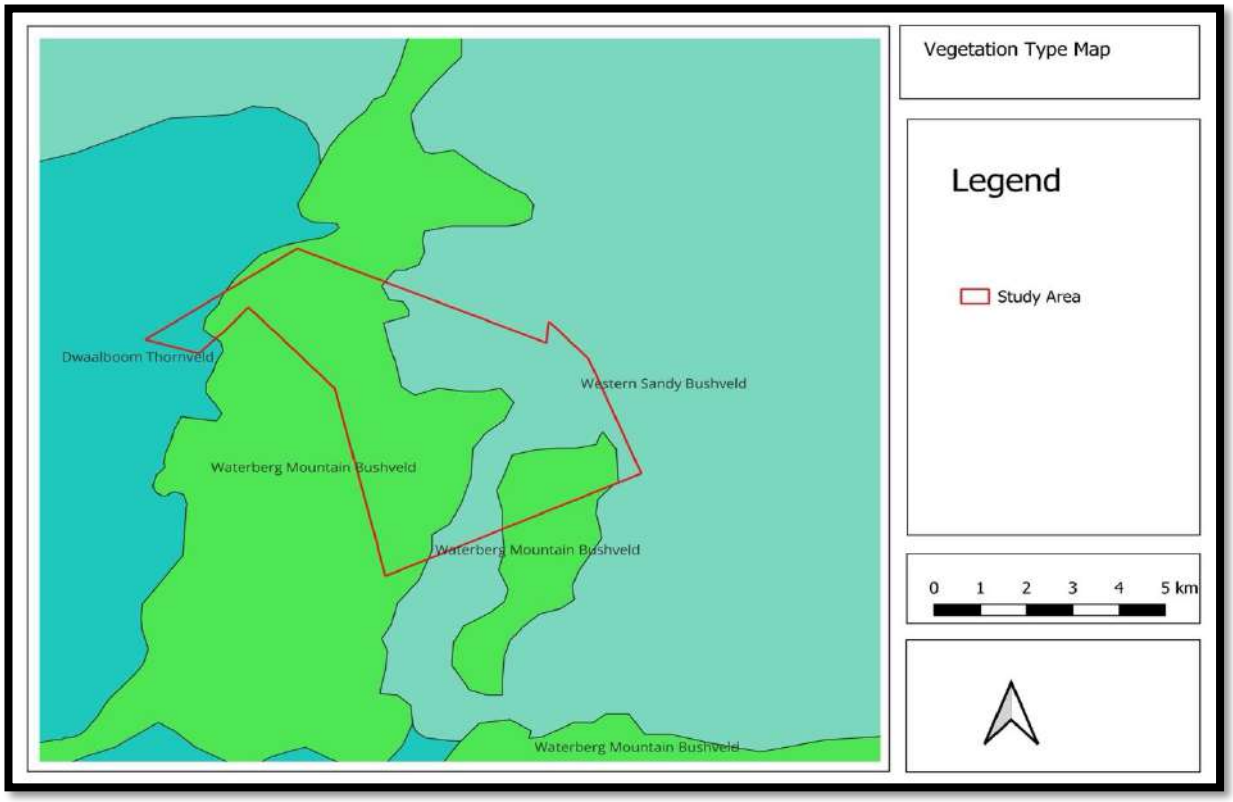

Figure 16: Vegetation Map

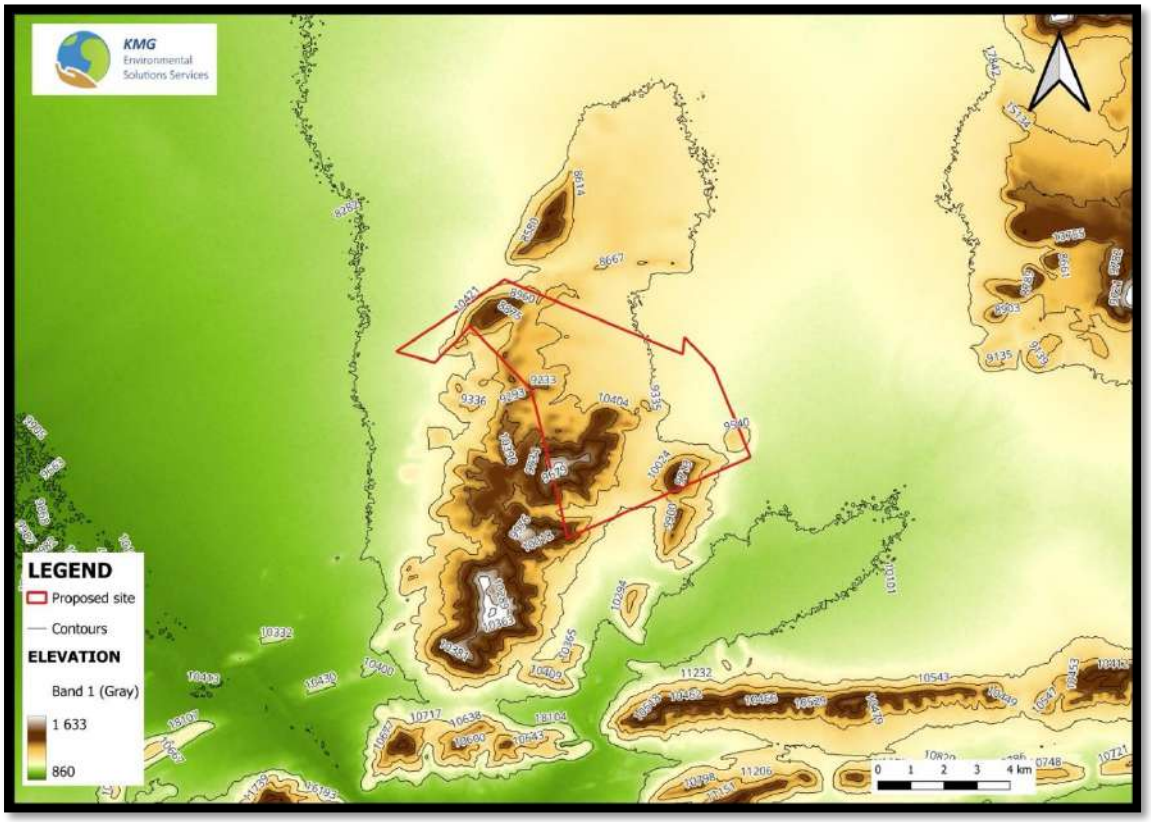

Figure 17: Contour Map

5.9 Sensitive Socio-Economic Receptors

Key receptors within the study area include:

- Farm dwellers and rural households;
- Road users along access routes;
- Tourism establishments and accommodation facilities;
- Agricultural operators.

These receptors are particularly sensitive to changes in land use, environmental quality, and economic conditions.

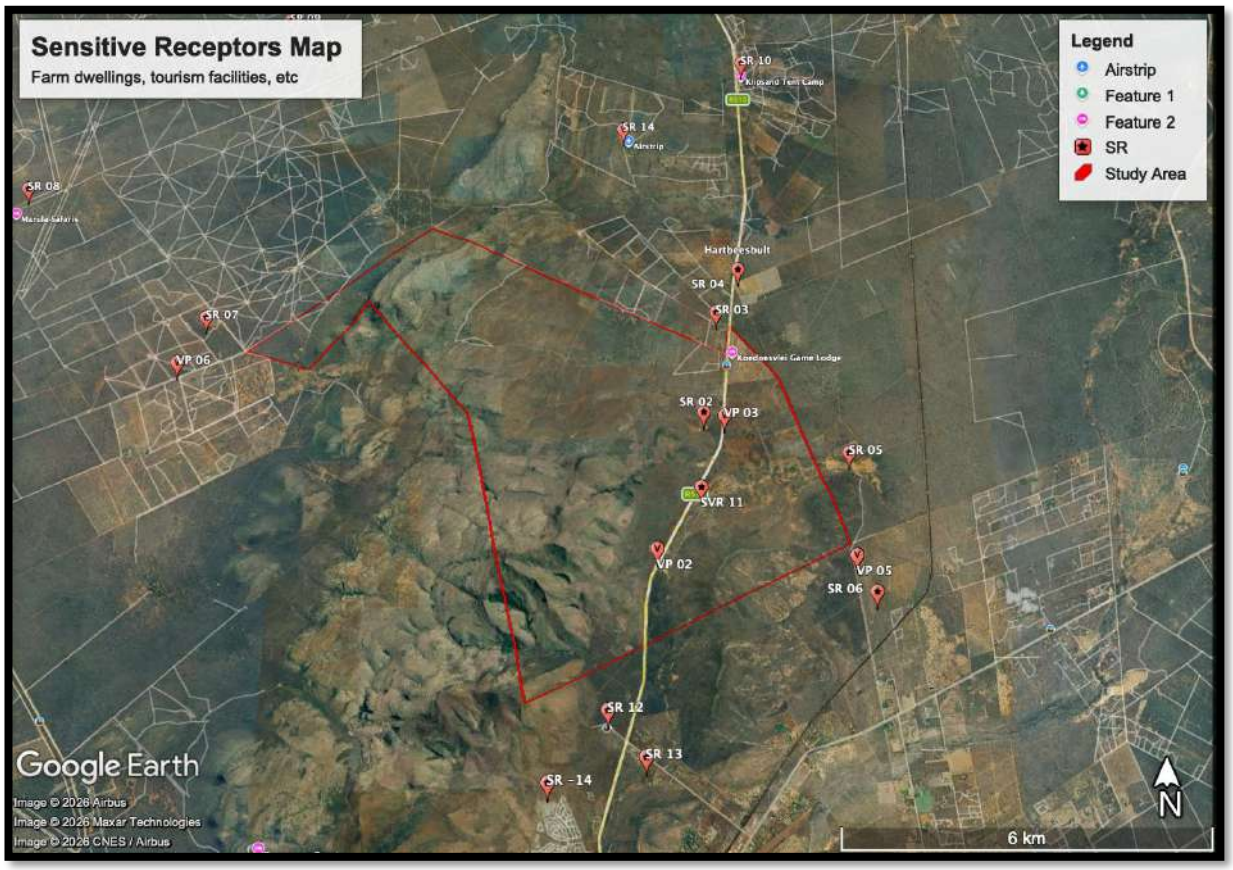

Figure 18: Sensitive Receptors Map

5.10 Site-Specific Baseline (Field Observations)

Field verification was undertaken to assess current conditions within the project area. Observations indicate:

- Predominantly agricultural land use with grazing activities;
- Presence of farm dwellings in proximity to the site;
- Existing road infrastructure used for local access;
- Relatively undisturbed visual landscape with natural vegetation.

Figure 19**:** View towards proposed mining area

Figure 20**:** Farm dwelling near project site

Figure 21**:** Access road conditions

Figure 22**:** Grazing land within study area

5.11 Key Socio-Economic Issues Identified

The following key issues were identified:

- High unemployment and limited economic opportunities;
- Dependence on agriculture and natural resources;
- Sensitivity of tourism activities to environmental change;
- Pressure on infrastructure and services;
- Vulnerability of rural communities.

5.12 Key Interpretation

The baseline socio-economic environment reflects a region with both economic potential and vulnerability. While mining presents opportunities for employment and economic growth, existing land uses such as agriculture and tourism are sensitive to change.

The findings highlight the importance of carefully managing socio-economic impacts to ensure that benefits are maximised while negative effects are minimised.

6. SOCIO-ECONOMIC IMPACT ASSESSMENT

6.1 Introduction

This section presents a detailed assessment of the potential socio-economic impacts associated with the proposed development within the Thabazimbi Local Municipality, Limpopo Province. The assessment evaluates both positive and negative impacts across the construction, operational, and closure phases of the project.

The analysis focuses on key socio-economic receptors, including tourism, farm dwellers, agricultural land, game farming enterprises, local businesses, and community well-being. The assessment is informed by the baseline conditions outlined in Section 5 and follows the methodology presented in Section 4.

6.2 Summary of Key Socio-Economic Impacts

Table 22 : Key Socio-Economic Impacts

Impact Category	Impact Description	Impact Type	Project Phase
Employment	Job creation and income generation	Positive	Construction & Operation
In-migration	Population influx and service pressure	Negative	Construction
Agriculture	Loss of productive land	Negative	Construction & Operation

Tourism	Visual and environmental disturbance	Negative	Operation
Farm Dwellers	Livelihood disruption	Negative	All phases
Local Economy	Business opportunities	Positive	Operation
Infrastructure	Pressure on roads and services	Negative	Construction
Safety	Traffic and road risks	Negative	Construction
Skills Development	Capacity building	Positive	Operation

6.3 Impact Assessment by Receptor

6.3.1 Employment and Local Economic Development

Description:

The project is expected to generate employment opportunities and stimulate the local economy through direct, indirect, and induced economic activities.

Criteria	Rating
Nature	Positive
Extent	Local to Regional
Duration	Medium to Long-term
Magnitude	Medium
Probability	High
Significance	Medium–High (Positive)

Discussion:

- Creation of jobs during construction and operation
- Increased household income
- Opportunities for local SMMEs and suppliers
- Economic multiplier effects across sectors

Mitigation / Enhancement:

- Prioritise local labour recruitment

- Implement skills development programmes
- Promote local procurement

6.3.2 Farm Dwellers and Rural Livelihoods

Description:

Farm dwellers rely on land for grazing, subsistence farming, and informal livelihoods, which may be affected by the development.

Criteria	Rating
Nature	Negative
Extent	Local
Duration	Long-term
Magnitude	Medium–High
Probability	High
Significance	High

Discussion:

- Loss of grazing land
- Reduced access to natural resources
- Increased vulnerability of rural households

Mitigation:

- Compensation for land use impacts
- Provision of alternative grazing areas
- Livelihood restoration programmes
- Ongoing stakeholder engagement

6.3.3 Agricultural Land and Productivity

Description:

The development may result in the loss or degradation of agricultural land used for livestock and crop production.

Criteria	Rating
Nature	Negative
Extent	Local
Duration	Long-term
Magnitude	Medium
Probability	High
Significance	Medium–High

Discussion:

- Reduction in grazing and arable land
- Soil degradation and dust impacts
- Impacts on food production

Mitigation:

- Avoid high-value agricultural land
- Implement soil management measures
- Establish buffer zones
- Progressive rehabilitation

6.3.4 Game Farming and Wildlife-Based Enterprises

Description:

Game farms are sensitive to disturbance, noise, and habitat fragmentation.

Criteria	Rating
Nature	Negative
Extent	Local to Regional
Duration	Long-term
Magnitude	Medium
Probability	High
Significance	Medium–High

Discussion:

- Disturbance to wildlife
- Reduced attractiveness for hunting and eco-tourism
- Potential decline in revenue

Mitigation:

- Maintain ecological corridors
- Control noise and disturbance
- Implement biodiversity monitoring

6.3.5 Tourism and Accommodation Sector

Description:

Tourism depends on environmental quality, visual appeal, and tranquillity.

Criteria	Rating
Nature	Negative
Extent	Local to Regional
Duration	Long-term
Magnitude	Medium
Probability	Medium–High
Significance	Medium–High

Discussion:

- Visual impacts on landscape
- Noise and dust affecting visitor experience
- Potential decline in tourism activities

Mitigation:

- Visual screening and landscaping
- Maintain buffer zones
- Dust and noise control measures

6.3.6 Infrastructure and Service Delivery

Description:

The project may increase pressure on roads, water supply, housing, and social services.

Criteria	Rating
Nature	Negative
Extent	Local
Duration	Medium-term
Magnitude	Medium
Probability	High
Significance	Medium

Discussion:

- Increased traffic and road deterioration
- Pressure on municipal services
- Increased demand for housing

Mitigation:

- Road maintenance and upgrades
- Traffic management plans
- Support municipal infrastructure planning

6.3.7 Community Well-being and Social Dynamics

Description:

The development may influence social cohesion, safety, and community dynamics.

Criteria	Rating
Nature	Mixed
Extent	Local
Duration	Long-term
Magnitude	Medium
Probability	High

Significance	Medium

Discussion:

- Positive: income generation and development
- Negative: increased crime risk, social conflict, in-migration pressure

Mitigation:

- Community engagement programmes
- Support local safety initiatives
- Social investment programmes

6.4 Cumulative Impacts

Aspect	Cumulative Effect
Mining	Increased regional pressure
Infrastructure	Overloading of services
Environment	Increased degradation risk
Communities	Socio-economic stress

6.5 Key Interpretation

The proposed development presents a combination of positive and negative socio-economic impacts.

Positive Impacts:

- Employment creation
- Economic growth
- Skills development

Negative Impacts:

- Loss of agricultural land
- Impacts on farm dwellers

- Tourism and visual impacts
- Pressure on infrastructure

Overall, the project is economically beneficial but requires effective mitigation to manage social and environmental risks.

With appropriate mitigation measures, most socio-economic impacts can be reduced to acceptable levels. However, certain impacts, particularly those related to land use change and rural livelihoods, may be long-term and partially irreversible. Continuous monitoring and stakeholder engagement will be critical to ensure sustainable outcomes.

The table below provides a consolidated summary of all identified socio-economic impacts associated with the proposed development. It reflects the significance of impacts **before and after mitigation**, enabling a clear understanding of residual effects.

Table 23: Consolidated Socio-Economic Impact Assessment Summary

Impact	Receptor	Nature	Extent	Duration	Magnitude	Probability	Significance (Pre-Mitigation)	Mitigation Measures	Significance (Post-Mitigation)
Employment creation	Local communities	Positive	Local–Regional	Medium–Long term	Medium	High	Medium–High (+)	Local hiring, skills training	High (+)
Local economic growth	Businesses / SMMEs	Positive	Local	Long-term	Medium	High	Medium–High (+)	Local procurement policies	High (+)
In-migration	Local communities	Negative	Local	Short–Medium term	Medium	High	Medium–High	Workforce management plans	Medium
Pressure on infrastructure	Municipality	Negative	Local	Medium-term	Medium	High	Medium	Infrastructure planning support	Low–Medium
Traffic and road safety	Road users	Negative	Local	Short-term	Medium	High	Medium–High	Traffic management plan	Medium

Loss of agricultural land	Farmers	Negative	Local	Long-term	Medium	High	Medium–High	Avoidance, buffers, rehabilitation	Medium
Impact on farm dwellers	Rural households	Negative	Local	Long-term	High	High	High	Compensation, livelihood restoration	Medium–High
Impact on game farming	Game farms	Negative	Local–Regional	Long-term	Medium	High	Medium–High	Biodiversity management, buffers	Medium
Impact on tourism	Lodges / tourism operators	Negative	Local–Regional	Long-term	Medium	Medium–High	Medium–High	Visual screening, dust control	Medium
Skills development	Local workforce	Positive	Local	Long-term	Medium	High	Medium (+)	Training programmes	High (+)
Community well-being	Local communities	Mixed	Local	Long-term	Medium	High	Medium	Social programmes	Low–Medium
Cumulative impacts	All receptors	Negative	Regional	Long-term	Medium–High	High	High	Integrated planning	Medium–High

Key Interpretation

- **Positive impacts** such as employment, skills development, and local economic growth are expected to have high residual significance, particularly with enhancement measures in place.
- **Negative impacts** related to land use, farm dwellers, tourism, and infrastructure can be reduced to medium or acceptable levels**,** provided mitigation measures are effectively implemented.
- Certain impacts, particularly those affecting rural livelihoods and land use, remain partially irreversible despite mitigation.
- **Cumulative impacts** remain a concern in the region due to ongoing and proposed mining activities.

The overall socio-economic impact profile of the proposed development is **moderately positive**, with significant economic benefits. However, careful management is required to minimise adverse impacts on vulnerable groups, agriculture, and tourism-related activities.

7. MITIGATION MEASURES AND MANAGEMENT PLAN

7.1 Introduction

This section outlines the **mitigation and management measures** required to address the identified socio-economic impacts associated with the proposed development. The measures are aligned with the **mitigation hierarchy** (avoid, minimise, rehabilitate, offset) and aim to enhance positive impacts while reducing negative impacts to acceptable levels.

7.2 Mitigation and Management Framework

The mitigation approach focuses on:

- Avoiding impacts where possible
- Minimising unavoidable impacts
- Restoring affected environments and livelihoods
- Enhancing positive socio-economic benefits

7.3 Detailed Mitigation and Management Plan

Table 24: Socio-Economic Mitigation and Management Plan

Impact	**Mitigation / Management Measure**	**Responsibility**	**Timeframe**	**Monitoring Indicator**
Employment creation	Prioritise local employment (minimum % target)	Developer / Contractor	Construction & Operation	% of local employees
Skills development	Implement training and learnership programmes	Developer	Operation	Number of trainees

Local economic development	Promote local procurement and SMME participation	Developer	All phases	% of local procurement
In-migration	Develop workforce accommodation plan	Developer	Construction	Workforce origin records
Infrastructure pressure	Coordinate with municipality on service capacity	Developer / Municipality	Construction	Service capacity reports
Traffic impacts	Implement traffic management plan	Contractor	Construction	Traffic incidents recorded
Agricultural land loss	Avoid high-value land, implement buffers	Developer	Planning & Construction	Area of land affected
Soil degradation	Implement soil management and rehabilitation	Contractor	Construction & Closure	Rehabilitation success rate
Farm dweller impacts	Compensation and livelihood restoration	Developer	Pre-construction	Compensation records
Game farming impacts	Maintain ecological buffers and corridors	Developer	Operation	Wildlife monitoring results
Tourism impacts	Visual screening, dust suppression	Developer	Construction & Operation	Complaints / visual audits
Community well-being	Community engagement and CSR programmes	Developer	All phases	Number of engagements
Safety and security	Support local safety initiatives	Developer	Operation	Crime statistics

Cumulative impacts	Integrated planning with other developments	Developer	All phases	Coordination records

7.4 Monitoring and Reporting

A monitoring programme will be implemented to track the effectiveness of mitigation measures and ensure compliance.

Key Monitoring Actions:

- Regular environmental and social audits
- Monitoring of employment and procurement targets
- Tracking of community complaints and grievances
- Periodic reporting to authorities and stakeholders

7.5 Institutional Arrangements

The successful implementation of the mitigation plan requires clear roles and responsibilities:

- **Developer:** Overall implementation and compliance
- **Contractors:** On-site execution of mitigation measures
- **Environmental Control Officer (ECO):** Monitoring and reporting
- **Local Municipality:** Coordination on infrastructure and services

7.6 Grievance Mechanism

A formal grievance mechanism will be established to allow affected parties to raise concerns.

Process Includes:

- Submission of complaints (verbal or written)
- Recording and tracking of grievances
- Investigation and resolution within defined timeframes
- Feedback to complainants

7.7 Key Interpretation

The implementation of the mitigation and management plan will significantly reduce negative socio-economic impacts and enhance project benefits. The success of this plan depends on:

- Effective stakeholder engagement
- Continuous monitoring and adaptive management
- Strong institutional coordination

With the implementation of the proposed mitigation measures, the socio-economic impacts of the project can be managed to acceptable levels. The project has the potential to contribute positively to local economic development, provided that risks to vulnerable groups and sensitive sectors such as agriculture and tourism are carefully managed.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PROGRAMME (ESMP) – SOCIO-ECONOMIC COMPONENT

8.1 Introduction

This section presents the **Environmental and Social Management Programme (ESMP)** for the socio-economic aspects of the proposed development. The ESMP provides a structured framework to ensure that all mitigation measures identified in Section 7 are **effectively implemented, monitored, and reported** throughout the project lifecycle.

8.2 Objectives of the ESMP

The key objectives of the ESMP are to:

- Ensure compliance with applicable legislation and best practice
- Minimise negative socio-economic impacts
- Enhance positive socio-economic benefits
- Promote sustainable development within the project area
- Provide clear guidance on implementation, monitoring, and reporting

8.3 ESMP Implementation Framework

The ESMP will be implemented across all project phases:

Project Phase	Focus Areas
Pre-Construction	Planning, stakeholder engagement, compensation
Construction	Employment, traffic, community impacts
Operation	Economic benefits, long-term impacts
Closure	Rehabilitation, livelihood restoration

8.4 Detailed ESMP Action Plan

Table 25: Socio-Economic ESMP Action Plan

Aspect	Action	Responsibility	Timing	Monitoring Indicator	Frequency
Employment	Recruit local workforce	Developer / Contractor	Construction & Operation	% local employment	Monthly
Skills Development	Provide training programmes	Developer	Operation	Number trained	Quarterly
Local Procurement	Source goods/services locally	Developer	All phases	% local procurement	Quarterly
Community Engagement	Conduct stakeholder meetings	Developer / ECO	All phases	Meeting records	Monthly
Grievance Mechanism	Maintain grievance register	ECO	All phases	Number of complaints resolved	Monthly

Traffic Management	Implement traffic control measures	Contractor	Construction	Traffic incidents	Weekly
Infrastructure	Coordinate with municipality	Developer	Construction	Service reports	Quarterly
Agriculture	Protect and rehabilitate soil	Contractor	Construction & Closure	Rehabilitation success	Quarterly
Farm Dwellers	Compensation and support programmes	Developer	Pre-construction	Compensation records	Once-off / Ongoing
Tourism	Implement visual and dust mitigation	Developer	Construction & Operation	Complaints / audits	Monthly
Game Farming	Maintain buffer zones	Developer	Operation	Wildlife monitoring	Quarterly
Safety	Support community safety initiatives	Developer	Operation	Safety reports	Quarterly

8.5 Monitoring and Performance Indicators

The following key indicators will be used to assess ESMP performance:

- Percentage of local employment achieved
- Number of community engagements conducted
- Number and resolution rate of grievances
- Compliance with traffic and safety measures
- Effectiveness of rehabilitation and land restoration
- Level of local procurement participation

8.6 Reporting Requirements

- Monthly internal monitoring reports
- Quarterly compliance reports
- Annual environmental and social performance reports
- Reporting to relevant authorities as required

8.7 Auditing and Review

- Independent audits will be conducted periodically
- ESMP to be reviewed and updated based on monitoring results
- Adaptive management approach to address emerging issues

8.8 Non-Compliance and Corrective Action

In cases of non-compliance:

- Immediate corrective actions must be implemented
- Incidents must be recorded and investigated
- Preventative measures must be introduced

8.9 Institutional Responsibilities

Role	Responsibility
Developer	Overall ESMP implementation
Contractor	Day-to-day compliance
Environmental Control Officer (ECO)	Monitoring and reporting
Municipality	Infrastructure coordination
Community Representatives	Stakeholder engagement

The ESMP provides a comprehensive framework to ensure that socio-economic impacts are effectively managed throughout the project lifecycle. Its successful implementation will support sustainable development, enhance local benefits, and minimise risks to communities and sensitive sectors.

9. CONCLUSION AND RECOMMENDATIONS

9.1 Introduction

This section provides the overall conclusions of the Socio-Economic Impact Assessment (SEIA) for the proposed development within the Thabazimbi Local Municipality, Limpopo Province. It synthesises the findings from the baseline assessment, impact assessment, and mitigation measures, and presents key recommendations to guide decision-making.

9.2 Summary of Key Findings

The assessment identified a combination of **positive and negative socio-economic impacts** associated with the proposed project.

Positive Impacts

- Creation of employment opportunities during construction and operation
- Stimulation of the local and regional economy
- Opportunities for local SMMEs and service providers
- Skills development and capacity building for the local workforce

Negative Impacts

- Loss of agricultural and grazing land
- Disruption to farm dwellers and rural livelihoods
- Potential impacts on tourism and game farming activities
- Increased pressure on infrastructure and municipal services
- Social risks associated with in-migration and population influx

9.3 Overall Impact Significance

- The project is expected to have a moderately positive socio-economic contribution at the local and regional scale.
- Negative impacts are largely manageable through mitigation measures**,** although some impacts (e.g., land transformation) may be long-term or irreversible**.**

- Vulnerable groups, particularly farm dwellers and small-scale farmers, require targeted mitigation and support.

9.4 Project Justification

From a socio-economic perspective, the project is considered **justifiable**, based on:

- Its contribution to economic development and employment creation
- Alignment with regional development priorities
- Potential to stimulate local economic growth and infrastructure investment

However, the justification is conditional on the effective implementation of mitigation measures and management plans**.**

9.5 Key Recommendations

To ensure sustainable socio-economic outcomes, the following recommendations are made:

1. Employment and Local Economic Development

- Prioritise local employment and procurement
- Implement structured skills development programmes
- Support local SMMEs and suppliers

2. Protection of Agricultural and Rural Livelihoods

- Avoid high-value agricultural land where possible
- Implement **livelihood restoration plans**
- Provide fair and transparent compensation

3. Tourism and Game Farming Protection

- Maintain visual and environmental quality through mitigation measures
- Establish buffer zones between project infrastructure and sensitive areas
- Engage tourism and game farming stakeholders

4. Infrastructure and Service Management

- Coordinate closely with the local municipality
- Upgrade and maintain access roads
- Manage water, waste, and service demands effectively

5. Social Management and Community Engagement

- Establish ongoing **stakeholder engagement platforms**
- Implement a functional **grievance mechanism**
- Invest in community development initiatives

6. Monitoring and Compliance

- Implement the ESMP in full
- Conduct regular monitoring and reporting
- Apply adaptive management where required

9.6 Final Conclusion

The proposed development has the potential to deliver meaningful socio-economic benefits, particularly in terms of employment and economic growth. However, it also presents notable risks to agriculture, rural livelihoods, tourism, and community well-being**.**

With the implementation of appropriate mitigation measures, management plans, and stakeholder engagement processes, the project can proceed in a manner that is socially acceptable and economically beneficial**,** while minimising adverse impacts.

9.7 Statement of Professional Opinion

Based on the findings of this assessment, it is the professional opinion of the specialist that:

The proposed development can be supported from a socio-economic perspective, provided that all recommended mitigation measures and management actions are implemented and monitored effectively throughout the project lifecycle.

10. REFERENCES

- Republic of South Africa (1998). *National Environmental Management Act (NEMA), Act No. 107 of 1998*. Pretoria: Government Printer.
- Republic of South Africa (2014, as amended). *Environmental Impact Assessment Regulations*. Pretoria: Department of Forestry, Fisheries and the Environment (DFFE).
- Republic of South Africa (1996). *Constitution of the Republic of South Africa, Act No. 108 of 1996*. Pretoria: Government Printer.
- Republic of South Africa (2003). *Broad-Based Black Economic Empowerment Act (B-BBEE), Act No. 53 of 2003*. Pretoria: Government Printer.
- Republic of South Africa (2002). *Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002*. Pretoria: Government Printer.
- Republic of South Africa (2010). *National Development Plan (NDP) 2030*. Pretoria: National Planning Commission.
- Limpopo Provincial Government (2015). *Limpopo Development Plan (LDP)*. Polokwane.
- Thabazimbi Local Municipality (2022). *Integrated Development Plan (IDP)*.
- Waterberg District Municipality (2022). *Integrated Development Plan (IDP)*.
- Department of Forestry, Fisheries and the Environment (DFFE) (2020). *Guidelines for Social Impact Assessment (SIA)*.
- Statistics South Africa (2022). *Census 2022 Statistical Release*. Pretoria.
- Statistics South Africa (2023). *Community Survey and Labour Market Statistics*.
- Statistics South Africa (2024). *Quarterly Labour Force Survey (QLFS)*.
- South African National Biodiversity Institute (2018). *National Biodiversity Assessment*.
- Department of Agriculture, Land Reform and Rural Development (2019). *Agricultural Land Capability Classification*.
- UNESCO (2020). *Waterberg Biosphere Reserve Documentation*.
- Vanclay, F. (2003). *International Principles for Social Impact Assessment*. Impact Assessment and Project Appraisal.
- Becker, H.A. & Vanclay, F. (2003). *The International Handbook of Social Impact Assessment*. Edward Elgar Publishing.
- International Association for Impact Assessment (IAIA) (2015). *Social Impact Assessment: Guidance for Assessing and Managing Social Impacts of Projects*.

- Client (2026). *Project Description and Layout Plans*.
- KML Spatial Data and Screening Tool Outputs (2026).
- Site Observations and Field Notes (2026).
- Stakeholder Engagement Inputs (2026).
- Statistics South Africa. https://www.statssa.gov.za
- Department of Forestry, Fisheries and the Environment. https://www.dffe.gov.za

APPENDICES

Appendix A: Specialist Declaration

I, Mpho Ramalivhana declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Mpho Ramalivhana Pri Sci. Nat (Hons. Bot.; SAAB; SACNASP).

I, Khumbelo Given Marabe declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Signature

Khumbelo Given Marabe

SACNASP NO: 132731

WISA REG NO :39885

IAIAsa: Membership no: 7837

IIAV Member No. 3163

Appendix B: Specialist CV

Mr Khumbelo Given Marabe

Principal Environmental Consultant | Director – KMG Environmental Solutions Services (Pty) Ltd

SACNASP Registered– Reg. No. **132731**

WISA Professional Process Controller – Reg. No. **39885**

Summary of Expertise:

Mr. Marabe is an experienced environmental specialist with over a decade of expertise in:

- Visual, Social, Wetland and Terrestrial Impact assessments
- Agricultural and soil capability impact assessments
- Noise, air quality, water, and dust monitoring
- Environmental awareness training
- Environmental audits and licensing applications
- NEMA and NWA compliance
- Environmental management and monitoring across sectors including mining, manufacturing, and renewable energy

Education & Certifications:

- BSc Environmental Sciences – University of Venda
- NEBOSH Environmental Management Certificate (2024)
- ISO 45001 & ISO 14001 Implementation & Internal Auditor – NOSA
- Health and Safety Regulations – HASLAC
- Certificates in Management Development (GIBS – AECI Programmes)
- Honours in Environmental Monitoring & Modelling (ongoing – UNISA)

Ms. Jeniffer Mutsila

Environmental GIS and Mapping Technician

Affiliation: KMG Environmental Solutions Services (Pty) Ltd

🎾 *Junior Environmental Assessment Practitioner, Environmental Mapping & spatial analysis*

Professional Overview:

Ms. Jeniffer Mutsila is a technically skilled Environmental Mapping and GIS Technician with a background in field-based wetland delineation and spatial data analysis. He provides vital support in environmental assessments by producing geospatial products and performing site-level data validation for use in Environmental Impact Assessments (EIAs), Basic Assessments (BAs), Wetland Impact Assessments, and Water Use Licence Applications (WULAs).

With hands-on experience in both **desktop and field applications**, Jeniffer brings a valuable blend of practical and digital expertise to complex projects that require environmental sensitivity mapping, buffer zone compliance checks, and spatial integration of biodiversity datasets.

Core Competencies:

- GIS Mapping & Spatial Analysis (ArcGIS, QGIS)
- GPS-based Field Surveying and Data Collection
- Wetland and Riparian Zone Delineation Support
- Environmental Reporting: BAR, EIA, EMPr, EMP, WULA, EPR
- Legislation Knowledge: NEMA, Water Act, Waste Act, Air Quality Act, MPRDA

Key Project Contributions:

◆ **Wetland Mapping and Sensitivity Overlay Support**

- Developed comprehensive map series for **prospecting right applications** in the North West and Limpopo provinces, including:
  - ✓ **Wetland Classification Maps** (HGM units: seep, valley-bottom, flat wetlands)
  - ✓ **30 m Riparian Buffer Sensitivity Maps**
  - ✓ **500 m Regulated Area Compliance Maps**
  - ✓ **Field-Verified Wetland Delineation Maps**

◆ **GIS Support for Impact Assessments**

- Integrated **soil, rainfall, vegetation, and biodiversity** datasets with national layers (e.g., NFEPA, Aquatic CBAs, ESA zones) to support:

- ✓ Wetland Impact Assessments
- ✓ Agricultural Impact Assessments (AIA)
- ✓ Biodiversity screening and risk mapping

◆ **Field Data Management & GPS Verification**

- Accompanied environmental specialists on site visits to:
  - ✓ Capture **wetland and watercourse coordinates**
  - ✓ Assist with **transect layout and data recording**
  - ✓ Cross-check digital boundary outputs against **ground conditions**

◆ **Reporting and Compliance Visuals**

- Prepared high-resolution map figures used in:
  - ✓ **Basic Assessment Reports (BARs)**
  - ✓ **Environmental Management Programmes (EMPrs)**
  - ✓ **Water Use Licence Applications (WULAs)**
- Ensured maps met **legislative and formatting standards** for submission to DMRE, DWS, and DFFE.

Professional Strengths:

- Detail-oriented and deadline-driven
- Strong spatial logic and environmental understanding
- Collaborative work ethic with specialists and field teams
- Effective communication of spatial data to technical and non-technical audiences

Summary Value to Projects:

Ms. Jeniffer GIS and mapping expertise plays an essential role in ensuring that environmental reports are visually informative, spatially accurate, and legally aligned. His ability to translate field data into structured spatial products enhances the defensibility and scientific integrity of environmental applications, especially those involving wetland delineation, regulated activity compliance, and site sensitivity verification

MPHO RAMALIVHANA

09 Krinkhout Avenue, Glen Marais, 1619

ramalivhanam@naledznaies.co.za | ramalivhanam@gmail.com

078 901 4833

LinkedIn: Available upon request

Driver's License: Code C1 (10)

ZA Nationality: South African

Date of Birth: 07 February 1987

PROFESSIONAL PROFILE

A seasoned Environmental Consultant and Director with over 15 years of diverse experience in environmental management, impact assessment, ecological monitoring, and biodiversity studies. Demonstrates excellence in leading multidisciplinary projects across Prospecting, energy, infrastructure, and conservation sectors across South Africa and the SADC region. A specialist in terrestrial biodiversity assessments, with hands-on expertise in managing complex EIA and EMP processes in alignment with local legislation and international standards (IFC PS, Equator Principles).

AREAS OF EXPERTISE

- Terrestrial Biodiversity & Ecological Assessments
- Environmental Impact Assessments (EIA) & Management Programmes (EMP)
- Environmental Monitoring & Auditing
- Wetland and Water Resource Assessments
- Stakeholder Engagement & Public Participation
- Environmental Due Diligence & Site Assessments
- IFC Performance Standards & Equator Principles Implementation

EDUCATION

Honours Degree in Botany (Plant Ecology)

University of Limpopo | 2008

Bachelor of Science in Botany & Microbiology

University of Limpopo | 2007

Matriculation (Grade 12)

Mudinane Secondary School | 2004

PROFESSIONAL AFFILIATIONS

- **South African Council for Natural Scientific Professions (SACNASP)** – Reg. No. 400395/14
- **South African Association of Botanists (SAAB)** – Member
- **International Association for Impact Assessment South Africa (I AWIAsa)** – Member

SELECTED BIODIVERSITY / TERRESTRIAL PROJECTS

- Terrestrial Biodiversity Assessment for a proposed mixed-use development on Greater Giyani 891 LT, Limpopo
- Biodiversity Assessment for prospecting right on Zwartrand 145 IP, Ventersdorp, North West
- Terrestrial Ecological Assessment – Glencore Merafe Venture: Boshoek Smelter, North West
- Biodiversity Impact Assessment for Eskom 132/11/6.6kV Calcined Products Line, Westonaria
- Terrestrial Biodiversity Study – Westgate Randfontein 132kV Line Deviation, Gauteng
- Biodiversity Impact Assessment for township development on Fouriestrust 2525, Free State
- Ecological Assessment for lodge development on Kheto Agricultural Farm, Greater Giyani
- Terrestrial Ecological Assessment for a ±5km 88kV Power Line, City of Tshwane

CAREER HISTORY

Managing Director / Senior Environmental Consultant

Naledzani Environmental Services | Nov 2014 – Present

- Lead biodiversity and terrestrial assessment teams
- Manage full EIA and EMP processes
- Conduct environmental audits and monitoring
- Business development and client liaison

Associate Environmental Assessment Practitioner

Joan Construction and Projects | Jun 2015 – Present

- Prepare and review environmental reports, with focus on ecological assessments
- Manage Prospecting and infrastructure projects

Environmental Consultant

Parsons Brinckerhoff Africa (now WSP) | Mar 2013 – Oct 2014

- Managed EIA and EMP development
- Led biodiversity and ecological studies
- Conducted baseline surveys, compliance monitoring

Senior Environmental Consultant

Tshikovha Environmental & Communication Consulting | Feb 2011 – Feb 2013

- Coordinated EIA, EMP, and stakeholder engagement processes
- Mentored junior staff and oversaw technical reviews

Data Management Co-ordinator Trainee

South African National Biodiversity Institute (SANBI) | Apr 2010 – Jan 2011

- Plant species identification, data collection, and mapping using GIS

Biodiversity Management Intern

Limpopo Dept. of Economic Development, Environment and Tourism | Apr 2009 – Mar 2010

- Wetland identification and rehabilitation assessments
- Conducted biodiversity impact reviews and river health monitoring

KEY PROJECT EXPERIENCE SNAPSHOT

- **Namibia**: ESIA for City of Windhoek's Bus Depot & Waste Facilities
- **Mozambique**: ESIA for Ncondezi Thermal Power Plant
- **Rwanda**: 220 kV Transmission Line for EWSA
- **South Africa**: Chrome and coal Prospecting EIAs, solar facilities, landfill upgrades, transmission lines
- **Ecological Monitoring**: Randwater Pipelines, Davhana Bridge Construction, Majosi-Levubu Road.

VISUAL IMPACT ASSESSSMENT FOR THE PROPOSED APPLICATION FOR MINING RIGHT FOR IRON ORE (FE) AND ASSOCIATED MINERALS ON PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF FARM CORNWALL 313 KQ AND REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF FARM KOEDOEVLEI 128 KQ, THABAZIMBI LOCAL MUNICIPALITY, LIMPOPO PROVINCE

LP 30/5/1/2/3/2/1/(10287) MR

PREPARED FOR:

ARENGO 297 (PTY) LTD

DATE OF SUBMISSION:
March 2026

Website: www.kmgenviro.co.za
Tel: 011 969 6184
Email: marabekg@kmgenviro.co.za
LEAD SPECIALIST: Khumbelo Given Marabe
Director and Principal Environmental Consultant
SACNASP NO: 132731
WISA REG NO :39885
IAIAsa: Membership no: 7837
IIAV Member No. 3163

VISUAL IMPACT ASSESSMENT REPORT

FOR THE PROPOSED MINING RIGHT APPLICATION

PROJECT TITLE:

Environmental Authorisation for Mining Right Application for Iron Ore (Fe) and Associated Minerals

PROJECT LOCATION:

Portions RE/2/313, RE/3/313, and RE/4/313 of the Farm Cornwall 313 KQ
Remaining Extent of Portions 2, 5, 8, 9, 10, and 11 of the Farm Koedoevlei 128 KQ
Thabazimbi Local Municipality
Waterberg District Municipality
Limpopo Province

DMRE REFERENCE NUMBER:

LP 30/5/1/2/3/2/1/(10287) MR

APPLICANT:

Arengo 297 (Pty) Ltd

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP):

Vahlengwe Mining Advisory and Consulting (Pty) Ltd

VISUAL IMPACT ASSESSMENT PREPARED BY:

KMG Environmental Solutions Services (Pty) Ltd

REPORT STATUS:

Final Draft

REPORT VERSION: Version 1.0

DOCUMENT INFORMATION

Item	Description
Report Title	Visual Impact Assessment Report
Project Title	Environmental Authorisation for Mining Right Application
Project Description	Proposed mining of Iron Ore (Fe) and associated minerals
Applicant	Arengo 297 (Pty) Ltd
DMRE Reference Number	LP 30/5/1/2/3/2/1/(10287) MR
Project Location	Portions RE/2/313, RE/3/313, and RE/4/313 of Farm Cornwall 313 KQ and Remaining Extent of Portions 2, 5, 8, 9, 10, and 11 of Farm Koedoevlei 128 KQ, Thabazimbi Local Municipality, Limpopo Province
Site Extent	Approximately 3,892 hectares
Environmental Assessment Practitioner (EAP)	Vahlengwe Mining Advisory and Consulting (Pty) Ltd
Specialist	KMG Environmental Solutions Services (Pty) Ltd
Specialist Contact Person	Khumbelo Given Marabe
Company Registration Number	2020/100850/07
VAT Number	4100322694
Company Address	08 Hillside Road, Metropolitan Building, 1st Floor B, Parktown, Johannesburg, 2193
Contact Details	Tel: 011 969 6184 / 011 480 4822
Email	info@kmgenviro.co.za
Website	www.kmgenviro.co.za

Report Status	Final Draft
Report Version	Version 1.0
Date of Issue	March 2026
Prepared By	KMG Environmental Solutions Services (Pty) Ltd
Reviewed By	Mpho Ramalivhana
Approved By	Khumbelo Given Marabe
Quality Control	Internal Review Conducted in accordance with KMG QMS
Confidentiality	This report is confidential and intended solely for the client and regulatory authorities
Distribution	Client, EAP, DMRE, DFFE, Interested and Affected Parties (as applicable)

DISCLAIMER

This Visual Impact Assessment Report has been prepared by **KMG Environmental Solutions Services (Pty) Ltd** for the exclusive use of the Client and the appointed Environmental Assessment Practitioner (EAP), **Vahlengwe Mining Advisory and Consulting (Pty) Ltd**, in support of the Environmental Authorisation process for the proposed mining right application.

The information contained in this report is based on:

- Available project information provided at the time of assessment;
- Site observations and field verification;
- Applicable legislation, guidelines, and best practice methodologies; and
- Professional judgement and experience of the specialist.

While every reasonable effort has been made to ensure the accuracy and completeness of the information presented, **KMG Environmental Solutions Services (Pty) Ltd** does not warrant that all data is free from errors or omissions. The findings, conclusions, and recommendations are based on conditions observed during the time of assessment and may be subject to change if new information becomes available or if site conditions change.

This report should be read as a whole, and no part thereof may be reproduced, distributed, or relied upon independently without the written consent of **KMG Environmental Solutions Services (Pty) Ltd**.

The assessment does not constitute a detailed engineering design, operational plan, or legal opinion. The responsibility for implementation of mitigation measures and compliance with applicable legislation rests with the Applicant.

Neither **KMG Environmental Solutions Services (Pty) Ltd**, nor its employees or sub-consultants, shall be held liable for any loss, damage, or consequences arising from the use or misuse of this report by any third party.

This report is confidential and is intended solely for submission to the relevant authorities, including the **Department of Mineral Resources and Energy (DMRE)** and other competent authorities, as part of the Environmental Impact Assessment (EIA) process.

ACRONYMS AND ABBREVIATIONS

Acronym	Description
BA	Basic Assessment
BID	Background Information Document
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs (now DFFE)
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GIS	Geographic Information System
GLVIA	Guidelines for Landscape and Visual Impact Assessment
ha	Hectare
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
KMG	KMG Environmental Solutions Services (Pty) Ltd
km	Kilometre
KQ	Farm Portion Reference (Survey Unit)
Lm	Local Municipality
m	Metre
m^2	Square Metre
m^3	Cubic Metre
MR	Mining Right
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NWA	National Water Act (Act 36 of 1998)
PPP	Public Participation Process
QMS	Quality Management System
SANS	South African National Standards

SDF	Spatial Development Framework
VIA	Visual Impact Assessment
VRM	Visual Resource Management
VSR	Visual Sensitivity Rating
VP	Viewpoint
WDM	Waterberg District Municipality
WULA	Water Use Licence Application
°C	Degrees Celsius
%	Percentage

DEFINITIONS AND TERMINOLOGY

Absorption Capacity (Visual Absorption Capacity – VAC)

The ability of a landscape to accommodate visual change without significantly altering its existing character or quality.

Activity Area

The specific portion of land where development activities occur within the broader project footprint.

Ambient Environment

The surrounding environmental conditions within which a project is located.

Assessment Criteria

The set of parameters used to evaluate impacts, including magnitude, extent, duration, and probability.

Baseline Environment

The existing environmental conditions prior to the implementation of a proposed development.

Cumulative Impact

The combined effect of multiple activities over time or space, which may result in a greater overall environmental impact.

Degree of Contrast

The extent to which a development differs visually from its surrounding environment in terms of form, colour, texture, or scale.

Development Footprint

The total area directly affected by a proposed development.

Direct Impact

An impact that occurs as an immediate result of an activity.

Duration of Impact

The period over which an impact is expected to occur, typically classified as short-term, medium-term, or long-term.

Environment

The surroundings within which humans exist, including land, water, atmosphere, flora, fauna, and their interactions.

Environmental Authorisation (EA)

Approval granted by a competent authority for a development to proceed.

Environmental Impact Assessment (EIA)

A process used to identify, predict, and evaluate the environmental effects of a proposed activity.

Environmental Management Programme (EMPr)

A document outlining mitigation measures and management actions for environmental impacts.

Extent of Impact

The geographical area over which an impact occurs.

Geographic Information System (GIS)

A system used for capturing, storing, analysing, and displaying spatial data.

Impact

Any change to the environment, whether positive or negative, resulting from a proposed activity.

Indirect Impact

An impact that occurs as a secondary consequence of an activity.

Interested and Affected Parties (I&APs)

Individuals or groups who may be affected by or have an interest in a proposed development.

Landscape Character

The distinct and recognisable pattern of elements that define a particular landscape.

Landscape Character Unit

A defined area with consistent and identifiable landscape characteristics.

Landscape Sensitivity

The susceptibility of a landscape to change as a result of development.

Line of Sight

The direct, unobstructed line between an observer and a viewed object.

Magnitude of Impact

The scale or intensity of an impact, typically classified as low, medium, or high.

Mitigation

Measures implemented to avoid, reduce, remedy, or compensate for negative impacts.

Mining Footprint

The area of land affected by mining activities, including pits, infrastructure, and disturbed areas.

Open Pit

A surface excavation used in mining that alters the natural landform.

Overburden

Material removed to access underlying mineral resources.

Photomontage

A visual simulation that combines photographs with digital models to illustrate the expected appearance of a development.

Probability of Occurrence

The likelihood that an impact will occur.

Progressive Rehabilitation

The restoration of disturbed areas during the operational phase of a project.

Receptor

A person, group, or element of the environment that may be affected by a development.

Residual Impact

The remaining impact after mitigation measures have been implemented.

Reversibility

The ability of the environment to return to its original condition after disturbance.

Scenic Quality

The aesthetic value or visual attractiveness of a landscape.

Screening

The use of natural or artificial features to reduce the visibility of a development.

Sensitivity (Viewer Sensitivity)

The degree to which a receptor is affected by changes in visual quality.

Significance of Impact

A measure of the importance of an impact, determined by combining consequence and probability.

Spatial Extent

The area over which a visual impact is experienced.

Stockpile

Accumulated material such as overburden or ore stored on-site.

Topography

The physical features and terrain of a landscape.

Viewpoint (VP)

A specific location from which visual impacts are assessed.

Viewshed

The geographic area visible from a particular location.

Visual Amenity

The overall visual pleasantness experienced by observers.

Visual Change

Alteration to the visual characteristics of a landscape.

Visual Envelope

The outer boundary within which a development is visible.

Visual Exposure

The degree to which a development is visible within the surrounding environment.

Visual Impact

A change in the appearance of the landscape as a result of development.

Visual Intrusion

The introduction of structures or activities that disrupt the existing landscape.

Visual Quality

The aesthetic value of a landscape based on natural and human elements.

Visual Receptor

An individual or group that experiences visual impacts.

Visual Resource

The visible components of a landscape, including landforms, vegetation, and built elements.

Visual Sensitivity Rating (VSR)

A classification of receptors based on their sensitivity to visual change.

Zone of Theoretical Visibility (ZTV)

A modelled area showing where a development may be visible based on terrain analysis.

EXECUTIVE SUMMARY

This Visual Impact Assessment (VIA) has been undertaken to evaluate the potential visual impacts associated with the proposed mining development located within the Thabazimbi area. The assessment forms part of the Environmental Impact Assessment process and aims to determine the extent to which the proposed development may affect the visual character, scenic quality, and visual amenity of the receiving environment.

The study area is characterised by a predominantly natural bushveld landscape typical of the Waterberg region, with a mixture of agricultural land uses, tourism activities, rural residential dwellings, and transport infrastructure such as the R510 corridor. The visual environment is defined by open to moderately vegetated terrain, undulating topography, and areas of elevated land which increase visibility across the landscape. The presence of tourism establishments and farmsteads indicates a strong reliance on the natural aesthetic quality of the environment, thereby increasing visual sensitivity.

A comprehensive baseline assessment was conducted, incorporating land use analysis, vegetation characteristics, topographical conditions, and viewshed modelling. The findings indicate that the study area exhibits moderate to high visual sensitivity, particularly in locations where receptors are exposed to open views or situated on elevated terrain. Sensitive visual receptors identified within the study area include residential dwellings and farmsteads, tourism and accommodation facilities such as lodges and safari operations, road users along the R510, institutional receptors including the Waterberg TVET College, and additional receptors such as airstrip users and agricultural operations.

The viewshed analysis indicates that the proposed development is likely to be visible from multiple areas within the study area, particularly from elevated positions and open landscapes where vegetation screening is limited. The extent of visibility is influenced by terrain, vegetation density, and distance from the development footprint. The analysis confirms that several sensitive receptors fall within areas of direct or partial line-of-sight to the proposed development.

Visual simulations were undertaken from representative viewpoints (VP01 to VP04) to illustrate the anticipated visual changes associated with the development. These viewpoints represent key receptor locations, including road users, residential dwellings, and tourism-

related areas. The visualisation results indicate that the proposed mining infrastructure, including pits, stockpiles, processing facilities, and access roads, will introduce industrial elements into a predominantly natural landscape. The degree of visual impact varies across viewpoints, with higher impacts observed in areas with limited vegetation screening and elevated terrain. In particular, VP03 demonstrates high visual exposure, while VP01 and VP04 exhibit moderate to high levels of visibility. VP02 shows partial screening due to vegetation, resulting in moderate visual impact.

The impact assessment identified several key visual impacts associated with the proposed development. These include visual intrusion of mining infrastructure, alteration of landscape character, impacts on residential receptors, degradation of scenic quality for tourism and accommodation facilities, and visual disturbance to road users along the R510 corridor. Pre-mitigation impact ratings indicate that visual intrusion and landscape transformation are of very high significance, while impacts on tourism and road users are generally high.

Mitigation measures have been proposed to reduce the severity of visual impacts. These measures include the strategic placement of infrastructure in less visually exposed areas, the use of natural colours and materials to reduce contrast, the establishment of vegetative screening buffers, the implementation of berms and landform shaping, and progressive rehabilitation of disturbed areas. Additional measures such as controlled lighting and preservation of key view corridors have been recommended to protect sensitive receptors.

The post-mitigation assessment indicates that the implementation of these measures will result in a reduction in impact significance across all receptor categories. Visual impacts on tourism and road users can be reduced to moderate levels, while impacts on residential receptors and overall landscape character remain high due to the inherent nature of mining activities and their permanence. Despite these residual impacts, the overall visual effect is considered manageable within the broader context of the surrounding land uses.

Environmental Management Programme inputs have been developed to ensure the effective implementation of mitigation measures throughout the project lifecycle. These include specific actions for construction, operational, and closure phases, as well as monitoring requirements such as photographic documentation from fixed viewpoints and regular visual inspections.

In conclusion, the proposed development will result in noticeable to significant visual changes within the study area. However, with the implementation of recommended mitigation measures and adherence to the Environmental Management Programme, the visual impacts can be reduced.

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SECTION 1: INTRODUCTION

1.1 Background and Project Description

This Visual Impact Assessment (VIA) has been undertaken as part of the Environmental Impact Assessment process for the proposed development. The purpose of the VIA is to assess the potential visual and landscape impacts associated with the construction and operation of the proposed project and to determine the significance of these impacts on the receiving environment.

The proposed development involves infrastructure and operational components that will introduce new visual elements into the existing landscape. These elements may include site establishment areas, access roads, stockpiles, processing infrastructure, and associated activities. The development is expected to alter the current visual character of the area through changes in landform, land cover, and the introduction of built structures.

The project area is located within a predominantly rural setting characterised by natural vegetation, open landscapes, and limited existing infrastructure. The visual environment is influenced by topography, vegetation cover, and the presence of nearby receptors such as homesteads, roads, and agricultural areas. The nearest air quality monitoring reference used in the broader assessment is located approximately 8.27 km from the project site, indicating a moderately open and connected landscape context.

1.2 Purpose of the Visual Impact Assessment

The purpose of this assessment is to evaluate the extent to which the proposed development may affect the visual environment and to provide recommendations to mitigate identified impacts.

The key objectives of the VIA include the following:

- To establish the existing visual and landscape baseline conditions of the study area
- To identify key visual receptors and sensitive viewpoints
- To assess the visibility and visual exposure of the proposed development
- To evaluate the magnitude and significance of visual impacts

- To recommend mitigation measures to reduce adverse visual impacts
- To assess residual impacts following mitigation

1.3 Terms of Reference

The assessment has been conducted in accordance with accepted visual impact assessment methodologies and includes the following components:

- Desktop analysis of spatial data, aerial imagery, and topographic information
- Identification of landscape character units within the study area
- Determination of the Zone of Theoretical Visibility
- Field verification to confirm visual conditions and receptor locations
- Assessment of visual sensitivity and visual absorption capacity
- Evaluation of visual impacts during construction and operational phases
- Development of mitigation measures and recommendations

1.4 Study Area

The study area includes the proposed development footprint and the surrounding environment within which visual impacts may occur. The extent of the study area is defined based on visibility analysis, topography, and the distribution of sensitive receptors.

The study area can be divided into the following zones:

- Core project area, representing the direct footprint of the development
- Immediate surroundings, typically within a 0 to 1 km radius
- Intermediate zone, extending from 1 km to 5 km
- Wider landscape context, extending beyond 5 km where visibility is possible

Figure 1: Study Area Locality Map Showing Project Footprint and Surrounding Context

1.5 Legislative and Policy Framework

This assessment is guided by relevant South African environmental legislation and best practice guidelines. The following key legislative frameworks are applicable:

- National Environmental Management Act, Act No. 107 of 1998
- Environmental Impact Assessment Regulations, 2014 (as amended)
- National Environmental Management: Biodiversity Act, Act No. 10 of 2004
- National Environmental Management: Air Quality Act, Act No. 39 of 2004
- Spatial Planning and Land Use Management Act, Act No. 16 of 2013

The VIA also aligns with international best practice principles for visual and landscape assessment, including guidelines related to landscape character and visual sensitivity.

1.6 Assumptions and Limitations

This assessment is based on available project information, spatial data, and field observations conducted at the time of the study. Certain assumptions and limitations apply:

- The assessment assumes that the project will be implemented as described in the available documentation
- Visual simulations and visibility analysis are based on terrain data and may not fully account for all screening elements such as vegetation and structures
- Field verification represents conditions at the time of site visit and may vary seasonally
- The assessment focuses on visual impacts and does not address other environmental aspects in detail

1.7 Methodological Approach

The methodology adopted for this VIA integrates both qualitative and quantitative assessment techniques to evaluate visual impacts.

The key steps in the methodology include:

- Baseline assessment of landscape character and visual quality
- Identification and mapping of visual receptors
- Visibility analysis using terrain modelling
- Assessment of visual sensitivity and absorption capacity
- Evaluation of impact magnitude and significance
- Development of mitigation measures
- Assessment of residual impacts

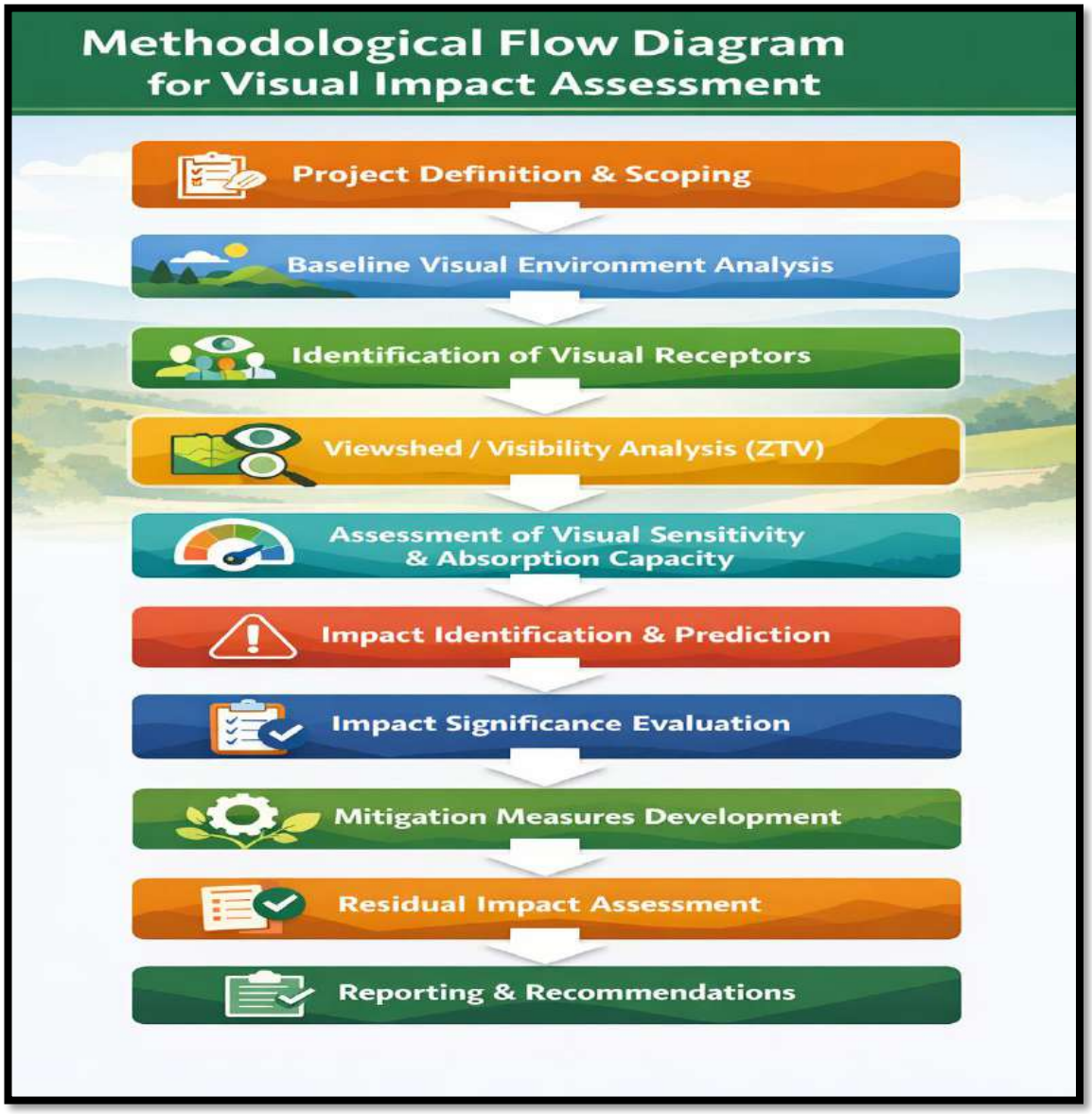


Figure 2**:** Methodological Flow Diagram for Visual Impact Assessment

1.8 Specialist Details and Independence

This Visual Impact Assessment has been conducted by a suitably qualified environmental specialist with experience in visual and landscape assessments. The specialist confirms independence and has no vested interest in the proposed development other than the provision of professional services.

The assessment has been conducted in accordance with accepted scientific principles and professional standards.

Table 1**:** Specialist Information and Declaration of Independence

Item	Description
Specialist Name	Khumbelo Given Marabe
Qualification	Environmental Practitioner
Registration	SACNASP / EAPASA
Company	KMG Environmental Solutions Services (Pty) Ltd
Role	Visual Impact Assessment Specialist
Independence	Independent, no vested interest in the project
Signature	_____
Date	_____

SECTION 2: PROJECT DESCRIPTION

2.1 Introduction

This section provides a detailed description of the proposed mining right application, including the nature of the development, project components, operational activities, and key elements that may influence the visual environment. The information presented herein forms the basis for the identification and assessment of potential visual impacts.

The proposed project entails mining activities within the Thabazimbi area, covering multiple farm portions and extending over a large geographical footprint. The scale and nature of the development are expected to introduce prominent visual changes within the receiving environment.

2.2 Project Location and Extent

The proposed mining right is located within the Thabazimbi Local Municipality in the Waterberg District Municipality of Limpopo Province. The project area covers portions of Farm Cornwall 313 KQ and Farm Koedoevlei 128 KQ, with a total extent of approximately 3,892 hectares.

The site is situated within a predominantly rural landscape characterised by agricultural activities, natural vegetation, and limited infrastructure. The project area lies approximately 6 km from Thabazimbi town and is accessible via existing road networks.

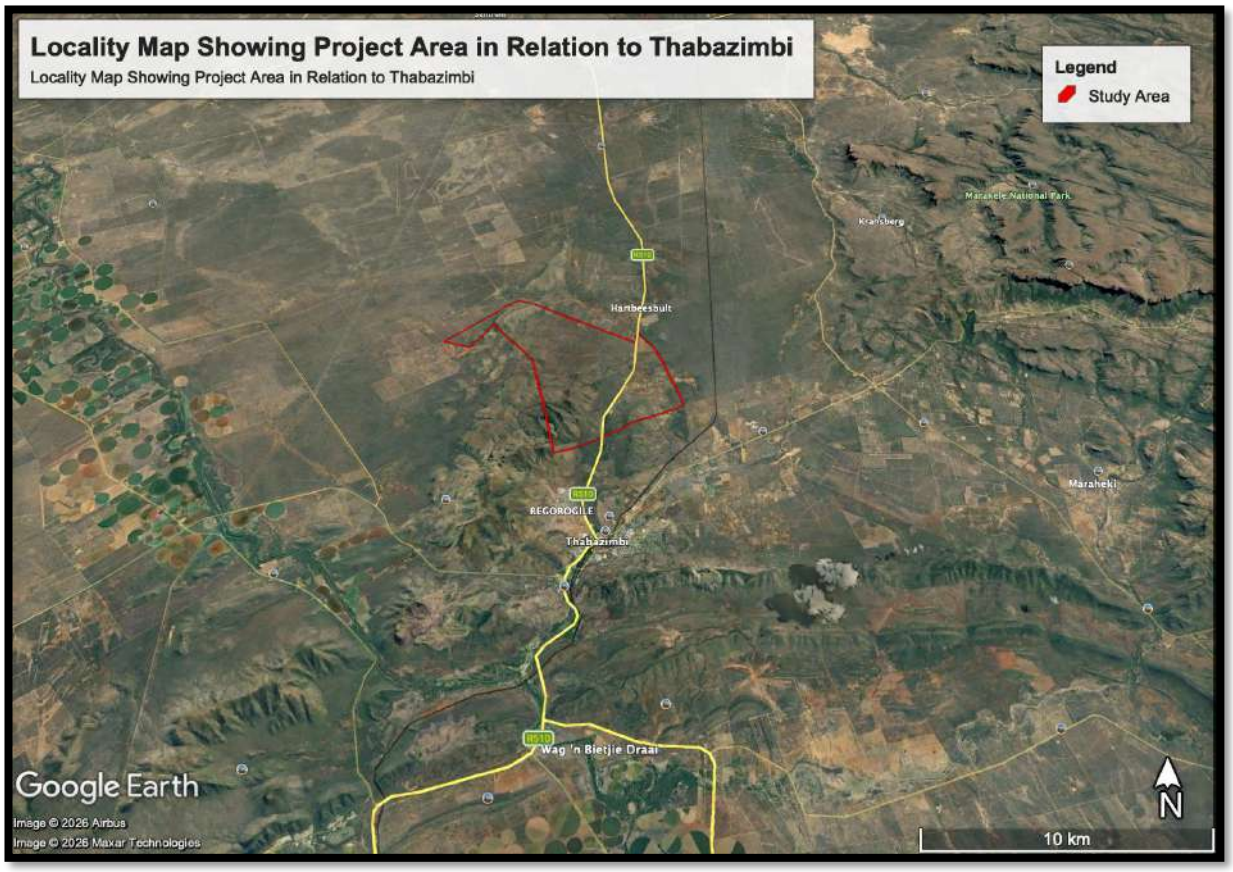


Figure 3: Locality Map Showing Project Area in Relation to Thabazimbi

2.3 Project Components

The proposed development will consist of several components associated with mining operations. These components are expected to contribute to visual impacts due to their scale, form, and spatial distribution.

The key project components include:

- Open pit mining areas
- Overburden and waste rock stockpiles
- Haul roads and access routes
- Processing and operational infrastructure

- Temporary construction areas
- Laydown areas and material storage zones

These components will collectively form the mining footprint and will result in changes to the existing landform and landscape character.

2.4 Project Phases

The development will occur in distinct phases, each associated with different types and intensities of visual impact.

2.4.1 Construction Phase

During the construction phase, the following activities are anticipated:

- Site clearing and vegetation removal
- Earthworks and excavation
- Establishment of infrastructure
- Increased movement of construction vehicles

This phase is typically associated with high levels of visual disturbance due to exposed soil surfaces and active operations.

2.4.2 Operational Phase

The operational phase includes ongoing mining activities and associated processes:

- Excavation and material extraction
- Transportation of materials via haul roads
- Stockpiling of ore and waste material
- Continuous presence of machinery and infrastructure

Visual impacts during this phase are more permanent and relate to long-term landscape transformation.

2.4.3 Rehabilitation Phase

Rehabilitation will be undertaken progressively throughout the life of the project and upon closure. This includes:

- Re-contouring of disturbed land
- Replacement of topsoil
- Re-vegetation using indigenous species

This phase aims to reduce visual impacts and restore the visual quality of the landscape over time.

2.5 Key Visual Impact Drivers

The primary factors contributing to visual impacts associated with the project include:

- Large-scale land disturbance
- Alteration of natural landforms
- Introduction of artificial structures
- Dust generation and visibility
- Movement of vehicles and machinery

These drivers influence both the magnitude and visibility of impacts across the study area.

2.6 Summary of Project Characteristics

The table below summarises the key characteristics of the proposed development relevant to the visual impact assessment.

Table 2: Summary of Project Characteristics

Aspect	Description
Project Type	Mining Right Application
Commodity	Iron Ore (Fe)
Project Location	Thabazimbi Local Municipality, Limpopo Province
Site Extent	±3,892 hectares

Land Use	Predominantly rural / agricultural
Key Activities	Mining, stockpiling, transport, processing
Development Footprint	Large-scale surface disturbance
Project Phases	Construction, Operation, Rehabilitation
Visual Sensitivity	Moderate to High
Expected Visual Change	Moderate to High without mitigation

2.7 Summary of Visual Aspects

The proposed development represents a significant transformation of the existing landscape. The extent and scale of the mining footprint, combined with the introduction of infrastructure and operational activities, will result in noticeable changes to the visual environment.

The following key observations are noted:

- The project footprint is extensive and will be visible from surrounding areas
- The landscape has limited natural screening, increasing visibility
- Sensitive receptors such as nearby residents and road users may experience visual intrusion
- Visual impacts will vary depending on distance, topography, and mitigation measures

2.8 Link to Visual Impact Assessment

The information presented in this section provides the foundation for the visual impact assessment. The identified project components and activities will be assessed in subsequent sections to determine their potential visual effects and significance.

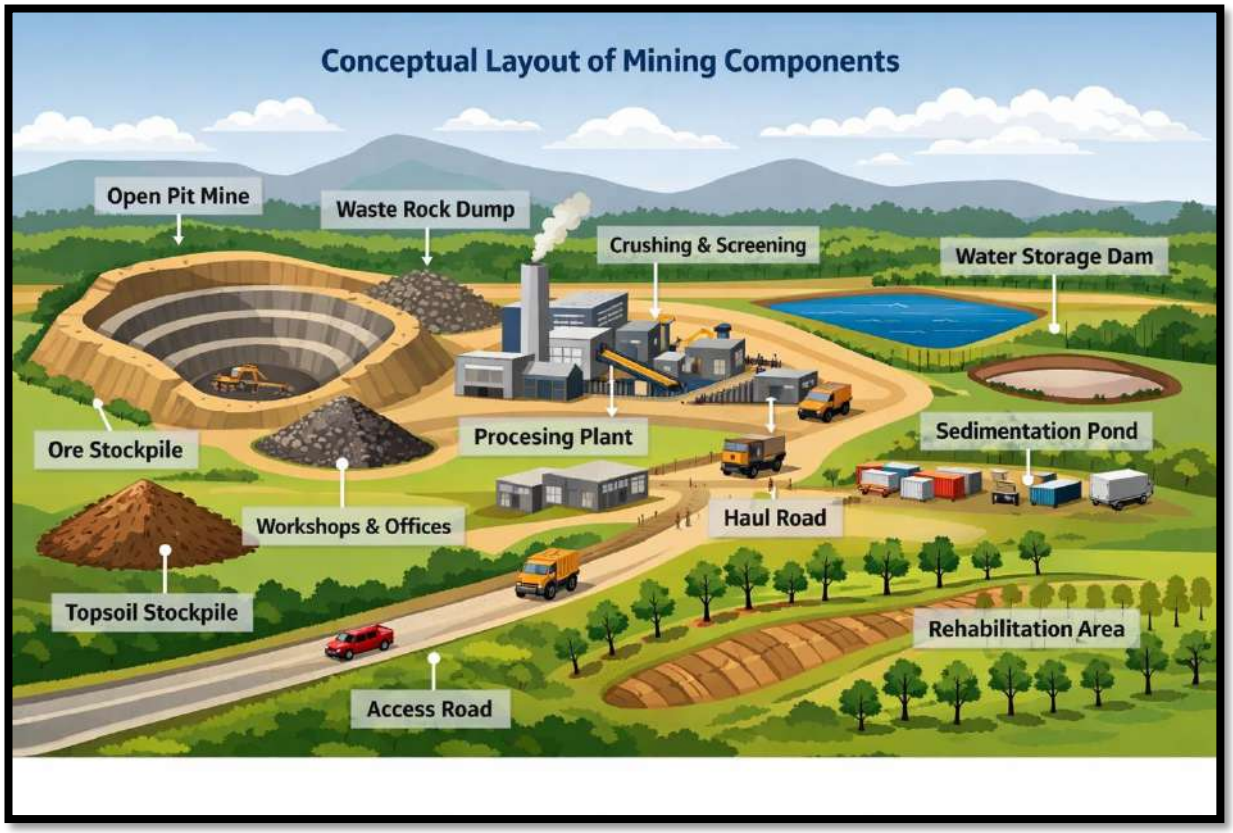


Figure 4: Conceptual Layout of Mining Components (Indicative Diagram)

SECTION 3: LEGISLATIVE AND POLICY FRAMEWORK

3.1 Introduction

This section outlines the legislative and policy framework applicable to the proposed development and the Visual Impact Assessment. The assessment has been conducted in accordance with relevant South African environmental legislation, regulations, and guidelines, as well as recognised best practice methodologies for visual and landscape assessment.

The purpose of this section is to demonstrate compliance with statutory requirements and to ensure that the assessment aligns with the regulatory expectations of the competent authorities.

3.2 Applicable Environmental Legislation

The proposed mining development triggers several legislative requirements under South African environmental law. The following key legislation is applicable to this assessment:

- National Environmental Management Act (Act No. 107 of 1998)
- Environmental Impact Assessment Regulations, 2014 (as amended)
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
- National Environmental Management: Air Quality Act (Act No. 39 of 2004)
- National Environmental Management: Waste Act (Act No. 59 of 2008)
- National Water Act (Act No. 36 of 1998)
- Spatial Planning and Land Use Management Act (Act No. 16 of 2013)

These legislative instruments provide the framework within which environmental impacts, including visual impacts, must be assessed and managed.

3.3 National Environmental Management Act (NEMA)

The National Environmental Management Act establishes the principles for sustainable development and environmental management in South Africa. The Act requires that environmental impacts be assessed and mitigated to ensure that development is socially, environmentally, and economically sustainable.

Key principles relevant to this VIA include:

- Avoidance and minimisation of environmental impacts
- Protection of sensitive environments
- Public participation and transparency
- Precautionary approach to environmental management

The VIA contributes to the EIA process by addressing visual impacts as part of the broader environmental assessment.

3.4 Environmental Impact Assessment Regulations

The EIA Regulations, promulgated under NEMA, require that specialist studies be conducted where potential impacts are identified. The Visual Impact Assessment forms part of these specialist studies and provides input into decision-making.

The regulations require:

- Identification and assessment of impacts
- Consideration of alternatives
- Development of mitigation measures
- Assessment of cumulative impacts

3.5 Mineral and Petroleum Resources Development Act

The proposed development is subject to the requirements of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002), which governs mining rights and associated environmental obligations.

The Act requires:

- Submission of an Environmental Management Programme (EMPr)
- Integration with the EIA process
- Rehabilitation and closure planning

3.6 Other Applicable Legislation and Guidelines

Additional legislation and planning instruments relevant to the assessment include:

- Provincial Environmental Management Frameworks
- Municipal Spatial Development Frameworks (SDFs)
- Integrated Development Plans (IDPs)
- DFFE Screening Tool

These instruments provide spatial and environmental context for the assessment and assist in identifying sensitive areas.

3.7 Visual Impact Assessment Guidelines

Although there is no specific South African legislation dedicated exclusively to visual impact assessment, the study follows internationally recognised best practice guidelines, including:

- Landscape and Visual Impact Assessment principles (GLVIA)
- Visual Resource Management methodologies
- Standard environmental impact assessment practices

These guidelines ensure a consistent and defensible approach to the assessment.

3.8 Compliance Summary

The table below summarises how this Visual Impact Assessment complies with the relevant legislative requirements.

Table 3: Legislative and Policy Compliance Summary

Legislation / Guideline	**Requirement**	**Relevance to Project**	**Compliance Statement**
National Environmental Management Act (Act 107 of 1998)	Sustainable development and environmental protection	Governs overall EIA process and environmental management	VIA conducted in line with NEMA principles and integrated into EIA
EIA Regulations, 2014 (as amended)	Mandatory environmental assessment and specialist studies	Requires identification and assessment of visual impacts	VIA prepared as a specialist study supporting EA application
Mineral and Petroleum Resources Development Act (Act 28 of 2002)	Regulation of mining activities and environmental obligations	Requires EMPr and rehabilitation planning	VIA informs EMPr mitigation and rehabilitation measures
National Environmental Management: Biodiversity Act (Act 10 of 2004)	Protection of biodiversity and sensitive ecosystems	Influences landscape character and visual sensitivity	Biodiversity considerations integrated into baseline and mitigation
National Environmental Management: Air Quality Act (Act 39 of 2004)	Air quality management and pollution control	Dust emissions affect visual quality and visibility	Dust impacts assessed and mitigation measures recommended

National Environmental Management: Waste Act (Act 59 of 2008)	Waste management and disposal	Waste rock dumps and stockpiles affect visual landscape	Waste-related visual impacts assessed and mitigated
National Water Act (Act 36 of 1998)	Protection and management of water resources	Water bodies influence landscape and visual receptors	Water-related visual aspects considered in layout and mitigation
Spatial Planning and Land Use Management Act (Act 16 of 2013)	Spatial planning and land use control	Ensures alignment with municipal planning frameworks	Project assessed in context of SDF and land use compatibility
National Heritage Resources Act (Act 25 of 1999)	Protection of cultural and heritage resources	Visual setting of heritage sites may be affected	Visual impacts on potential heritage landscapes considered
National Environmental Management: Protected Areas Act (Act 57 of 2003)	Protection of declared protected areas	Visual intrusion into protected areas must be avoided	No direct impact anticipated; screening considered where applicable
Conservation of Agricultural Resources Act (Act 43 of 1983)	Protection of agricultural land and soil	Land transformation affects rural landscape character	Agricultural landscape changes considered in visual assessment
Occupational Health and Safety Act (Act 85 of 1993)	Health and safety in workplaces	Layout and infrastructure visibility relates to safe operations	Considered indirectly in design and operational planning
National Forests Act (Act 84 of 1998)	Protection of indigenous forests and trees	Vegetation removal affects visual screening	Vegetation clearing assessed and mitigation recommended

Provincial Environmental Management Framework (EMF)	Identification of environmentally sensitive areas	Guides development suitability and sensitivity	Used to inform baseline sensitivity and constraints
Municipal Spatial Development Framework (SDF)	Local planning and land use guidance	Influences landscape character and visual expectations	Alignment with SDF considered in assessment
Integrated Development Plan (IDP)	Municipal development priorities	Provides socio-economic and spatial context	Considered in understanding land use and receptors
DFFE Screening Tool	Identification of environmental sensitivities	Highlights visually sensitive areas and constraints	Used to inform baseline and receptor identification
National Dust Control Regulations (GN R827 of 2013)	Control of dust emissions	Dust affects visibility and visual quality	Dust impacts assessed and mitigation measures proposed
International Best Practice (GLVIA)	Standardised approach to visual assessment	Provides methodology for VIA	Assessment conducted in line with GLVIA principles
Visual Resource Management (VRM) Principles	Management of scenic quality and visual resources	Guides evaluation of visual impacts	Applied in assessing visual sensitivity and impact significance

SECTION 4: METHODOLOGY

4.1 Introduction

This section outlines the methodology adopted for the Visual Impact Assessment. The approach integrates both qualitative and quantitative techniques to assess the potential visual impacts associated with the proposed development. The methodology is aligned with

recognised international best practice, including Landscape and Visual Impact Assessment principles, and is adapted to the South African environmental and regulatory context.

The assessment process follows a systematic approach beginning with project understanding and baseline characterisation, followed by visibility analysis, impact identification, significance evaluation, and the development of mitigation measures.

4.2 Approach to the Assessment

The methodology was structured to ensure that all relevant visual components of the environment were adequately assessed. The following key stages were undertaken:

- Review of project information and layout
- Identification of the study area and visual envelope
- Baseline assessment of landscape character and visual quality
- Identification of visual receptors and viewpoints
- Visibility analysis using terrain and spatial data
- Assessment of visual sensitivity and absorption capacity
- Evaluation of impact magnitude and significance
- Development of mitigation measures
- Assessment of residual impacts

4.3 Data Sources and Tools

The assessment utilised a combination of desktop and field-based data sources to ensure accuracy and reliability.

Key data sources included:

- Aerial imagery and satellite data
- Topographic maps and digital elevation models
- Project layout information
- Environmental screening tool outputs
- Field observations and photographic records

The following tools were used:

- Geographic Information Systems for spatial analysis
- Mapping software for viewshed modelling
- Visual interpretation techniques

4.4 Study Area Delineation

The study area was defined based on the extent to which the proposed development may be visible within the surrounding environment. The delineation considered terrain, vegetation, and the distribution of sensitive receptors.

The study area includes:

- Core development footprint
- Immediate zone (0–1 km)
- Intermediate zone (1–5 km)
- Extended zone (>5 km)

4.5 Baseline Visual Assessment

The baseline assessment focused on understanding the existing visual environment prior to development. This included:

- Identification of landscape character units
- Assessment of visual quality
- Evaluation of visual absorption capacity
- Identification of existing disturbances

The baseline provides a reference against which changes caused by the project are assessed.

4.6 Identification of Visual Receptors

Visual receptors were identified based on their likelihood of being affected by changes in the visual environment. These include individuals or groups who may experience views of the proposed development.

Key receptors include:

- Residential dwellings and farmsteads
- Road users and transport corridors
- Agricultural land users
- Recreational and tourism users

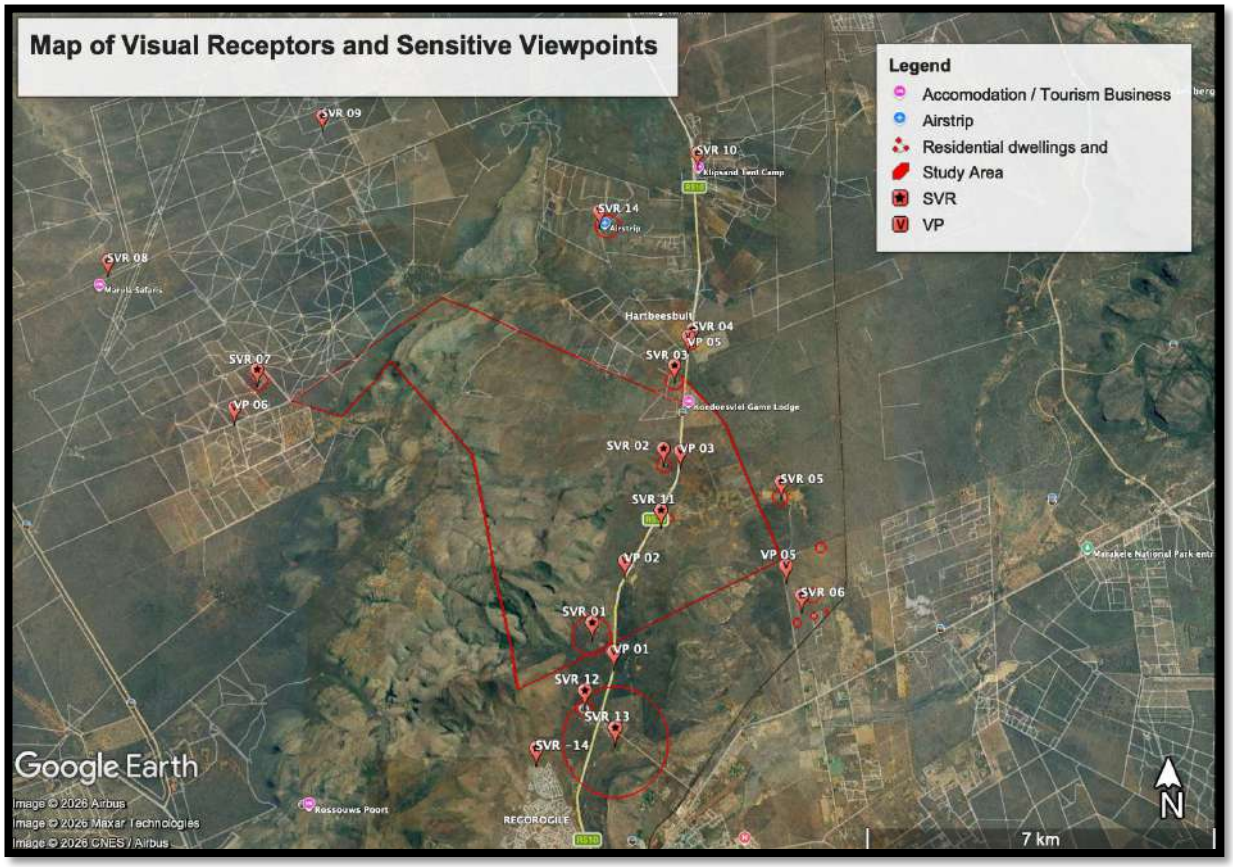


Figure 5: Map of Visual Receptors and Sensitive Viewpoints

4.7 Visibility Analysis

Visibility analysis was conducted to determine the areas from which the proposed development may be visible. This involved the use of terrain modelling to generate a Zone of Theoretical Visibility.

The analysis considered:

- Elevation and topography
- Viewing distance
- Line of sight

The results of the visibility analysis inform the identification of high-exposure areas and sensitive receptors.

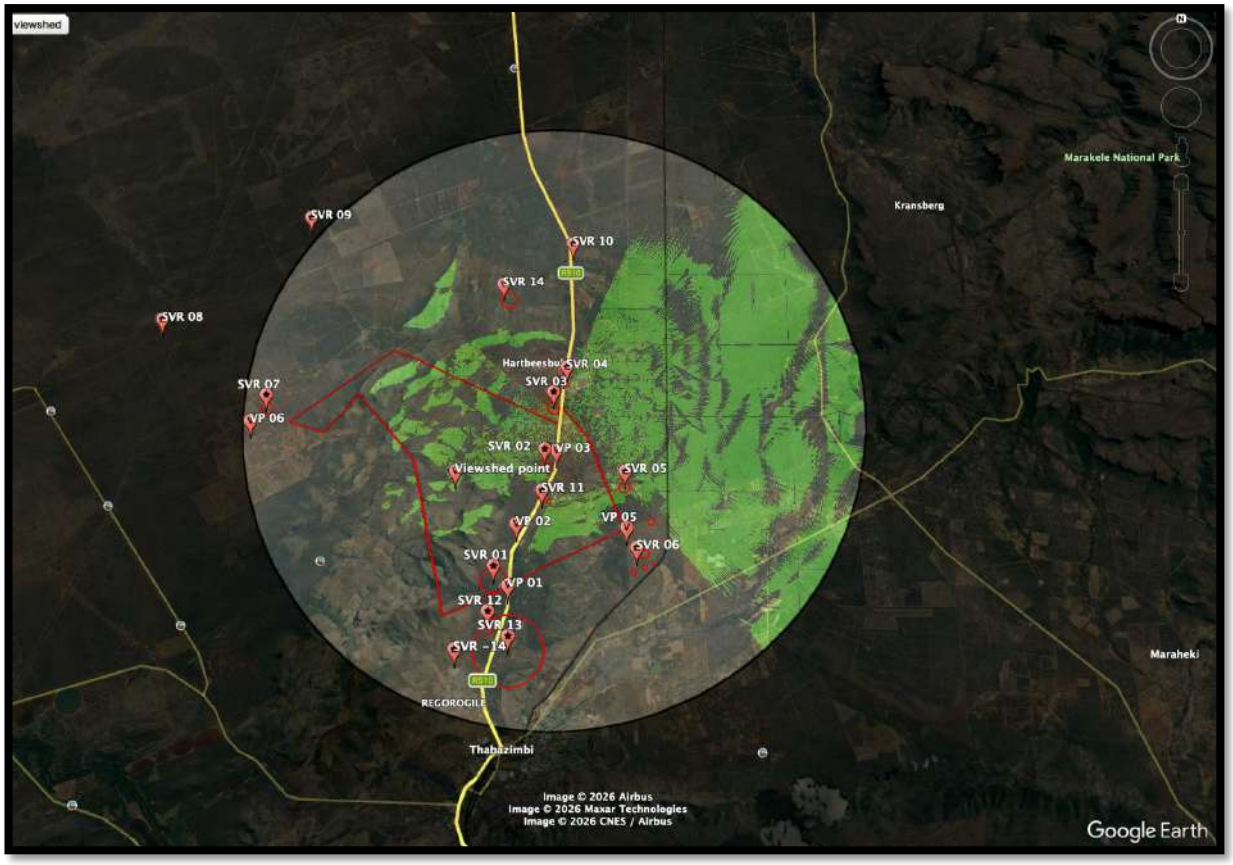


Figure 6: Viewshed Map

4.8 Visual Sensitivity Assessment

Visual sensitivity was assessed by considering both the characteristics of the landscape and the sensitivity of receptors.

Factors considered include:

- Landscape character and scenic quality
- Presence of natural or cultural features
- Viewer expectations and activities
- Degree of existing disturbance

Table 4: Visual Sensitivity Rating Criteria

Sensitivity Level	Description
High	Areas with high scenic value and sensitive receptors
Medium	Moderately disturbed areas with some visual sensitivity
Low	Areas with existing disturbance and low sensitivity

4.9 Visual Absorption Capacity

The visual absorption capacity of the landscape was assessed to determine its ability to accommodate change.

Factors considered include:

- Vegetation cover and density
- Topography and landform
- Existing land use

Landscapes with low absorption capacity are more susceptible to visual impacts.

4.10 Impact Identification and Prediction

Potential visual impacts were identified based on the interaction between the proposed development and the receiving environment.

The following impact types were considered:

- Visual intrusion
- Landscape alteration
- Loss of visual amenity
- Visual scarring

Each impact was assessed for its potential effect on receptors and the landscape.

4.11 Impact Assessment Criteria

The significance of impacts was determined by evaluating key criteria.

Table 5: Impact Assessment Criteria

Criterion	Description
Magnitude	Scale and intensity of the impact
Extent	Geographic area affected
Duration	Time period over which the impact occurs
Probability	Likelihood of occurrence
Reversibility	Ability to restore the environment

4.12 Impact Significance Rating

Impact significance was determined by combining consequence and probability.

Table 6: Impact Significance Matrix

Consequence	Probability	Significance
Low	Low	Low
Medium	Medium	Medium
High	High	High

4.13 Mitigation and Residual Impact Assessment

Mitigation measures were developed to reduce identified impacts. These measures focus on:

- Avoidance of sensitive areas
- Reduction of visual contrast
- Enhancement of natural screening
- Rehabilitation of disturbed areas

Residual impacts were assessed after mitigation to determine the remaining level of impact.

4.14 Limitations of the Study

The assessment is subject to the following limitations:

- Dependence on available data and project information

- Seasonal variations in vegetation and visibility
- Assumptions related to final project design

Despite these limitations, the assessment provides a reliable evaluation of potential visual impacts.

4.15 Summary of Methodology

The methodology adopted for this Visual Impact Assessment ensures a comprehensive and systematic evaluation of visual impacts. The integration of spatial analysis, field verification, and professional judgement provides a robust basis for impact assessment and decision-making.

SECTION 5: BASELINE VISUAL ENVIRONMENT AND RECEPTOR CONTEXT

5.1 Introduction

This section characterises the existing visual environment within the study area by integrating spatial datasets, terrain analysis, land use patterns, vegetation structure, viewshed modelling, and field verification. The objective is to establish a defensible baseline against which the visual impacts of the proposed development can be assessed.

The baseline reflects a predominantly rural landscape with varying degrees of naturalness, visual exposure, and receptor sensitivity influenced by terrain and land use distribution.

5.2 Landscape Character and Land Use

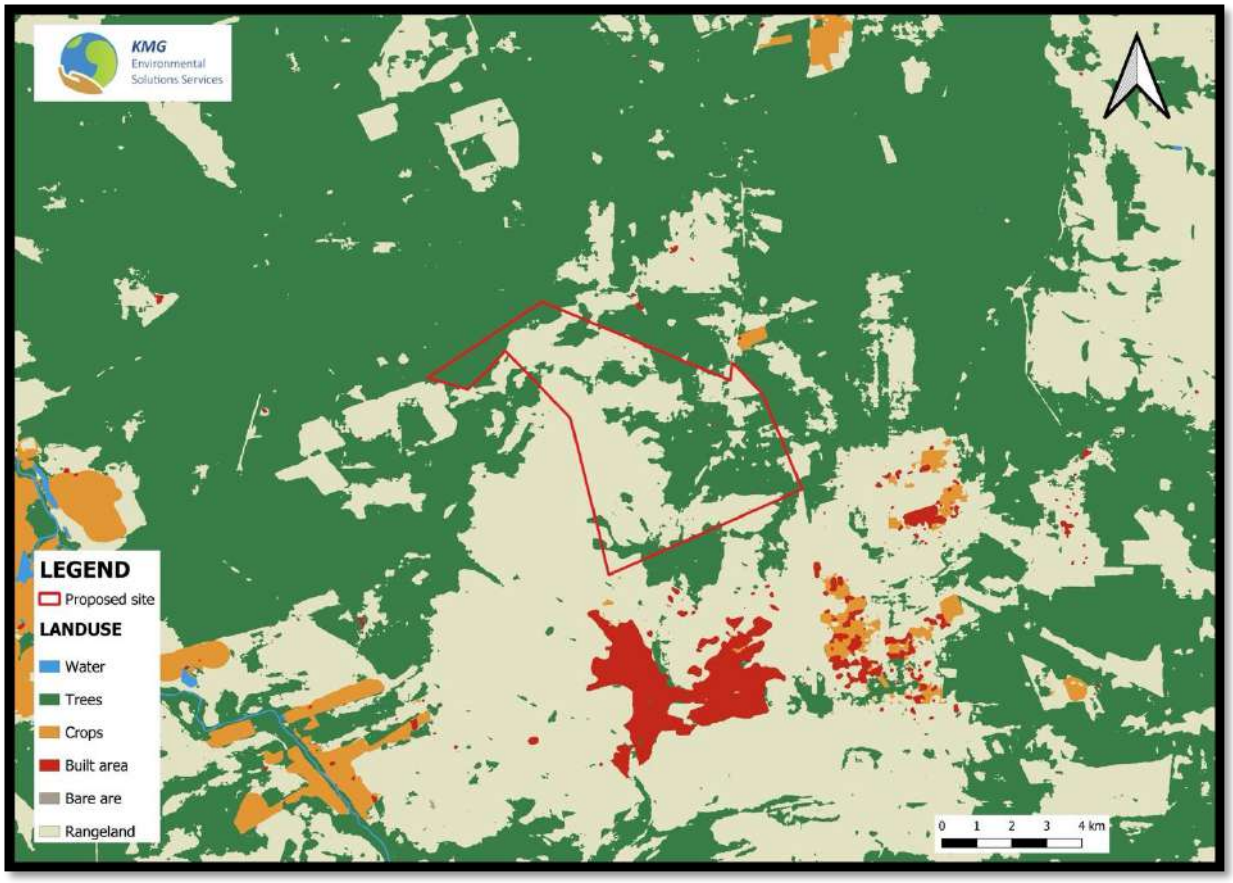


Figure 7: Land Use Map

The study area is dominated by natural rangeland interspersed with agricultural activities and limited built infrastructure. The landscape is largely open, with pockets of settlement and tourism-related land uses.

The key landscape characteristics include:

- Extensive natural bushveld forming the dominant visual matrix
- Agricultural transformation in flatter and accessible areas
- Localised built clusters associated with rural settlements
- Tourism and safari-related land uses contributing to landscape value

From a visual perspective, the landscape exhibits moderate to high scenic quality, particularly where natural vegetation remains intact and development is sparse.

5.3 Vegetation Structure and Visual Texture

Vegetation patterns across the study area introduce variation in colour, texture, and screening potential. The presence of Waterberg Mountain Bushveld and associated vegetation units contributes to a rugged and visually diverse landscape.

Vegetation influences the baseline in the following ways:

- Dense vegetation areas reduce visibility and increase absorption capacity
- Open thornveld areas allow extended views and increase exposure
- Transitional zones create visual contrast across the landscape

The overall vegetation structure supports a moderate visual absorption capacity, although this is highly variable depending on local density and terrain.

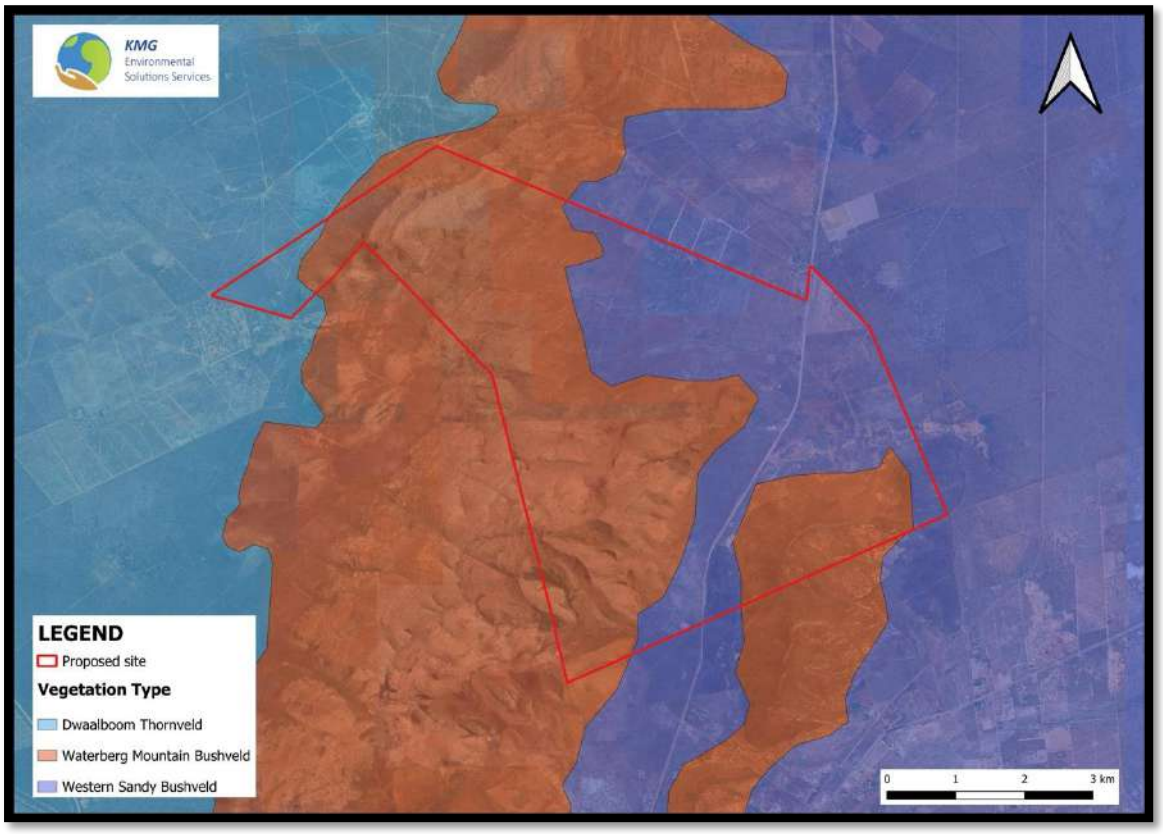


Figure 8: Vegetation Type Map

5.4 Terrain and Visual Exposure

Topography is the dominant factor influencing visual exposure within the study area. The presence of elevated ridges and mountainous terrain results in increased visibility across large portions of the landscape.

Key terrain-related observations include:

- Elevated areas function as primary visual exposure zones
- Slopes and ridgelines enable long-distance views toward the site
- Valleys and depressions provide localised screening
- Terrain orientation influences directional visibility

The topographical complexity creates a landscape where visibility is unevenly distributed, with certain receptors experiencing significantly higher exposure.

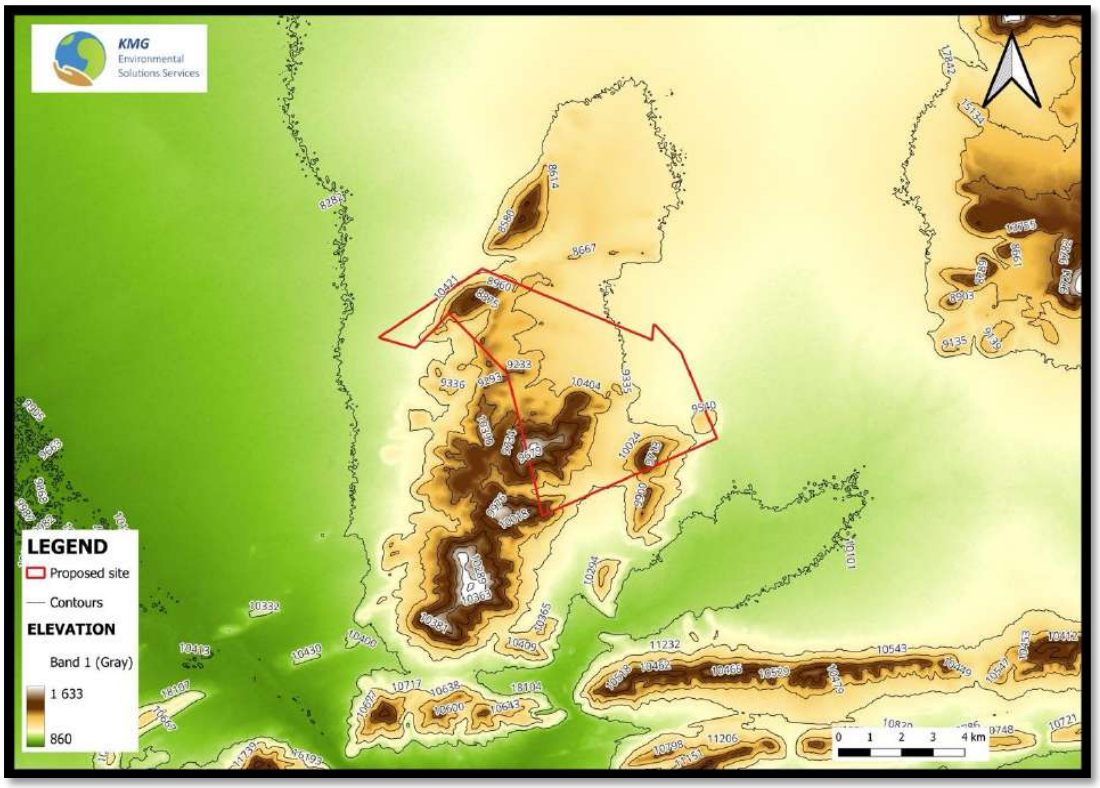


Figure 9: Topographic and Contour Map

5.5 Viewshed Interpretation

The viewshed analysis identifies the spatial extent of potential visibility of the proposed development. The results indicate that visibility is strongly influenced by terrain elevation and landscape openness.

The analysis shows:

- Extensive zones of theoretical visibility in elevated and open areas
- Moderate visibility across agricultural and transitional landscapes
- Limited visibility in areas with dense vegetation or terrain shielding

Importantly, several identified receptors fall within moderate to high visibility zones, indicating a direct line-of-sight relationship with the proposed development footprint.

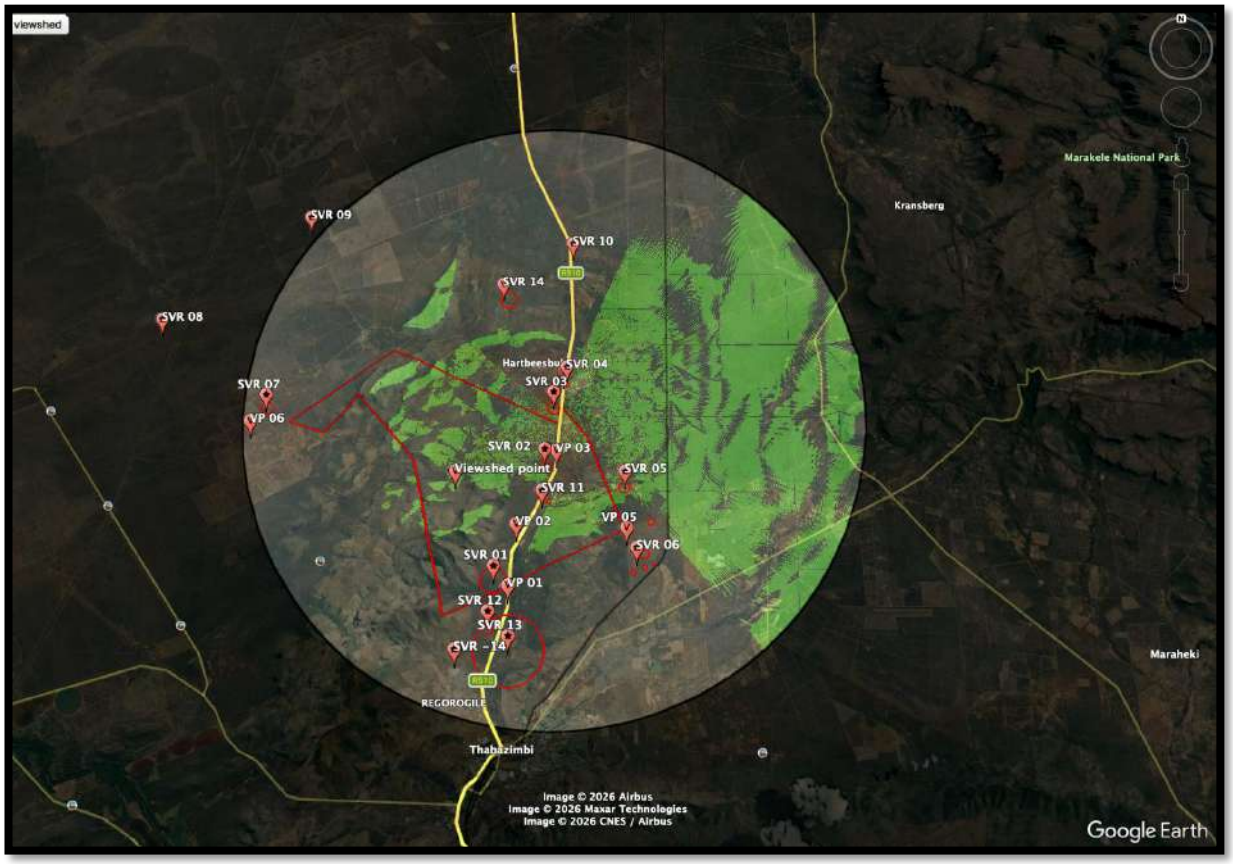


Figure 10: Viewshed Map

5.6 Visual Receptor Environment

The study area contains a range of receptors with varying sensitivity to visual change. These include residential dwellings, tourism facilities, transport corridors, and institutional areas.

Table 7: Visual Receptors

Receptor ID	Location	Description	Sensitivity
SVR 01	24°32'52.74"S 27°23'40.26"E	Residential dwellings and farmsteads	High
SVR 02	24°30'52.20"S 27°24'34.77"E	Residential dwellings and farmsteads	High
SVR 03	24°29'51.23"S 27°24'44.08"E	Residential dwellings and farmsteads	High
SVR 04	24°29'23.99"S 27°24'59.04"E	Residential dwellings and farmsteads	High
SVR 05	24°31'15.07"S 27°26'5.01"E	Residential dwellings and farmsteads	High
SVR 06	24°32'34.15"S 27°26'17.50"E	Residential dwellings and farmsteads	High
SVR 07	24°29'53.41"S 27°19'15.08"E	Residential dwellings and farmsteads	Medium
SVR 08	24°28'29.31"S 27°17'6.83"E	Tourism and game farming	High
SVR 09	24°26'32.70"S 27°19'53.04"E	Tourism and accommodation	High
SVR 10	24°27'5.06"S 27°25'5.54"E	Tourism and accommodation	High
SVR 11	24°31'36.02"S 27°24'32.30"E	Road users (R510)	Medium
SVR 12	24°33'37.43"S 27°23'35.02"E	Residential dwellings	High
SVR 13	24°34'1.42"S 27°23'57.30"E	Farming and safari operations	High

SVR 14	24°34'14.40"S 27°23'0.11"E	Institutional (TVET College)	High
SVR 15	24°27'52.83"S 27°23'44.62"E	Airstrip users and farmsteads	Medium

5.7 Viewpoints

Viewpoints were selected to represent typical viewing conditions and receptor perspectives within the study area.

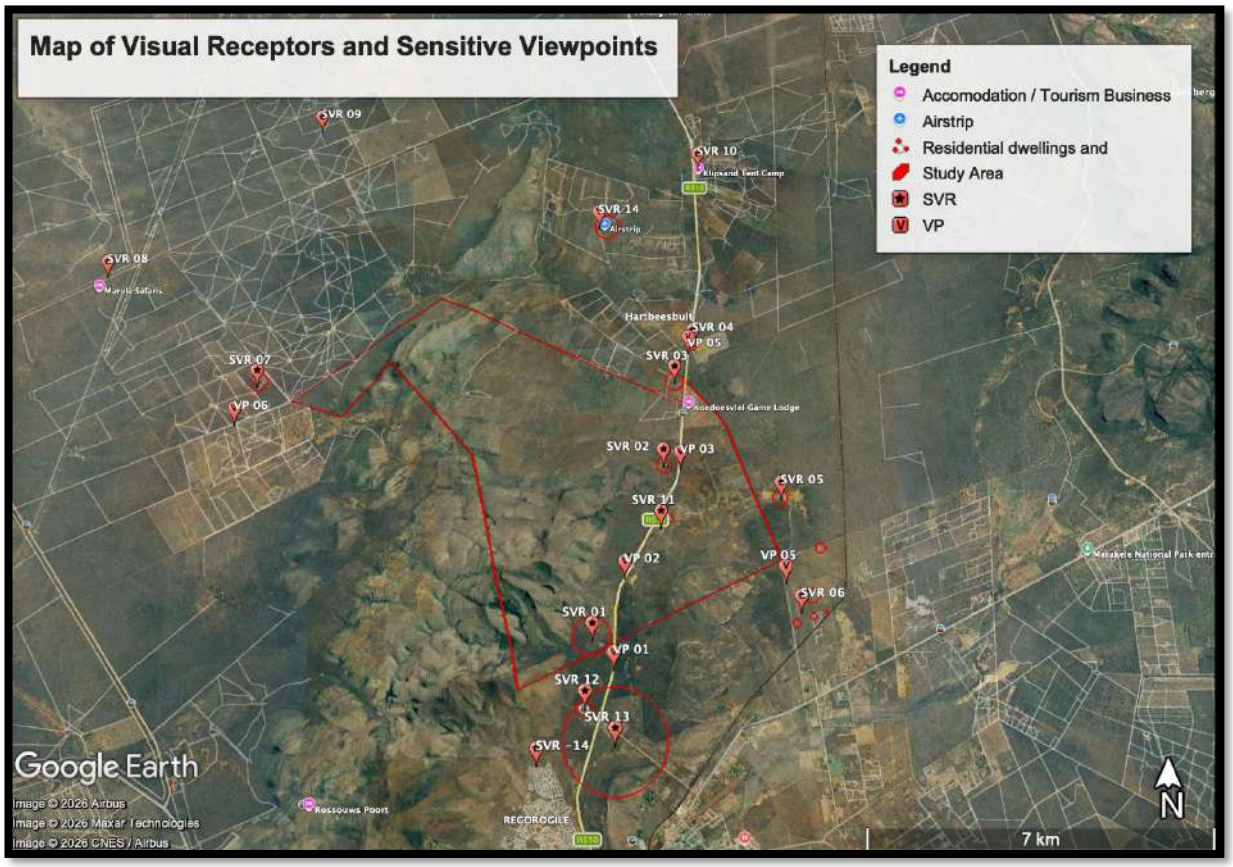


Figure 11: Map of Visual Receptors and Viewpoints

Table 8: Viewpoints

Viewpoint	Coordinates	Direction
VP 01	24°33'12.27"S 27°23'56.36"E	North
VP 02	24°32'11.17"S 27°24'4.67"E	North-East
VP 03	24°30'53.97"S 27°24'47.84"E	West

VP 04	24°29'29.17"S 27°24'55.27"E	North
VP 05	24°32'14.05"S 27°26'6.49"E	North-West
VP 06	24°30'21.55"S 27°18'59.47"E	East

5.8 Field Verification (Photographic Record)

Field verification was undertaken to validate desktop findings and to confirm actual visual conditions on site. Photographic records were collected at representative viewpoints and receptor locations.

Table 9: Baseline Photographic Plates

Plate	Field Taken Picture
Plate 5-1 – View from VP01 (South → North)	
Plate 5-2 – View from VP02 (South-West → North-East)	

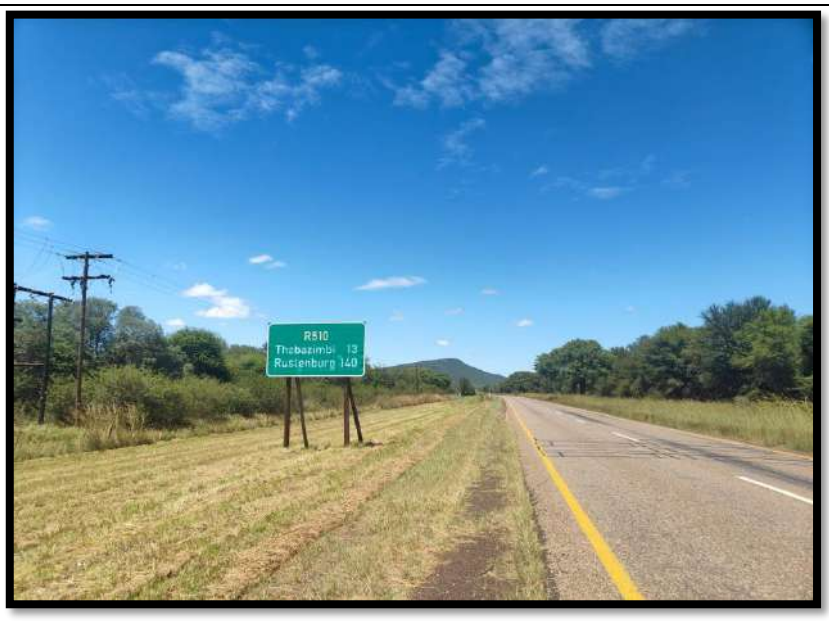
Plate 5-3 – View from VP03 (Central Receptors)	
Plate 5-4 – View from VP04 (Northern Receptors)	
Plate 5-5 – View from VP05 (Eastern Receptors)	

Plate 5-6 – View from VP06 (Western Tourism Area)	
Plate 5-7 – Vegetation	

The field observations confirm the following:

- The landscape is predominantly open in several areas, allowing extended visibility
- Vegetation provides partial but inconsistent screening
- Elevated terrain significantly increases visual exposure
- Built elements are currently limited and do not dominate the landscape
- The visual environment is largely natural, particularly away from settlements

The photographic record supports the viewshed analysis and confirms that visibility toward the site is achievable from multiple receptor locations.

5.9 Visual Sensitivity and Absorption Capacity

The baseline visual sensitivity is considered moderate to high due to:

- Presence of sensitive residential and tourism receptors
- Scenic value associated with natural bushveld landscapes
- Elevated terrain increasing visibility

Visual absorption capacity is variable:

- High in densely vegetated areas
- Moderate in mixed-use landscapes
- Low in exposed and elevated terrain

5.10 Baseline Summary

The baseline visual environment is defined by a combination of natural landscape character, sensitive receptors, and terrain-driven visibility. The interaction between open landscapes and elevated terrain creates conditions where visual exposure is pronounced in certain areas.

The integration of spatial analysis and field verification provides a robust and reliable representation of existing conditions, forming a sound basis for the assessment of visual impacts.

Table 10: Comprehensive Baseline Visual Environment Summary

Component	**Description**	**Key Characteristics**	**Sensitivity Rating**	**Visual Absorption Capacity**	**Visibility / Exposure**	**Key Risks / Implications**
Landscape Character	Predominantly rural bushveld landscape with agricultural	Natural vegetation dominates with scattered settlements	High	Moderate	Moderate to High	Potential loss of natural landscape character

	and tourism activities	and farming areas				
Land Use	Mix of rangeland, agriculture, tourism, and limited built-up areas	Low-density development with high reliance on natural landscape	High	Moderate	Moderate	Increased visual intrusion in low-density areas
Vegetation	Waterberg Mountain Bushveld, Dwaalboom Thornveld, Western Sandy Bushveld	Variable density, with both open and dense vegetation zones	High	High (dense areas) / Moderate (open areas)	Variable	Reduced screening in open vegetation areas
Topography	Mountainous terrain with ridges, slopes, and valleys	Strong elevation variation influencing visibility	High	Low (elevated areas) / Moderate (valleys)	High in elevated zones	Increased long-distance visibility
Viewshed	Extensive theoretical visibility across study area	High visibility from elevated and open areas	High	Low to Moderate	High	Multiple receptors fall within direct line of sight
Residential Receptors	Farmsteads and rural dwellings	Scattered but sensitive due to permanence and proximity	High	Low	High	Visual intrusion and loss of rural character

Tourism Receptors	Lodges, safari operations, accommodation facilities	Dependent on scenic quality and natural landscape	High	Low	High	Degradation of tourism value and visual experience
Road Users (R510)	Transport corridor with mixed users	Transient receptors with intermittent exposure	Medium	Moderate	Moderate	Short-term visual disturbance
Institutional Receptors	Waterberg TVET College	Permanent occupancy with high visual sensitivity	High	Low	Moderate to High	Visual degradation of institutional setting
Airstrip Users	Aviation-related receptors	Elevated viewing angles and wider visibility range	Medium	Low	Moderate	Aerial visual intrusion
Viewpoints	Representative observation locations (VP01–VP06)	Cover all directional perspectives	High	N/A	High	Confirm widespread visibility
Terrain Screening	Valleys and vegetated zones	Provide localised visual buffering	Medium	High	Low to Moderate	Partial mitigation potential

Open Landscape Areas	Areas with minimal vegetation	High exposure and low screening	High	Low	High	Increased visual prominence of infrastructure

The baseline assessment indicates that the study area exhibits a combination of high visual sensitivity and variable absorption capacity. The presence of elevated terrain and open landscapes significantly increases the potential for visibility of the proposed development.

The most critical baseline factors influencing visual impact include:

- High concentration of sensitive residential and tourism receptors
- Elevated terrain creating extensive viewsheds
- Open vegetation structures reducing screening effectiveness
- Strong reliance on natural landscape character for visual quality

Overall, the baseline conditions suggest that the receiving environment is moderately to highly sensitive to visual change, particularly in areas where visibility is high and receptors are concentrated.

6. VISUALISATION OF PROPOSED DEVELOPMENT (VIEWPOINT ANALYSIS)

6.1 Introduction

The purpose of this section is to present a visual simulation of the proposed mining development from selected viewpoints (VP01–VP04), representing sensitive receptors including road users, residential dwellings, tourism facilities, and accommodation establishments.

The visualisations provide a comparative understanding between the existing baseline landscape and the anticipated post-development scenario, allowing for a clear interpretation of potential visual change.

6.2 Visualisation Method

The visual simulations were developed based on:

- Field photography captured at representative viewpoints
- Viewshed analysis outputs indicating areas of theoretical visibility
- Topographical and land cover data
- Conceptual placement of mining infrastructure components

The simulations illustrate the expected scale, form, and visibility of the proposed development within the receiving environment.

6.3 Viewpoint Visualisations

6.3.1 Viewpoint VP01 (Facing North Direction)

Figure 12: Simulated View from VP01 Showing Proposed Development

The baseline view from VP01 represents a predominantly natural rural landscape, characterised by open grassland vegetation, scattered trees, and gently undulating terrain. The road forms the primary visual element, guiding the viewer's perspective into the distance, while the surrounding environment retains a high scenic and natural quality with minimal visible development.

The simulated view indicates very limited visual change from this viewpoint. The proposed mining activity is not directly visible; however, indirect effects are perceptible through increased road usage and faint dust emissions observed far in the distance on the left-hand side of the landscape. These changes are subtle and do not significantly alter the overall visual character of the area.

The visual change is characterised by:

- Slight increase in traffic presence along the road corridor
- Faint, distant dust emissions visible on the horizon
- No direct visibility of mining infrastructure from this viewpoint
- Retention of the natural landscape character and scenic quality

6.3.2 Viewpoint VP02 (Facing North-East Direction)

Figure 13: Simulated View from VP02 Showing Proposed Development

The baseline environment at VP02 includes denser vegetation patches, which provide partial screening of distant views. The landscape retains a natural and scenic quality, particularly relevant to tourism receptors.

The simulated view demonstrates that the proposed development will be partially visible through vegetation gaps. The visual intrusion is fragmented rather than continuous.

The visual change is characterised by:

- Intermittent visibility of infrastructure
- Partial blending in areas with vegetation screening
- Reduction in scenic quality for tourism-related receptors

6.3.3 Viewpoint VP03 (Facing North Direction)

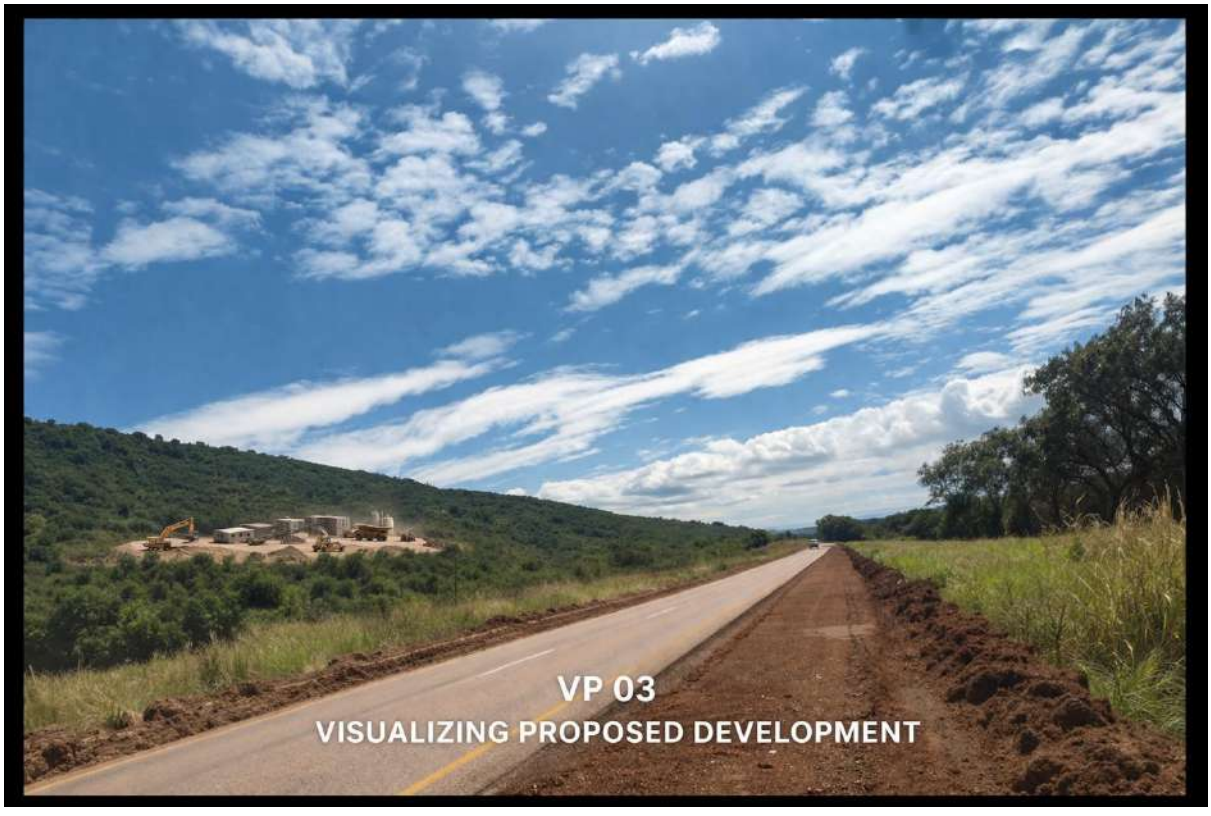


Figure 14: Simulated View from VP03 Showing Proposed Development

VP03 represents one of the most exposed viewpoints due to open terrain and limited vegetation cover. The baseline landscape allows extensive visibility across the study area.

The simulated view shows a clear and dominant presence of mining infrastructure within the visual field. The development is expected to significantly alter the landscape character.

The visual change is characterised by:

- High visual prominence of infrastructure
- Strong contrast with natural surroundings
- Significant alteration of rural visual character

6.3.4 Viewpoint VP04 (Facing West Direction)

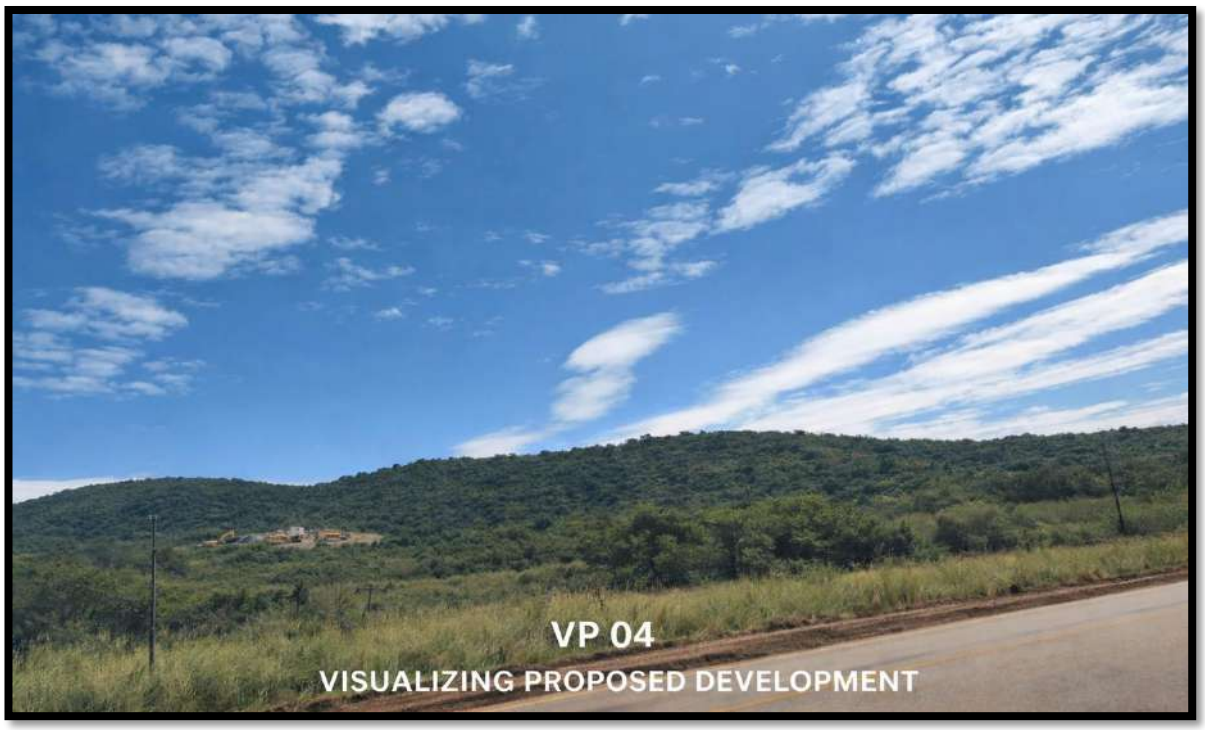


Figure 15: Simulated View from VP04 Showing Proposed Development

The baseline view from VP04 includes a combination of open areas and slightly elevated terrain, enhancing visibility across the landscape.

The simulated view indicates that the proposed development will be visible over extended distances, particularly affecting panoramic views experienced by tourism and residential receptors.

The visual change is characterised by:

- Increased visibility due to elevation
- Expansion of visual influence across the landscape
- Moderate to high visual intrusion depending on distance

6.4 Integrated Visual Comparison

Table 11Comparative Visualisation Panel (Baseline vs Simulated Views for VP01–VP04)

Visual Point	Baseline View Description	Simulated View Description	Key Visual Changes	Overall Visual Impact
VP01	Natural rural landscape with open grassland, scattered vegetation, and a dominant road corridor extending into the distance. Minimal visible disturbance.	No direct visibility of mining infrastructure. Slight increase in traffic and faint dust emissions visible far on the horizon (left-hand side).	• Increased traffic presence • Distant dust emissions • No infrastructure visibility	**Very Low**
VP02	Open bushveld landscape with moderate vegetation and linear elements such as road and powerlines. Clear sightlines across the terrain.	Small-scale mining activities positioned far from the road, beyond powerlines on the left. Infrastructure appears distant and partially screened.	• Introduction of distant mining elements • Limited visibility due to setback • Partial blending with environment	**Low**

VP03	Scenic bushveld landscape with mountainous backdrop and moderate vegetation cover. Strong natural character and visual cohesion.	Small-scale mining activity located at the foot of the mountain on the left, away from the road. Visible but not dominant.	• Localised infrastructure visibility • Slight reduction in scenic quality • Integration with landform	**Low to Medium**
VP04	Dense vegetation and mountainous terrain with high scenic value and minimal disturbance. Strong sense of natural intactness.	Mining activity positioned far from the road and visually distant at the foot of the mountain. Barely noticeable within the broader landscape.	• Very limited visibility • Minimal foreground/midground intrusion • No skyline disruption	**Very Low**

The comparative analysis highlights the extent of visual transformation associated with the proposed development. Across all viewpoints, the introduction of mining infrastructure results in varying degrees of visual change, influenced by vegetation, topography, and distance.

6.5 Summary of Visualisation Outcomes

Table 12: Visualisation Outcomes

Visual Point	Nature of Impact	Extent	Duration	Intensity	Probability	Significance (Pre-Mitigation)	Mitigation Measures	Significance (Post-Mitigation)
VP01	Indirect visual impact (traffic & distant dust)	Local	Medium-term	Low	High	**Low**	• Dust suppression (water spraying) • Speed control for vehicles • Proper road maintenance	**Very Low**
VP02	Introduction of distant mining infrastructure	Local	Long-term	Low	High	**Low to Medium**	• Maintain setback from road • Use natural colour tones for infrastructure • Progressive rehabilitation	**Low**
VP03	Visible mining at foot of mountain	Local	Long-term	Medium	High	**Medium**	• Limit vertical structures • Vegetation buffering where possible • Minimise disturbed footprint	**Low to Medium**

VP04	Distant, minimally visible mining activity	Local	Long-term	Very Low	High	**Low**	• Maintain distance from sensitive views • Avoid skyline intrusion • Ongoing rehabilitation	**Very Low**

6.6 Key Interpretation

The visual simulations confirm that the proposed development will introduce noticeable to significant visual changes within the study area. The degree of impact varies depending on receptor location and environmental conditions.

Key interpretations include:

- Highest visual impact expected at VP03 due to open exposure
- Moderate to high impacts at VP01 and VP04 due to visibility and receptor sensitivity
- Reduced but still noticeable impacts at VP02 due to vegetation screening
- Tourism and residential receptors remain the most sensitive

7. VISUAL IMPACT ASSESSMENT

7.1 Introduction

This section presents the assessment of potential visual impacts associated with the proposed mining development. The assessment evaluates the magnitude, extent, duration, and significance of visual impacts on identified receptors, including residential dwellings, tourism facilities, road users, and institutional areas.

The assessment is informed by the baseline environment, viewshed analysis, and visualisation outputs presented in preceding sections.

7.2 Impact Assessment Methodology

The visual impact assessment follows a structured approach based on standard environmental impact assessment practices in South Africa.

The significance of impacts is determined by considering:

- Nature of the impact
- Extent (site, local, regional)
- Duration (short-term, medium-term, long-term, permanent)

- Intensity (low, moderate, high)
- Probability of occurrence
- Reversibility
- Irreplaceability of affected environment

7.3 Impact Rating Criteria

Table 13: Impact Rating Scale

Criteria	Description
Extent	Site (1), Local (2), Regional (3)
Duration	Short-term (1), Medium-term (2), Long-term (3), Permanent (4)
Intensity	Low (1), Moderate (2), High (3)
Probability	Unlikely (1), Possible (2), Probable (3), Definite (4)

7.4 Impact Significance Formula

Impact Significance is calculated as:

Significance = (Extent + Duration + Intensity) × Probability

7.5 Significance Rating Categories

Score	Significance
1–10	Low
11–20	Moderate
21–30	High
>30	Very High

7.6 Identified Visual Impacts

The following key visual impacts have been identified:

- Visual intrusion of mining infrastructure
- Alteration of natural landscape character

- Reduction in scenic quality for tourism receptors
- Visual disturbance to residential dwellings
- Increased visibility from transport corridors

7.7 Detailed Impact Assessment

Impact 1: Visual Intrusion of Mining Infrastructure

Description:

The introduction of mining infrastructure such as pits, stockpiles, processing plants, and access roads will result in visible industrial features within a predominantly natural landscape.

Table 14: Impact Assessment – Visual Intrusion

Criteria	Rating	Motivation
Extent	3	Visible across local to regional scale due to viewshed
Duration	4	Permanent for life-of-mine
Intensity	3	High contrast with natural environment
Probability	4	Definite

Significance Calculation:

$(3 + 4 + 3) \times 4 = 40$

Significance Rating: Very High

Impact 2: Impact on Residential Receptors

Description:

Farm dwellers and rural households will experience direct views of the development, resulting in reduced visual amenity and alteration of sense of place.

Table 15: Impact Assessment – Residential Receptors

Criteria	Rating	Motivation
Extent	2	Localised to residential clusters
Duration	4	Long-term to permanent

Intensity	3	High sensitivity receptors
Probability	4	Definite

Significance Calculation:

(2 + 4 + 3) × 4 = 36

Significance Rating: Very High

Impact 3: Impact on Tourism and Accommodation Facilities

Description:

Tourism receptors, including lodges and safari operations, may experience degradation of scenic quality due to visible industrial elements.

Table 16**:** Impact Assessment – Tourism Receptors

Criteria	Rating	Motivation
Extent	3	Regional visibility affecting tourism landscape
Duration	4	Long-term
Intensity	3	High reliance on visual quality
Probability	3	Probable

Significance Calculation:

(3 + 4 + 3) × 3 = 30

Significance Rating: High

Impact 4: Visual Impact on Road Users (R510 Corridor)

Description:

Road users will experience intermittent visual exposure to mining infrastructure along transport routes.

Table 17: Impact Assessment – Road Users

Criteria	Rating	Motivation

Extent	2	Local along road corridor
Duration	3	Long-term
Intensity	2	Moderate due to transient exposure
Probability	4	Definite

Significance Calculation:

(2 + 3 + 2) × 4 = 28

Significance Rating: High

Impact 5: Alteration of Landscape Character

Description:

The transformation from a natural bushveld landscape to an industrial mining environment will fundamentally alter the visual character of the area.

Table 18: Impact Assessment – Landscape Character

Criteria	Rating	Motivation
Extent	3	Regional scale
Duration	4	Permanent
Intensity	3	High
Probability	4	Definite

Significance Calculation:

(3 + 4 + 3) × 4 = 40

Significance Rating: Very High

7.8 Consolidated Impact Summary

Table 19: Consolidated Impact Summary

Impact	Extent	Duration	Intensity	Probability	Score	Significance
Visual Intrusion	3	4	3	4	40	Very High
Residential Impact	2	4	3	4	36	Very High

Tourism Impact	3	4	3	3	30	High
Road Users	2	3	2	4	28	High
Landscape Change	3	4	3	4	40	Very High

7.9 Key Findings

The assessment indicates that the proposed development will result in moderate to very high visual impacts, particularly for sensitive receptors such as residential dwellings and tourism facilities.

Key findings include:

- High visibility due to topography and open landscape
- Strong visual contrast between natural and industrial elements
- Significant impacts on high-sensitivity receptors
- Widespread alteration of landscape character

The results highlight the need for robust mitigation measures to reduce visual impacts.

8. MITIGATION MEASURES AND RESIDUAL IMPACT ASSESSMENT

8.1 Introduction

This section outlines mitigation measures aimed at reducing the visual impacts associated with the proposed mining development. The effectiveness of these measures is evaluated through a post-mitigation impact assessment, demonstrating the extent to which visual impacts can be reduced to acceptable levels.

Mitigation measures are designed in accordance with the mitigation hierarchy, focusing on avoidance, minimisation, and rehabilitation.

8.2 General Mitigation Principles

The following overarching principles apply to all visual mitigation measures:

- Reduce visibility of infrastructure where feasible
- Integrate development into the surrounding landscape
- Minimise contrast between development and natural environment
- Preserve sensitive views where possible
- Implement progressive rehabilitation

8.3 Specific Mitigation Measures

8.3.1 Visual Intrusion of Mining Infrastructure

Mitigation measures include:

- Positioning infrastructure in lower-lying areas to reduce visibility
- Limiting the height and extent of above-ground structures where feasible
- Use of natural colour palettes (earth tones) for buildings and equipment
- Implementation of perimeter berms and screening structures
- Progressive rehabilitation of disturbed areas

8.3.2 Residential Receptors

Mitigation measures include:

- Establishment of vegetative screening buffers around sensitive receptors
- Maintenance of buffer zones between development and residential areas
- Strategic placement of infrastructure away from direct line of sight
- Use of topography to shield views

8.3.3 Tourism and Accommodation Facilities

Mitigation measures include:

- Preservation of key scenic view corridors
- Avoidance of development in visually prominent areas
- Enhancement of natural screening through indigenous vegetation planting
- Reduction of night-time lighting impacts through directional lighting

8.3.4 Road Users (R510 Corridor)

Mitigation measures include:

- Establishment of roadside vegetation buffers
- Minimisation of exposed infrastructure along road corridors
- Use of natural terrain features to obscure views
- Implementation of visual barriers where necessary

8.3.5 Landscape Character

Mitigation measures include:

- Phased development to limit cumulative visual disturbance
- Rehabilitation aligned with natural landscape patterns
- Removal of redundant infrastructure after closure
- Restoration of natural vegetation cover

8.4 Residual Impact Assessment (Post-Mitigation)

Table 20: Post-Mitigation Impact Assessment

Impact	Extent	Duration	Intensity	Probability	Score	Significance
Visual Intrusion	2	4	2	3	24	High
Residential Impact	2	4	2	3	24	High
Tourism Impact	2	4	2	2	16	Moderate
Road Users	2	3	1	3	18	Moderate
Landscape Change	2	4	2	3	24	High

8.5 Comparison of Pre- and Post-Mitigation Impacts

Table 21: Impact Reduction Summary

Impact	Pre-Mitigation	Post-Mitigation	Improvement
Visual Intrusion	Very High (40)	High (24)	Reduced
Residential Impact	Very High (36)	High (24)	Reduced

Tourism Impact	High (30)	Moderate (16)	Reduced
Road Users	High (28)	Moderate (18)	Reduced
Landscape Change	Very High (40)	High (24)	Reduced

8.6 Key Observations

The implementation of mitigation measures significantly reduces the severity of visual impacts across all receptor categories. However, due to the nature of mining activities, certain impacts remain unavoidable.

Key observations include:

- Visual impacts can be reduced but not fully eliminated
- Residential and landscape impacts remain relatively high
- Tourism impacts show the most effective reduction
- Vegetation and topography play a critical role in mitigation

8.7 Residual Impact Statement

Following the implementation of recommended mitigation measures, the residual visual impacts are considered moderate to high. While the development will introduce permanent changes to the landscape, the impacts are deemed manageable within the context of the surrounding land uses.

The project can proceed from a visual perspective, provided that all mitigation measures are strictly implemented and monitored.

9. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) INPUTS FOR VISUAL IMPACTS

9.1 Introduction

This section provides specific Environmental Management Programme inputs aimed at managing and reducing visual impacts associated with the proposed mining development. The

measures outlined below must be implemented throughout the construction, operational, and closure phases of the project to ensure effective visual impact management.

9.2 Objectives of Visual Management

The primary objectives of visual impact management are:

- To minimise the visibility of mining infrastructure
- To protect sensitive visual receptors, including residential and tourism areas
- To maintain, where possible, the natural landscape character
- To ensure progressive rehabilitation of disturbed areas
- To reduce long-term visual scarring of the landscape

9.3 Management Actions by Project Phase

9.3.1 Construction Phase

Aspect	Management Action	Responsibility	Monitoring	Frequency
Site Clearing	Limit clearing to approved footprint only	Contractor / ECO	Visual inspection	Weekly
Vegetation Removal	Retain existing vegetation where feasible	Contractor	ECO audit	Weekly
Stockpiles	Locate in low-visibility areas	Contractor	Visual checks	Weekly
Temporary Infrastructure	Avoid placement on elevated areas	Contractor	ECO monitoring	Weekly
Dust Control	Implement dust suppression measures	Contractor	Monitoring reports	Continuous

9.3.2 Operational Phase

Aspect	Management Action	Responsibility	Monitoring	Frequency

Infrastructure Design	Use natural colours and non-reflective materials	Proponent	Visual audit	Once-off / ongoing
Lighting	Use downward-facing, low-intensity lighting	Proponent	Night inspection	Monthly
Screening	Establish vegetative buffers	Proponent	Vegetation monitoring	Quarterly
Waste Dumps / Stockpiles	Shape and stabilise to blend with terrain	Proponent	Visual inspection	Monthly
Progressive Rehabilitation	Rehabilitate disturbed areas continuously	Proponent	Rehabilitation reports	Quarterly

9.3.3 Closure and Rehabilitation Phase

Aspect	Management Action	Responsibility	Monitoring	Frequency
Infrastructure Removal	Remove all non-essential structures	Proponent	Final audit	Once-off
Landform Restoration	Re-contour disturbed areas to natural profiles	Proponent	Visual inspection	Monthly
Vegetation Rehabilitation	Re-establish indigenous vegetation	Proponent	Vegetation surveys	Bi-annual
Long-term Stability	Ensure no visual scarring remains	Proponent	Post-closure monitoring	Annual

9.4 Monitoring and Reporting

Visual monitoring must be conducted throughout the project lifecycle to ensure compliance with mitigation measures.

Monitoring requirements include:

- Photographic monitoring from fixed viewpoints (VP01–VP06)
- Quarterly visual inspections by Environmental Control Officer
- Documentation of rehabilitation progress
- Reporting of non-compliance and corrective actions

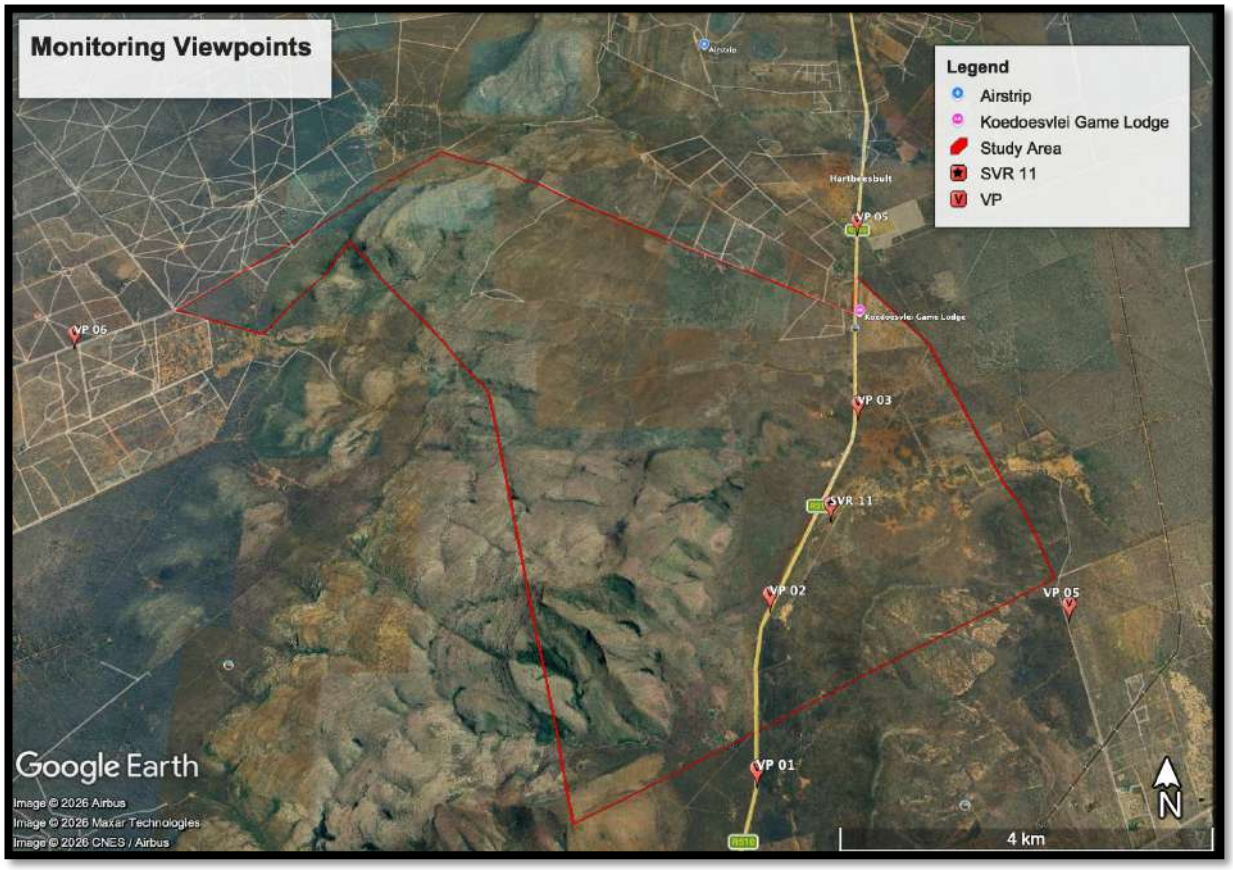


Figure 16: Photographic Monitoring Points Map (VP01–VP06)

9.5 Compliance Requirements

All visual mitigation measures must comply with:

- National Environmental Management Act (NEMA)
- Environmental Authorisation conditions
- Approved Environmental Management Programme

Failure to implement mitigation measures may result in increased visual impacts and regulatory non-compliance.

10. CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion

The Visual Impact Assessment has evaluated the potential visual effects of the proposed mining development within the study area. The assessment considered baseline conditions, viewshed analysis, sensitive receptors, and visual simulations from key viewpoints.

The study area is characterised by a predominantly natural bushveld landscape with scattered residential dwellings, tourism facilities, and transport corridors. The visual environment exhibits moderate to high sensitivity due to its reliance on natural landscape character and scenic quality.

The assessment identified several key visual impacts, including visual intrusion of mining infrastructure, alteration of landscape character, and impacts on residential and tourism receptors. These impacts are primarily driven by the visibility of the development across open terrain and elevated areas.

Pre-mitigation impact ratings indicate moderate to very high significance, particularly for sensitive receptors. However, the implementation of appropriate mitigation measures significantly reduces the severity of these impacts.

Post-mitigation impacts are generally reduced to moderate to high significance levels, indicating that while visual impacts cannot be completely eliminated, they can be effectively managed.

10.2 Recommendations

Based on the findings of this assessment, the following recommendations are made:

- All proposed mitigation measures must be strictly implemented
- Infrastructure should be designed to minimise visual contrast
- Vegetation screening must be prioritised and maintained
- Progressive rehabilitation must be undertaken throughout the project lifecycle
- Visual monitoring must be conducted using fixed viewpoints

- Sensitive receptors, particularly tourism and residential areas, must be considered in final design layouts

10.3 Overall Statement

From a visual impact perspective, the proposed development is considered acceptable, provided that all recommended mitigation measures and management actions are implemented effectively.

The project may proceed, subject to compliance with environmental authorisation conditions and ongoing monitoring of visual impacts.

11. REFERENCES

- Department of Environmental Affairs (DEA). 2014. *National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations, 2014*. Pretoria: DEA.
- Department of Forestry, Fisheries and the Environment (DFFE). 2020. *Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes*. Pretoria: DFFE.
- Department of Environmental Affairs and Tourism (DEAT). 2002. *Guideline Document on Environmental Impact Assessment Regulations*. Pretoria: DEAT.
- Oberholzer, B. 2005. *Guideline for Involving Visual and Aesthetic Specialists in Environmental Impact Assessment Processes*. CSIR Report ENV-S-C 2005 053. Stellenbosch: CSIR.
- Palmer, J.F. 2000. *Reliability of Rating Visible Landscape Qualities*. Landscape Journal, 19(1–2): 166–178.
- South African National Roads Agency SOC Ltd (SANRAL). 2013. *Visual Impact Assessment Guidelines for Road Projects*. Pretoria: SANRAL.
- Landscape Institute and Institute of Environmental Management & Assessment (IEMA). 2013. *Guidelines for Landscape and Visual Impact Assessment (GLVIA3)*. 3rd Edition. London: Routledge.
- United States Bureau of Land Management (BLM). 2008. *Visual Resource Management Manual*. Washington, DC: U.S. Department of the Interior.

- European Commission. 2017. *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report*. Luxembourg: Publications Office of the European Union.
- Forman, R.T.T. & Godron, M. 1986. *Landscape Ecology*. New York: Wiley.
- Turner, M.G., Gardner, R.H. & O'Neill, R.V. 2001. *Landscape Ecology in Theory and Practice*. New York: Springer.
- Natural England. 2014. *An Approach to Landscape Character Assessment*. Sheffield: Natural England.
- South African National Biodiversity Institute (SANBI). 2018. *National Biodiversity Assessment*. Pretoria: SANBI.
- Council for Scientific and Industrial Research (CSIR). 2010. *Guidelines for Specialist Studies in Environmental Impact Assessments*. Pretoria: CSIR.

APPENDICES

Appendix A: Specialist Declaration

I, Mpho Ramalivhana declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Mpho Ramalivhana Pri Sci. Nat (Hons. Bot.; SAAB; SACNASP).

I, Khumbelo Given Marabe declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).

- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Signature

Khumbelo Given Marabe

SACNASP NO: 132731

WISA REG NO :39885

IAIAsa: Membership no: 7837

IIAV Member No. 3163

Appendix B: Specialist CV

Mr Khumbelo Given Marabe

Principal Environmental Consultant | Director – KMG Environmental Solutions Services (Pty) Ltd

SACNASP Registered– Reg. No. **132731**

WISA Professional Process Controller – Reg. No. **39885**

Summary of Expertise:

Mr. Marabe is an experienced environmental specialist with over a decade of expertise in:

- Visual, Social, Wetland and Terrestrial Impact assessments
- Agricultural and soil capability impact assessments
- Noise, air quality, water, and dust monitoring
- Environmental awareness training
- Environmental audits and licensing applications
- NEMA and NWA compliance
- Environmental management and monitoring across sectors including mining, manufacturing, and renewable energy

Education & Certifications:

- BSc Environmental Sciences – University of Venda
- NEBOSH Environmental Management Certificate (2024)
- ISO 45001 & ISO 14001 Implementation & Internal Auditor – NOSA
- Health and Safety Regulations – HASLAC
- Certificates in Management Development (GIBS – AECI Programmes)
- Honours in Environmental Monitoring & Modelling (ongoing – UNISA)

Ms. Jeniffer Mutsila

Environmental GIS and Mapping Technician
Affiliation: KMG Environmental Solutions Services (Pty) Ltd
🎤 *Junior Environmental Assessment Practitioner, Environmental Mapping & spatial analysis*

Professional Overview:
Ms. Jeniffer Mutsila is a technically skilled Environmental Mapping and GIS Technician with a background in field-based wetland delineation and spatial data analysis. He provides vital support in environmental assessments by producing geospatial products and performing site-level data validation for use in Environmental Impact Assessments (EIAs), Basic Assessments (BAs), Wetland Impact Assessments, and Water Use Licence Applications (WULAs).

With hands-on experience in both **desktop and field applications**, Jeniffer brings a valuable blend of practical and digital expertise to complex projects that require environmental sensitivity mapping, buffer zone compliance checks, and spatial integration of biodiversity datasets.

Core Competencies:

- GIS Mapping & Spatial Analysis (ArcGIS, QGIS)
- GPS-based Field Surveying and Data Collection
- Wetland and Riparian Zone Delineation Support
- Environmental Reporting: BAR, EIA, EMPr, EMP, WULA, EPR
- Legislation Knowledge: NEMA, Water Act, Waste Act, Air Quality Act, MPRDA

Key Project Contributions:

◆ **Wetland Mapping and Sensitivity Overlay Support**

- Developed comprehensive map series for **prospecting right applications** in the North West and Limpopo provinces, including:
  - ✓ **Wetland Classification Maps** (HGM units: seep, valley-bottom, flat wetlands)
  - ✓ **30 m Riparian Buffer Sensitivity Maps**
  - ✓ **500 m Regulated Area Compliance Maps**
  - ✓ **Field-Verified Wetland Delineation Maps**

◆ **GIS Support for Impact Assessments**

- Integrated **soil, rainfall, vegetation, and biodiversity** datasets with national layers (e.g., NFEPA, Aquatic CBAs, ESA zones) to support:
  - ✓ Wetland Impact Assessments
  - ✓ Agricultural Impact Assessments (AIA)
  - ✓ Biodiversity screening and risk mapping

◆ **Field Data Management & GPS Verification**

- Accompanied environmental specialists on site visits to:
  - ✓ Capture **wetland and watercourse coordinates**
  - ✓ Assist with **transect layout and data recording**
  - ✓ Cross-check digital boundary outputs against **ground conditions**

◆ **Reporting and Compliance Visuals**

- Prepared high-resolution map figures used in:
  - ✓ **Basic Assessment Reports (BARs)**
  - ✓ **Environmental Management Programmes (EMPrs)**
  - ✓ **Water Use Licence Applications (WULAs)**
- Ensured maps met **legislative and formatting standards** for submission to DMRE, DWS, and DFFE.

Professional Strengths:

- Detail-oriented and deadline-driven
- Strong spatial logic and environmental understanding
- Collaborative work ethic with specialists and field teams
- Effective communication of spatial data to technical and non-technical audiences

Summary Value to Projects:

Ms. Jeniffer GIS and mapping expertise plays an essential role in ensuring that environmental reports are visually informative, spatially accurate, and legally aligned. His ability to translate field data into structured spatial products enhances the defensibility and scientific integrity of environmental applications, especially those involving wetland delineation, regulated activity compliance, and site sensitivity verification

MPHO RAMALIVHANA

09 Krinkhout Avenue, Glen Marais, 1619

ramalivhanam@naledznaies.co.za | ramalivhanam@gmail.com

078 901 4833

LinkedIn: Available upon request

Driver's License: Code C1 (10)

ZA Nationality: South African

Date of Birth: 07 February 1987

PROFESSIONAL PROFILE

A seasoned Environmental Consultant and Director with over 15 years of diverse experience in environmental management, impact assessment, ecological monitoring, and biodiversity studies. Demonstrates excellence in leading multidisciplinary projects across Prospecting, energy, infrastructure, and conservation sectors across South Africa and the SADC region. A specialist in terrestrial biodiversity assessments, with hands-on expertise in managing complex EIA and EMP processes in alignment with local legislation and international standards (IFC PS, Equator Principles).

AREAS OF EXPERTISE

- Terrestrial Biodiversity & Ecological Assessments
- Environmental Impact Assessments (EIA) & Management Programmes (EMP)
- Environmental Monitoring & Auditing

- Wetland and Water Resource Assessments
- Stakeholder Engagement & Public Participation
- Environmental Due Diligence & Site Assessments
- IFC Performance Standards & Equator Principles Implementation

EDUCATION

Honours Degree in Botany (Plant Ecology)

University of Limpopo | 2008

Bachelor of Science in Botany & Microbiology

University of Limpopo | 2007

Matriculation (Grade 12)

Mudinane Secondary School | 2004

PROFESSIONAL AFFILIATIONS

- **South African Council for Natural Scientific Professions (SACNASP)** – Reg. No. 400395/14
- **South African Association of Botanists (SAAB)** – Member
- **International Association for Impact Assessment South Africa (I AWIAsa)** – Member

SELECTED BIODIVERSITY / TERRESTRIAL PROJECTS

- Terrestrial Biodiversity Assessment for a proposed mixed-use development on Greater Giyani 891 LT, Limpopo
- Biodiversity Assessment for prospecting right on Zwartrand 145 IP, Ventersdorp, North West
- Terrestrial Ecological Assessment – Glencore Merafe Venture: Boshoek Smelter, North West
- Biodiversity Impact Assessment for Eskom 132/11/6.6kV Calcined Products Line, Westonaria
- Terrestrial Biodiversity Study – Westgate Randfontein 132kV Line Deviation, Gauteng

- Biodiversity Impact Assessment for township development on Fouriestrust 2525, Free State
- Ecological Assessment for lodge development on Kheto Agricultural Farm, Greater Giyani
- Terrestrial Ecological Assessment for a ±5km 88kV Power Line, City of Tshwane

CAREER HISTORY

Managing Director / Senior Environmental Consultant

Naledzani Environmental Services | Nov 2014 – Present

- Lead biodiversity and terrestrial assessment teams
- Manage full EIA and EMP processes
- Conduct environmental audits and monitoring
- Business development and client liaison

Associate Environmental Assessment Practitioner

Joan Construction and Projects | Jun 2015 – Present

- Prepare and review environmental reports, with focus on ecological assessments
- Manage Prospecting and infrastructure projects

Environmental Consultant

Parsons Brinckerhoff Africa (now WSP) | Mar 2013 – Oct 2014

- Managed EIA and EMP development
- Led biodiversity and ecological studies
- Conducted baseline surveys, compliance monitoring

Senior Environmental Consultant

Tshikovha Environmental & Communication Consulting | Feb 2011 – Feb 2013

- Coordinated EIA, EMP, and stakeholder engagement processes
- Mentored junior staff and oversaw technical reviews

Data Management Co-ordinator Trainee

South African National Biodiversity Institute (SANBI) | Apr 2010 – Jan 2011

- Plant species identification, data collection, and mapping using GIS

Biodiversity Management Intern

Limpopo Dept. of Economic Development, Environment and Tourism | Apr 2009 – Mar 2010

- Wetland identification and rehabilitation assessments
- Conducted biodiversity impact reviews and river health monitoring

KEY PROJECT EXPERIENCE SNAPSHOT

- **Namibia**: ESIA for City of Windhoek's Bus Depot & Waste Facilities
- **Mozambique**: ESIA for Ncondezi Thermal Power Plant
- **Rwanda**: 220 kV Transmission Line for EWSA
- **South Africa**: Chrome and coal Prospecting EIAs, solar facilities, landfill upgrades, transmission lines
- **Ecological Monitoring**: Randwater Pipelines, Davhana Bridge Construction, Majosi-Levubu Road.

KMG
Environmental
Solutions Services

WETLAND IMPACT ASSESSSMENT FOR THE PROPOSED APPLICATION FOR MINING RIGHT FOR IRON ORE (FE) AND ASSOCIATED MINERALS ON PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF FARM CORNWALL 313 KQ AND REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF FARM KOEDOEVLEI 128 KQ, THABAZIMBI LOCAL MUNICIPALITY, LIMPOPO PROVINCE

LP 30/5/1/2/3/2/1/(10287) MR

PREPARED FOR:

ARENGO 297 (PTY) LTD

DATE OF SUBMISSION:
March 2026

Website: www.kmgenviro.co.za
Tel: 011 969 6184
Email: marabekg@kmgenviro.co.za
LEAD SPECIALIST: Khumbelo Given Marabe
Director and Principal Environmental Consultant
SACNASP NO: 132731
WISA REG NO :39885
IAIAsa: Membership no: 7837
IIAV Member No. 3163

WETLAND IMPACT ASSESSMENT REPORT

ENVIRONMENTAL IMPACT ASSESSMENT FOR MINING RIGHT APPLICATION

Project Title

Wetland Impact Assessment for the Proposed Mining Right Application
Arengo 297 (Pty) Ltd

DMRE Reference Number

LP 30/5/1/2/3/2/1/(10287) MR

Project Description

Environmental Authorisation process for the proposed mining of iron ore (Fe) within the following properties:

- Portions RE/2/313, RE/3/313, and RE/4/313 of the Farm Cornwall 313 KQ
- Remaining Extent of Portions 2, 5, 8, 9, 10, and 11 of the Farm Koedoevlei 128 KQ

Located within:
Thabazimbi Local Municipality
Waterberg District Municipality
Limpopo Province

Project Extent: Approximately 3,892 hectares

Prepared For: Arengo 297 (Pty) Ltd

Environmental Assessment Practitioner (EAP)

Vahlengwe Mining Advisory and Consulting (Pty) Ltd

Wetland Specialist

KMG Environmental Solutions Services (Pty) Ltd
08 Hillside Road, Metropolitan Building, 1st Floor B
Parktown, Johannesburg, 2193

Tel: 011 969 6184 / 011 480 4822
Cell: 072 546 3191

DOCUMENT INFORMATION

Item	Description
Report Title	Wetland Impact Assessment Report
Project Name	Arengo 297 Mining Right Application
Project Description	Proposed mining of iron ore (Fe)
DMRE Reference Number	LP 30/5/1/2/3/2/1/(10287) MR
Report Number	KMG-WIA-2026-10287MR
Report Type	Specialist Study Report
Date	March 2026
Revision Status	Draft / Final
Prepared By	KMG Environmental Solutions Services (Pty) Ltd
Author	Khumbelo Given Marabe
Author Qualification	Pr.Sci.Nat
Reviewed By	Mpho Ramalivhana
Approved By	Khumbelo Given Marabe
Client	Arengo 297 (Pty) Ltd
Environmental Assessment Practitioner	Vahlengwe Mining Advisory and Consulting (Pty) Ltd

Project Location	Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province
Property Description	Portions RE/2/313, RE/3/313, RE/4/313 of Cornwall 313 KQ and Remaining Extent of Portions 2, 5, 8, 9, 10, and 11 of Koedoevlei 128 KQ
Project Extent	Approximately 3,892 hectares
Contact Details (KMG)	Tel: 011 969 6184 / 011 480 4822
Email	info@kmgenviro.co.za
Website	www.kmgenviro.co.za

DISCLAIMER

This Wetland Impact Assessment Report has been prepared by **KMG Environmental Solutions Services (Pty) Ltd** for **Arengo 297 (Pty) Ltd** as part of the Environmental Authorisation process for the proposed mining right application.

The information contained in this report is based on site investigations, available data, and information provided by the client and relevant stakeholders at the time of assessment. While all reasonable care has been taken to ensure the accuracy and completeness of the information, KMG Environmental Solutions Services (Pty) Ltd does not guarantee that all environmental features, particularly wetlands and associated ecological processes, have been identified in full, due to inherent limitations associated with seasonal variability, data availability, and site accessibility.

The findings, recommendations, and conclusions presented in this report are based on the conditions observed during the time of the assessment and the professional judgment of the specialist. These may be subject to change should additional information become available or if site conditions change.

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KMG Environmental Solutions Services (Pty) Ltd shall not be held liable for any use of this report beyond its intended purpose, nor for any decisions made based on information contained herein, except where such use has been authorised in writing.

All interpretations and recommendations must be considered within the context of applicable environmental legislation, including but not limited to the National Environmental Management Act (Act 107 of 1998) and the National Water Act (Act 36 of 1998).

ACRONYMS

Acronym	Description
BA	Basic Assessment
BAR	Basic Assessment Report
CBD	Convention on Biological Diversity
CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fisheries and the Environment
DEA	Department of Environmental Affairs (now DFFE)
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
ECO	Environmental Control Officer
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Area
GIS	Geographic Information System
GN	Government Notice
GNR	Government Notice Regulation
ha	Hectares
HGM	Hydrogeomorphic
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
KML	Keyhole Markup Language
LCA	Life Cycle Assessment
LM	Local Municipality
LU	Land Use
NAAQS	National Ambient Air Quality Standards
NDP	National Development Plan

NEMA	National Environmental Management Act (Act 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act 39 of 2004)
NEM:WA	National Environmental Management: Waste Act (Act 59 of 2008)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
OHS	Occupational Health and Safety
PES	Present Ecological State
PGM	Platinum Group Metals
PPP	Public Participation Process
Pr.Sci.Nat	Professional Natural Scientist
RAM	Risk Assessment Matrix
RQO	Resource Quality Objectives
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SDG	Sustainable Development Goals
SDF	Spatial Development Framework
SEF	Socio-Economic Framework
SEIA	Socio-Economic Impact Assessment
SoER	State of the Environment Report
SPLUMA	Spatial Planning and Land Use Management Act (Act 16 of 2013)
ToR	Terms of Reference
TSP	Total Suspended Particulates
VIP	Visual Impact Point
VIA	Visual Impact Assessment
WMA	Water Management Area
WQ	Water Quality
WRC	Water Research Commission
WULA	Water Use Licence Application
WWTW	Wastewater Treatment Works

TERMS AND DEFINITIONS

Term	Definition
Aquatic Ecosystem	An ecosystem located in a body of water, including rivers, wetlands, lakes, and estuaries, supporting aquatic and semi-aquatic life.
Buffer Zone	A designated area surrounding a wetland or watercourse intended to protect it from external impacts and maintain ecological integrity.
Delineation	The process of identifying and mapping the boundary of a wetland or watercourse based on vegetation, soil, and hydrological indicators.
Direct Impact	An impact that occurs as an immediate result of an activity, such as vegetation clearing or soil disturbance within a wetland.
Ecological Integrity	The ability of an ecosystem to maintain its structure, composition, and function over time.
Ecological Sensitivity	The degree to which a system is susceptible to disturbance and its capacity to recover from impacts.
Ecosystem Services	The benefits that people obtain from ecosystems, including water purification, flood attenuation, grazing, and biodiversity support.
Erosion	The removal of soil or rock by water, wind, or human activity, often exacerbated by vegetation clearing.
Floodplain	The flat or gently sloping land adjacent to a river or stream that is periodically inundated during high flow events.
Groundwater	Water located beneath the earth’s surface in soil pore spaces and fractures of rock formations.
Hydrology	The study and movement of water within the environment, including surface water and groundwater interactions.
Hydrogeomorphic (HGM) Unit	A classification of wetlands based on their geomorphic setting, water source, and hydrodynamics (e.g., valley bottom, seep, depression).
Impact Significance	A measure of the importance of an impact, considering its magnitude, duration, extent, and probability.

Indirect Impact	An impact that occurs as a result of a primary activity but is not directly caused by it, such as downstream sedimentation.
Mitigation	Measures implemented to avoid, minimise, rehabilitate, or offset adverse environmental impacts.
Rehabilitation	The process of restoring a disturbed area to a stable and functional condition, though not necessarily to its original state.
Riparian Zone	The interface between land and a river or stream, often characterised by distinct vegetation and ecological processes.
Surface Water	Water that collects on the surface of the earth, including rivers, streams, and wetlands.
Sustainable Development	Development that meets present needs without compromising the ability of future generations to meet their own needs.
Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, supporting hydrophytic vegetation and hydromorphic soils.
Wetland Function	The natural processes performed by wetlands, such as water storage, sediment trapping, nutrient cycling, and habitat provision.
Wetland Health	The overall condition of a wetland in terms of its ecological functioning and resilience to disturbance.
Wetland Sensitivity	The susceptibility of a wetland to disturbance based on its ecological importance and resilience.
Watercourse	As defined in the National Water Act, includes a river, spring, natural channel, wetland, or pan where water flows or accumulates.
Water Use	Activities defined under Section 21 of the National Water Act that may impact water resources and require authorisation.
Cumulative Impact	The combined effect of multiple activities over time on the environment, which may be significant even if individual impacts are minor.
Significance Rating	A quantified measure used to evaluate the importance of an environmental impact based on standard assessment criteria.

EXECUTIVE SUMMARY

This report presents the findings of an environmental assessment conducted for a proposed development located in the Thabazimbi area within the Limpopo Province of South Africa. The assessment was undertaken in accordance with relevant environmental legislation and best practice guidelines, with particular emphasis on wetland identification and assessment (WIA), as well as broader environmental sensitivities associated with the site and its surrounding landscape. The primary objective of the study was to evaluate the environmental suitability of the site, identify potential constraints, and recommend appropriate mitigation measures to ensure sustainable development.

An integrated methodological approach was adopted, incorporating desktop analysis, Geographic Information Systems (GIS)-based mapping, and field verification. A range of environmental datasets were analysed, including wetland classification (NBA 2018), vegetation types, biodiversity sensitivity (CBA and ESA layers), soil characteristics, geology, hydrology, land use, and topography. These datasets were used to generate thematic maps, which informed the identification of environmentally sensitive areas. A site visit was conducted to verify desktop findings, assess on-site conditions, and confirm the presence and extent of wetlands and hydrological features through field observations and wetland indicators.

The study area is currently utilised predominantly as a game farm and is characterised by largely intact natural bushveld vegetation typical of the Savanna Biome, specifically the Waterberg Mountain Bushveld. The site remains mostly undeveloped, with limited supporting infrastructure such as access roads and artificial water bodies (man-made dams) used for the temporary storage of water to support wildlife and agricultural activities. These artificial features influence local hydrology but are not classified as natural wetlands. The surrounding landscape is rural in nature, comprising a mixture of grazing land, agricultural activities, and natural vegetation.

The assessment confirmed the presence of several wetland systems within and in close proximity to the study area. These include channelled valley-bottom wetlands, unchannelled valley-bottom wetlands, and seep systems, all of which play an important role in maintaining hydrological and ecological processes. Field verification confirmed the occurrence of wetland vegetation and hydromorphic soil conditions in areas identified as water bodies, thereby validating the desktop mapping outputs. In addition, several drainage lines and river channels

were observed across the site. These systems are largely non-perennial and exhibit temporary flow following rainfall events, indicating seasonal hydrological dynamics typical of the region.

From a biodiversity perspective, the site falls predominantly within Ecological Support Areas (ESA), which are important for maintaining ecological connectivity and supporting the functioning of surrounding Critical Biodiversity Areas (CBAs). Although the site itself is not formally protected, its location within a broader ecologically important landscape increases its sensitivity. The vegetation cover provides habitat for fauna and contributes to ecosystem services such as soil stabilisation and water regulation.

The physical characteristics of the site present additional constraints. Soil mapping indicates the presence of shallow and plinthic soils, which may limit infiltration and increase susceptibility to erosion when disturbed. The topography is variable, with areas of steep slopes, rocky outcrops, and uneven terrain, particularly in the central and southern portions of the site. These features not only influence hydrological processes but also pose challenges for infrastructure development and increase the risk of erosion and land degradation.

The impact assessment identified that the most significant potential impacts are associated with the disturbance of wetlands and drainage systems, alteration of natural hydrological processes, soil erosion, and vegetation clearing. Without mitigation, these impacts are considered to be of moderate to high significance, particularly in areas where development may encroach on sensitive features. However, the study demonstrates that with the implementation of appropriate mitigation measures, these impacts can be effectively reduced to low or acceptable levels.

Key mitigation measures include the strict avoidance of all delineated wetlands and associated buffer zones, the protection of drainage lines and maintenance of natural flow regimes, the implementation of erosion and stormwater management controls, and the minimisation of vegetation clearing. Furthermore, the rehabilitation of disturbed areas and the control of invasive species are essential to ensure long-term ecological stability. The appointment of an Environmental Control Officer (ECO) and ongoing environmental monitoring are recommended to ensure compliance with environmental management requirements.

In conclusion, the assessment did not identify any fatal environmental flaws that would preclude development of the site. However, the presence of wetlands, hydrological features,

and ecologically sensitive areas necessitates a cautious and well-managed approach to development. The site is therefore considered conditionally suitable for development, provided that all recommended mitigation measures are implemented, sensitive areas are avoided, and relevant environmental legislation is adhered to. The protection of wetlands and the maintenance of ecological processes should remain the primary consideration throughout the planning, construction, and operational phases of the proposed development.

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WETLAND IMPACT ASSESSMENT FOR THE PROPOSED MINING RIGHT APPLICATION ARENGO 297 (PTY) LTD I

DMRE REFERENCE NUMBER I

PROJECT DESCRIPTION I

PROJECT EXTENT: APPROXIMATELY 3,892 HECTARES I

PREPARED FOR: ARENGO 297 (PTY) LTD I

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) II

WETLAND SPECIALIST II

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1. INTRODUCTION

1.1 Background

KMG Environmental Solutions Services (Pty) Ltd was appointed to undertake a Wetland Impact Assessment (WIA) in support of a proposed development within the Thabazimbi Local Municipality, Limpopo Province.

The Wetland Impact Assessment forms part of the Environmental Impact Assessment (EIA) process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) and is further aligned with requirements of the National Water Act (Act 36 of 1998) (NWA), which regulates activities within watercourses.

The proposed development may result in activities occurring within or in proximity to wetlands and drainage features, which are classified as watercourses in terms of the NWA. As such, it is necessary to identify, delineate, and assess these systems to determine potential impacts and inform the need for water use authorisation.

1.2 Purpose of the Study

The purpose of this Wetland Impact Assessment is to:

- Identify and delineate wetlands and watercourses within the study area
- Assess the ecological condition and functioning of the wetlands
- Determine the ecological importance and sensitivity of the identified systems
- Identify and assess potential impacts of the proposed development on wetlands
- Recommend mitigation measures to avoid, minimise, and manage impacts
- Inform the Environmental Impact Assessment (EIA) process and water use authorisation requirements

1.3 Objectives of the WIA

The key objectives of this study are to:

- Conduct a field-based wetland delineation using accepted methodologies

- Classify wetlands according to **the** Hydrogeomorphic (HGM) system
- Assess the Present Ecological State (PES) of the wetlands
- Determine the Ecological Importance and Sensitivity (EIS)
- Evaluate potential impacts associated with:
    - Construction activities
    - Operational activities
    - Associated infrastructure development
- Provide practical mitigation and management measures
- Ensure compliance with DWS and DFFE guidelines

1.4 Scope of Work

The scope of the Wetland Impact Assessment includes:

- Desktop review of:
    - National wetland datasets (e.g. NFEPA, SANBI)
    - Aerial imagery and GIS data
    - Project layout and design information
- Field assessment including:
    - Wetland delineation using:
        - Vegetation indicators
        - Soil characteristics
        - Hydrological indicators
    - Classification of wetlands into HGM units
    - Identification of wetland boundaries and buffer zones
- Ecological assessment including:
    - Determination of Present Ecological State (PES)
    - Assessment of Ecological Importance and Sensitivity (EIS)
- Impact assessment:
    - Identification of potential impacts
    - Evaluation of impact significance
    - Development of mitigation measures
- Reporting:
    - Compilation of a comprehensive Wetland Impact Assessment Report

1.5 Study Area

The study area is located within the **Thabazimbi Local Municipality**, under the **Waterberg District Municipality** in Limpopo Province.

The area is characterised by:

- Mixed land uses including mining, agriculture, and game farming
- Presence of seasonal and/or perennial drainage features
- Potential occurrence of valley bottom wetlands, seep wetlands, and drainage lines
- Semi-arid climatic conditions with variable rainfall influencing wetland hydrology

The assessment covers both the project footprint and surrounding areas that may be directly or indirectly affected by the proposed development.

1.6 Legislative Context

This study is undertaken in accordance with applicable environmental legislation, including:

- National Environmental Management Act (Act 107 of 1998)
- National Water Act (Act 36 of 1998)
- Relevant EIA Regulations (2014, as amended**)**

The presence of wetlands may trigger water uses in terms of Section 21 of the NWA**,** particularly:

- Section 21(c): Impeding or diverting the flow of water in a watercourse
- Section 21(i): Altering the bed, banks, or characteristics of a watercourse

Where applicable, a Water Use Licence Application (WULA) or General Authorisation will be required.

1.7 Assumptions and Limitations

The assessment is subject to the following assumptions and limitations:

- Wetland boundaries are based on field indicators observed at the time of assessment

- Seasonal variation may influence the visibility of hydrological indicators
- Reliance on available secondary data and spatial datasets
- Changes in project design may affect impact outcomes

Despite these limitations, the assessment provides a reliable and defensible evaluation of wetland systems and associated impacts.

2. LEGISLATIVE AND POLICY FRAMEWORK

2.1 Introduction

This section outlines the key legislative and policy frameworks applicable to the Wetland Impact Assessment (WIA). The assessment is undertaken in accordance with South African environmental legislation governing the protection, management, and sustainable use of water resources and associated ecosystems.

Wetlands are recognised as sensitive ecological systems and are protected under multiple legislative instruments, primarily the **National Environmental Management Act (NEMA)** and the **National Water Act (NWA)**.

2.2 National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act (NEMA) provides the overarching framework for environmental management in South Africa and establishes principles for sustainable development.

Key principles relevant to this study include:

- Avoidance and minimisation of environmental degradation
- Protection of ecologically sensitive areas, including wetlands
- Integration of environmental considerations into decision-making
- Promotion of equitable and sustainable development

The WIA supports the Environmental Impact Assessment (EIA) process required under NEMA and its associated regulations.

2.3 National Water Act (Act 36 of 1998)

The National Water Act (NWA) is the primary legislation governing water resource management in South Africa. Wetlands are defined as **watercourses** under the Act and are therefore protected.

The following water uses may be triggered:

- **Section 21(c):** Impeding or diverting the flow of water in a watercourse
- **Section 21(i):** Altering the bed, banks, or characteristics of a watercourse

Where these activities are triggered, a **Water Use Licence Application (WULA)** or General Authorisation is required from the Department of Water and Sanitation (DWS).

2.4 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (NEMBA) provides for the conservation of South Africa's biodiversity and the protection of ecosystems.

This Act supports:

- Protection of threatened ecosystems
- Conservation of species and habitats
- Alignment with biodiversity planning tools such as **Critical Biodiversity Areas (CBAs)** and **Ecological Support Areas (ESAs)**

Wetlands often fall within sensitive biodiversity areas and must be managed accordingly.

2.5 National Environmental Management: Waste Act (Act 59 of 2008)

This Act regulates waste management practices to prevent pollution and environmental degradation.

Key relevance to wetlands includes:

- Prevention of contamination of water resources
- Proper handling and disposal of waste during construction and operation

- Protection of wetlands from pollution sources

2.6 Environmental Impact Assessment Regulations (2014, as amended)

The EIA Regulations, promulgated under NEMA, provide the procedural framework for environmental assessments.

Activities within or near wetlands are often listed activities requiring:

- Basic Assessment (BA), or
- Scoping and Environmental Impact Assessment

Wetland studies form a critical component of specialist inputs required for environmental authorisation.

2.7 National Water Resource Strategy (NWRS)

The National Water Resource Strategy provides strategic direction for water resource management in South Africa.

It emphasises:

- Protection of aquatic ecosystems
- Sustainable allocation and use of water resources
- Maintenance of ecological reserves

Wetlands play a key role in achieving these objectives.

2.8 Other Relevant Guidelines and Policies

The following guidelines and tools inform the Wetland Impact Assessment:

- DWS Wetland Delineation Guidelines
- SANBI National Wetland Map (NWM)
- National Freshwater Ecosystem Priority Areas (NFEPA)
- DFFE Screening Tool
- Provincial biodiversity plans

These tools support the identification of sensitive areas and guide decision-making.

2.9 Summary of Applicable Legislation

Table 1: Summary of Applicable Legislative Framework

Legislation	Purpose	Relevance to WIA
NEMA (Act 107 of 1998)	Environmental management framework	Guides EIA and sustainability principles
NWA (Act 36 of 1998)	Water resource management	Protects wetlands as watercourses
NEMBA (Act 10 of 2004)	Biodiversity conservation	Protects ecosystems and species
Waste Act (Act 59 of 2008)	Waste management	Prevents pollution of wetlands
EIA Regulations (2014)	Environmental authorisation	Regulates listed activities
NWRS	Water strategy	Promotes ecosystem protection
DWS Guidelines	Wetland assessment	Guides delineation and assessment
SANBI / NFEPA	Biodiversity planning	Identifies sensitive wetland areas

The legislative framework emphasises the protection of wetlands as critical ecological systems and requires that any development affecting these systems be carefully assessed and managed.

Compliance with the above legislation ensures that:

- Wetlands are properly identified and protected
- Impacts are avoided or minimised
- Appropriate authorisations are obtained
- Sustainable development principles are upheld

3. METHODOLOGY

3.1 Introduction

This section outlines the methodology applied in undertaking the Wetland Impact Assessment (WIA). The approach follows accepted South African best practice and is aligned with Department of Water and Sanitation (DWS)guidelines, SANBI wetland tools, and applicable environmental legislation.

The methodology integrates desktop analysis, field verification, wetland delineation, ecological assessment, and impact evaluation to ensure a scientifically defensible and regulator-ready assessment suitable for EIA and WULA processes.

3.2 Approach Overview

The assessment followed a stepwise approach:

1. Desktop Review
2. Field Assessment and Wetland Delineation
3. Wetland Classification (HGM)
4. Ecological Assessment (PES & EIS)
5. Impact Identification and Assessment
6. Mitigation Development

3.3 Desktop Assessment

The desktop assessment was undertaken to identify potential wetlands and sensitive features prior to fieldwork.

Key datasets and tools reviewed include:

- National Wetland Map (SANBI)
- NFEPA database
- DFFE Screening Tool
- Aerial imagery and GIS mapping
- Topographical maps

- Project layout plans

Table 2: Desktop Data Sources

Data Source	Purpose
SANBI NWM	Identification of wetland features
NFEPA	Freshwater priority areas
DFFE Screening Tool	Environmental sensitivity
Aerial Imagery	Site interpretation
GIS Mapping	Spatial analysis
Project Layout	Impact overlay

3.4 Field Assessment and Wetland Delineation

A field survey was conducted to verify the presence and extent of wetlands.

Wetland delineation was undertaken using the three-criteria approach**,** namely:

- Hydrophytic Vegetation
- Hydromorphic Soils
- Wetland Hydrology

The outer boundary of the wetland was identified based on the transition from wetland to terrestrial conditions.

Table 3: Wetland Delineation Indicators

Indicator	Description	Field Evidence
Vegetation	Presence of hydrophytic species	Wetland plants
Soils	Hydromorphic characteristics	Mottling, gleying
Hydrology	Evidence of water	Saturation, seepage

3.5 Wetland Classification (HGM System)

Wetlands were classified using the Hydrogeomorphic (HGM) system, which considers:

- Geomorphic setting
- Water source
- Hydrodynamics

Table 4: HGM Classification

HGM Unit	Description
Valley Bottom	Wetlands along drainage lines
Seep	Groundwater-driven wetlands
Depression	Isolated basins
Channelled	Defined flow channels

3.6 Ecological Assessment

3.6.1 Present Ecological State (PES)

The ecological condition of wetlands was assessed using the PES framework.

Table 5: PES Classification

Category	Description
A	Natural
B	Largely natural
C	Moderately modified
D	Largely modified
E	Seriously modified
F	Critically modified

3.6.2 Ecological Importance and Sensitivity (EIS)

The importance and sensitivity of wetlands were assessed based on ecological and socio-functional value.

Table 6: EIS Classification

Category	Description

Low	Limited importance
Moderate	Moderate importance
High	High importance
Very High	Critical importance

3.7 Buffer Determination

A wetland buffer was applied in accordance with DWS guidelines.

Table 7: Buffer Determination

Wetland Sensitivity	Recommended Buffer
Low	15 m
Moderate	32 m
High	50 m+

3.8 Impact Assessment Methodology

3.8.1 Assessment Criteria

Impacts were assessed using standard criteria.

Table 8: Impact Assessment Criteria

Criteria	Description
Nature	Positive/Negative
Extent	Spatial scale
Duration	Timeframe
Magnitude	Degree of change
Probability	Likelihood
Significance	Overall rating

3.8.2 Significance Rating Matrix

Table 9: Significance Matrix

Magnitude ↓ / Probability →	Low	Medium	High
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

3.9 Impact Typology

Table 10: Impact Types

Type	Description
Direct	Immediate impact
Indirect	Secondary effect
Cumulative	Combined impacts
Residual	Post-mitigation

3.10 Mitigation Hierarchy

Table 11: Mitigation Framework

Step	Description
Avoid	Prevent impact
Minimise	Reduce impact
Rehabilitate	Restore
Offset	Compensate

3.11 Confidence and Limitations

Table 12**:** Confidence Levels

Level	Description
High	Reliable data
Medium	Moderate confidence
Low	Limited data

4. ENVIRONMENTAL BASELINE DESCRIPTION

4.1 Regional and Local Setting

The study area is located in the vicinity of Thabazimbi within the Limpopo Province of South Africa. The site falls within a predominantly rural landscape characterised by a combination of natural vegetation, agricultural activities, and scattered settlements. Accessibility to the site is facilitated by a network of regional and local roads, with a primary route traversing close to the eastern boundary of the study area.

At a broader scale, the site is situated within the Waterberg region, which is recognised for its ecological importance, diverse topography, and role in regional water production. The surrounding land uses include cultivated fields, grazing lands, and areas of natural bushveld vegetation.

Figure 1: Locality Map

4.2 Topography and Landform

The topography of the study area is variable, consisting of undulating terrain with localized ridges and rocky outcrops.

- The southern and central portions of the site exhibit elevated terrain with steep slopes.
- Northern areas appear relatively gentler with moderate slopes.
- Rocky ridges and koppies are evident, indicating shallow soils and potential development constraints.
- The topography influences drainage patterns and contributes to the formation of localized wetland systems.

These characteristics suggest that slope stability, erosion potential, and runoff management will be important considerations for any proposed development

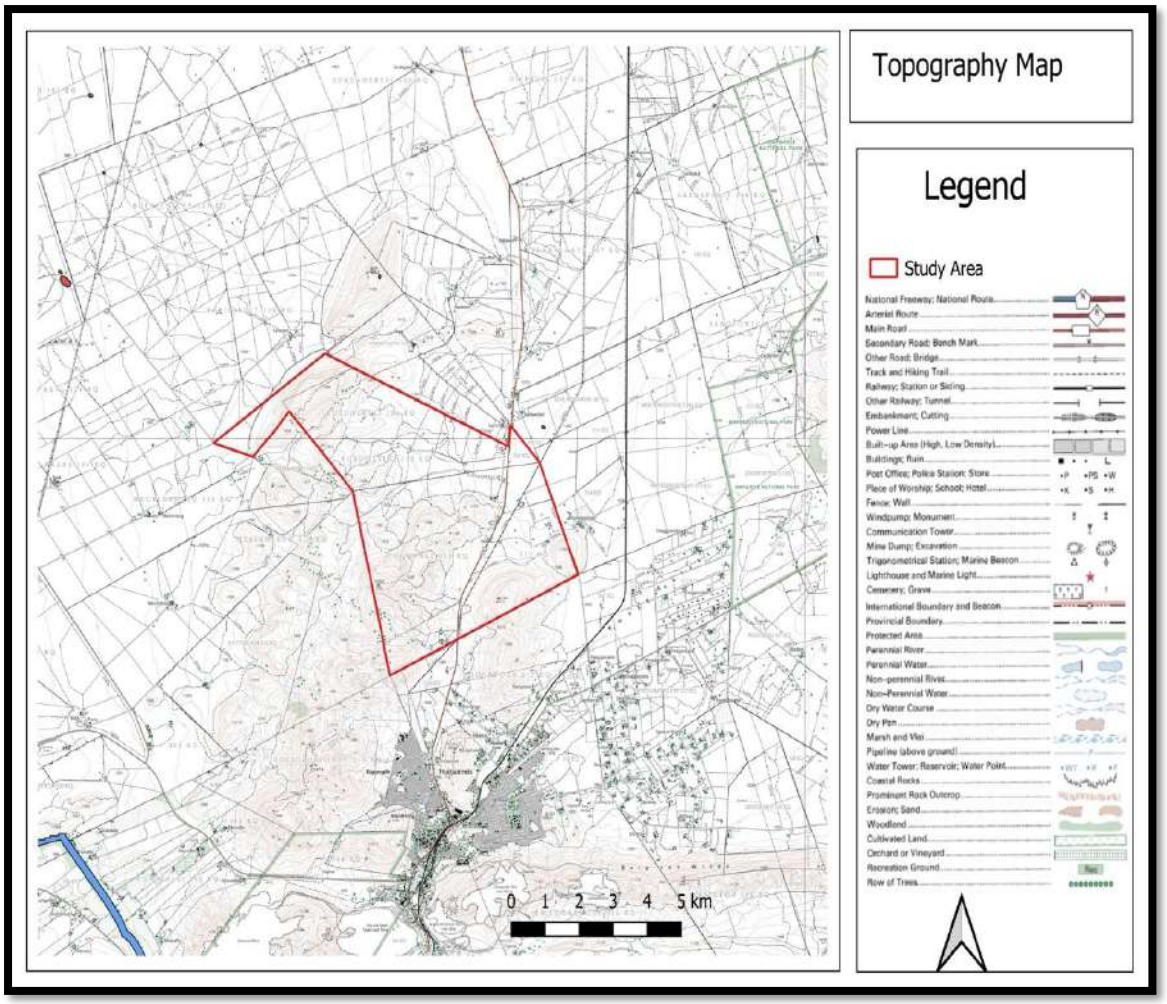

Figure 2: Topographic Map

4.3 Geology

The site is underlain predominantly by geological formations associated with the Transvaal Supergroup.

Figure 3 : Geology Map

- The geology is dominated by hard rock formations, including sedimentary and volcanic sequences.
- These formations contribute to the rugged terrain observed across the site.
- The presence of resistant rock units may limit excavation but enhances slope stability in certain areas.
- Geological conditions influence soil formation and groundwater movement.

4.4 Soil Characteristics

The soil classification indicates a mix of shallow and moderately deep soils across the study area

- Large portions of the site consist of non-soil land classes, associated with exposed rock and shallow substrates.
- Areas with freely drained, structureless soils occur in the eastern portions.

- Plinthic soils (red/yellow with iron accumulation) are present, which may restrict root penetration and water movement.

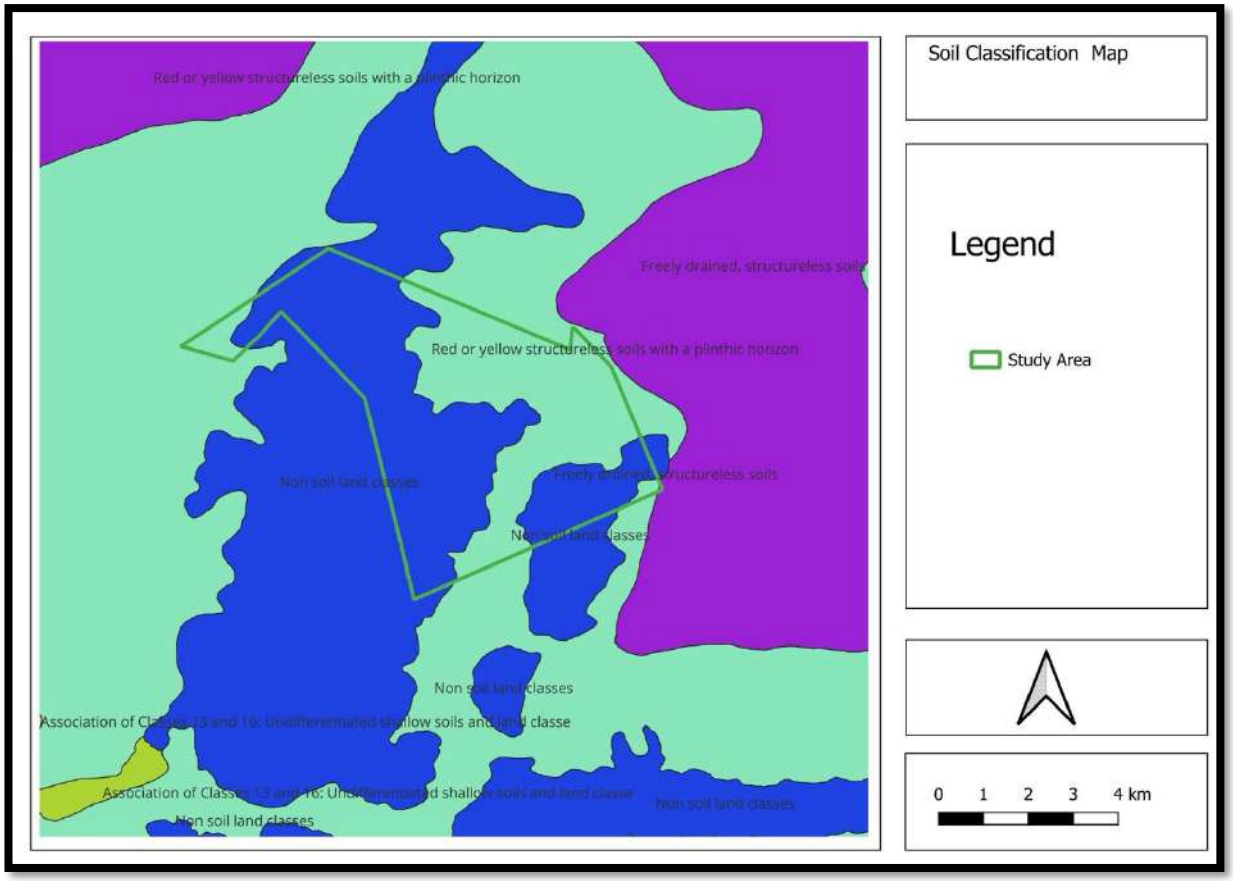

Figure 4 : Soil Classification Map

These soil conditions indicate:

- Limited agricultural potential in rocky areas
- Moderate erosion susceptibility in disturbed zones
- Constraints for infrastructure development in shallow soil regions

4.5 Vegetation and Biome

The study area falls within the Savanna Biome, specifically associated with bushveld vegetation types.

- Dominant vegetation includes Waterberg Mountain Bushveld.

- Adjacent vegetation types include Western Sandy Bushveld and Dwaalboom Thornveld**.**
- Vegetation structure consists of a mix of trees, shrubs, and grasses typical of savanna ecosystems.

Ecological importance:

- Provides habitat for a range of fauna species
- Supports ecosystem services such as carbon storage and soil protection
- Sensitive to disturbance, particularly clearing and overgrazing

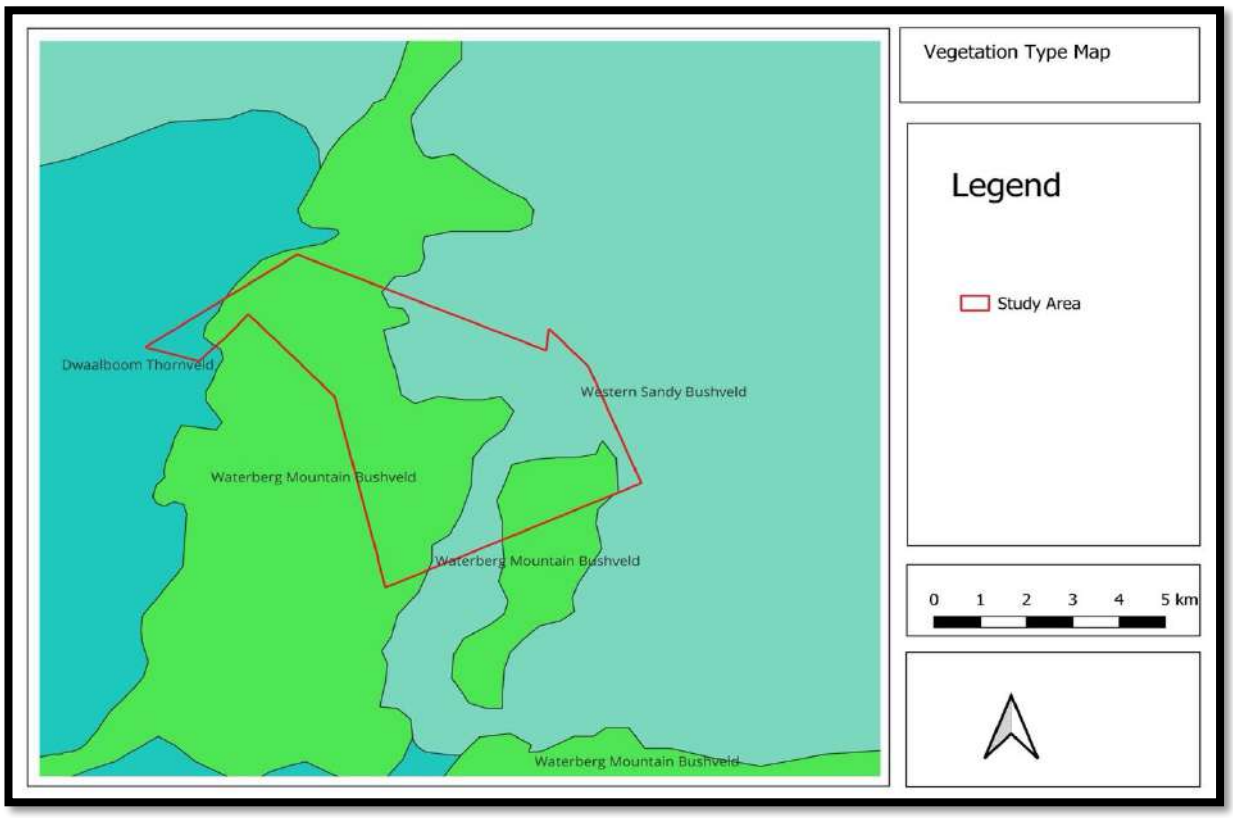

Figure 5: Vegetation Type Map

4.6 Land Use

Current land use within and surrounding the study area is predominantly rural.

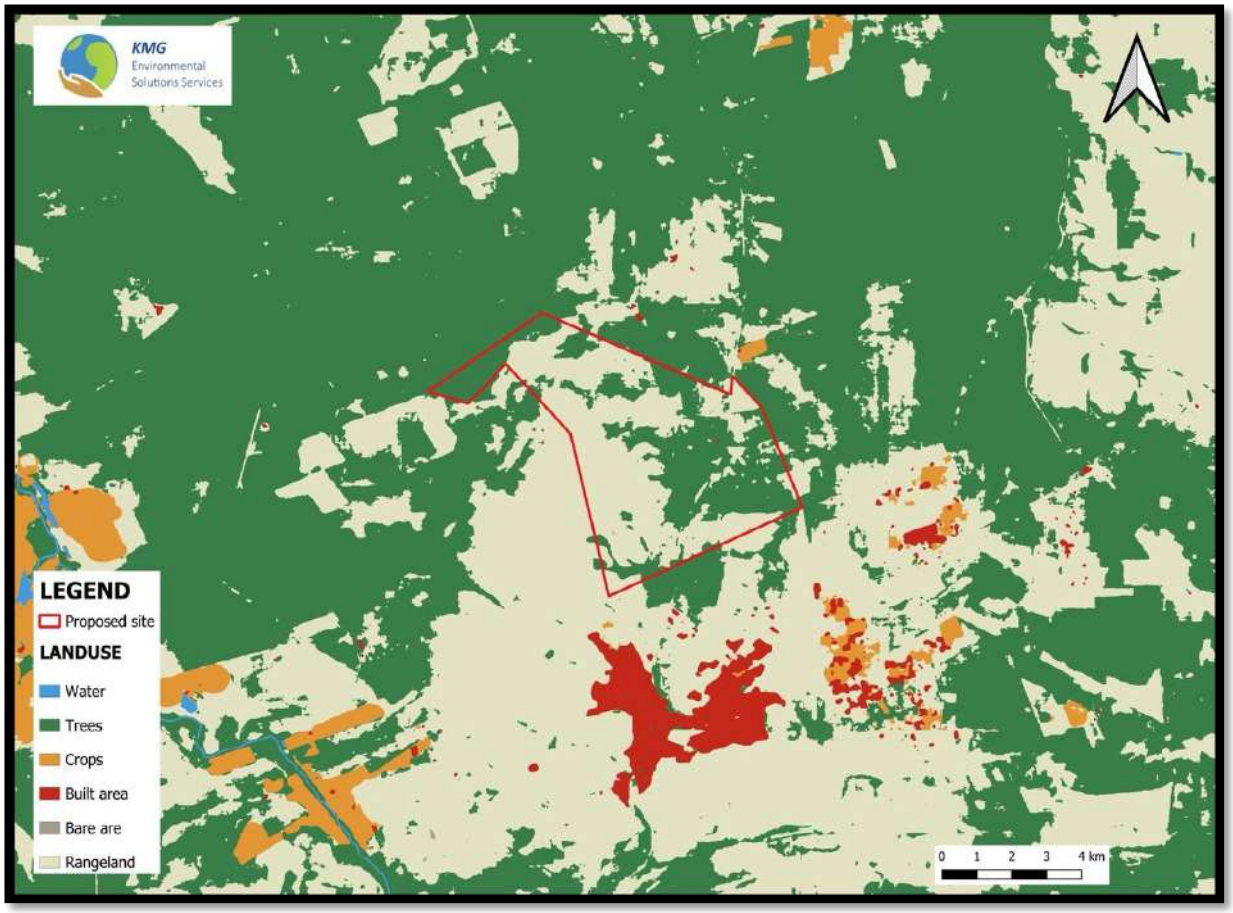

Figure 6 : Land Use Map

- Rangeland and natural vegetation dominate the landscape.
- Agricultural activities are present, including irrigated fields.
- Built-up areas are concentrated near Thabazimbi and along transport routes.
- The site itself is largely undeveloped.

4.7 Hydrology and Wetlands

The site is located within a landscape influenced by regional drainage systems and wetland features.

The hydrological regime of the study area is characterised by a network of drainage features and wetland systems that play a critical role in maintaining ecological functioning and water flow within the broader landscape. The delineation of wetlands was informed by national datasets (NBA 2018) and supported by satellite imagery interpretation

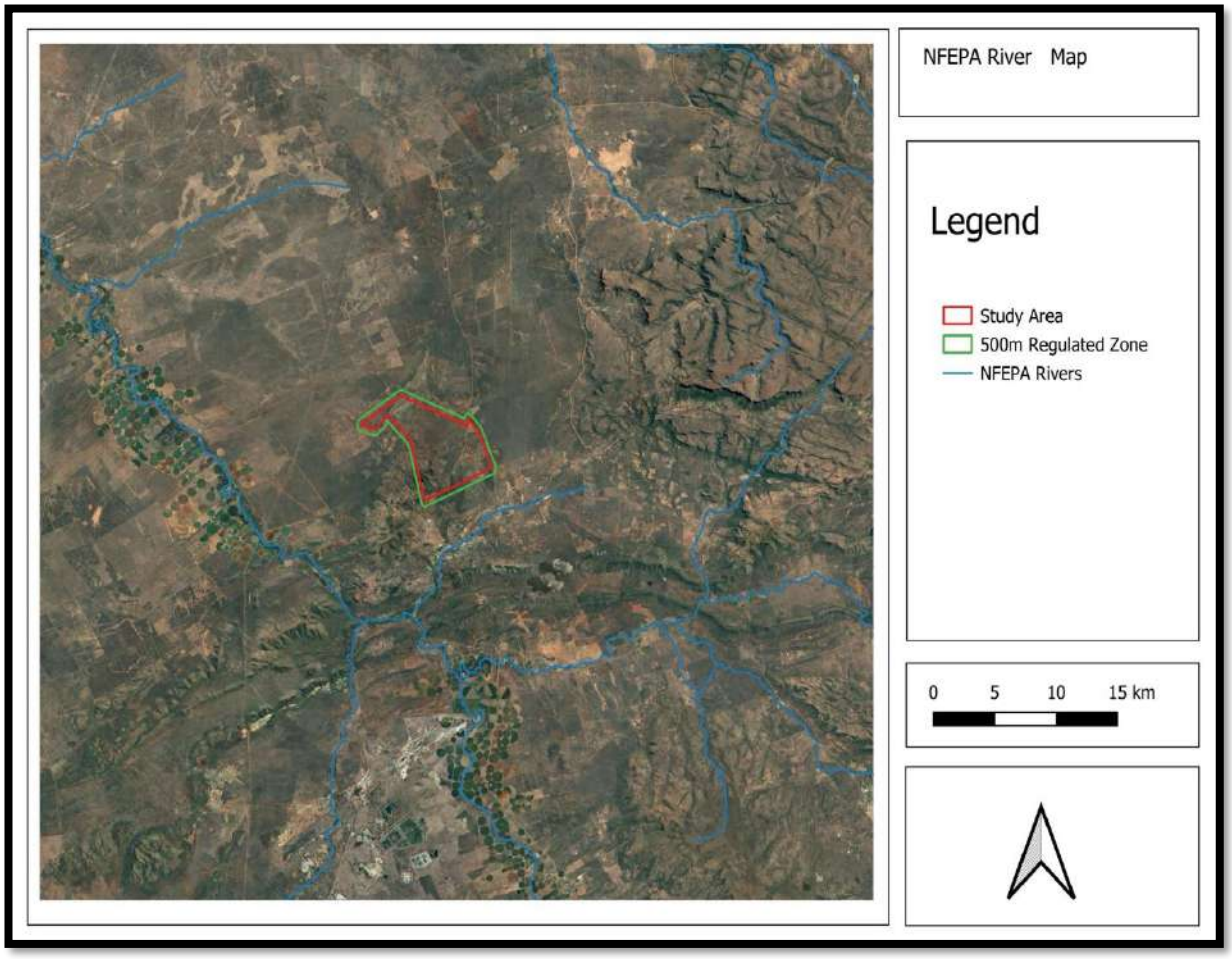

Figure 7: NFEPA River Map

- Several drainage lines and NFEPA-classified rivers occur in the broader area.
- A **500 m regulated zone** surrounds identified water features.
- Wetland types include:
    - Floodplains
    - Seep areas
    - Valley-bottom systems

Implications:

- These systems are environmentally sensitive
- Development may trigger regulatory requirements
- Hydrological connectivity must be maintained

The wetland classification map indicates that several wetland types occur within and in close proximity to the study area. These include:

- Channelled Valley-Bottom Wetlands
    - Associated with defined drainage channels.
    - Likely to transport water during rainfall events.
    - Important for sediment transport and flow regulation.
- Unchannelled Valley-Bottom Wetlands
    - Occur in broader valley floors without clearly defined channels.
    - Act as natural sponges, storing and slowly releasing water.
    - Highly sensitive to disturbance and compaction.
- Seep Wetlands
    - Occur where groundwater emerges at the surface.
    - Typically found along slopes and at the base of hills.
    - Support specialised vegetation and are highly sensitive to hydrological changes.

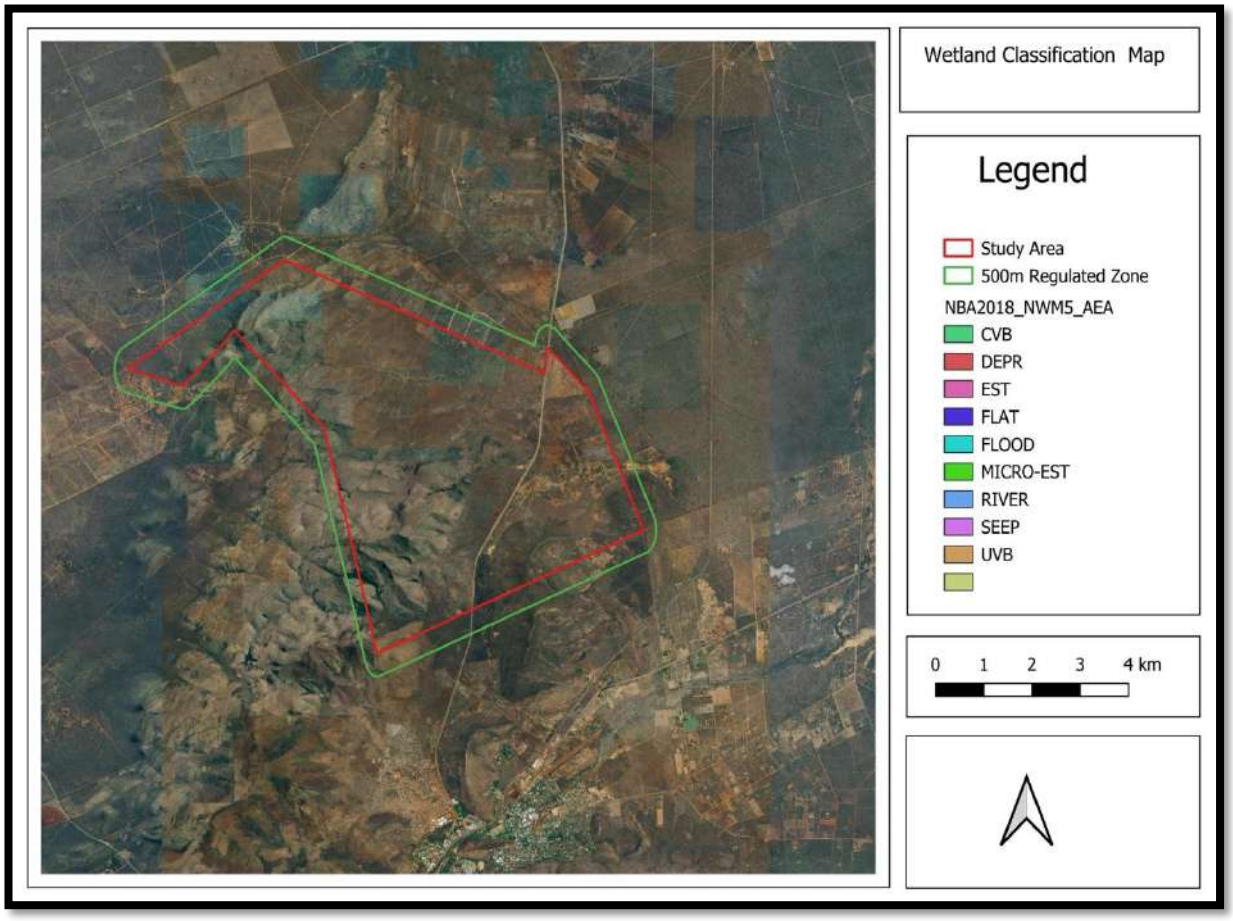

Figure 8 : Wetland Classification Map

The spatial analysis further indicates that portions of the study area fall within a 500 m regulated zone surrounding identified watercourses and wetland features. This buffer is significant in terms of regulatory compliance, as activities within this zone may trigger authorisation in terms of the National Water Act (Act No. 36 of 1998).

Hydrological characteristics of the site include:

- Surface water flow is influenced by the undulating topography and rocky terrain.
- Drainage is generally directed towards lower-

4.8 Biodiversity Sensitivity

The biodiversity sensitivity map indicates varying ecological importance across the study area.

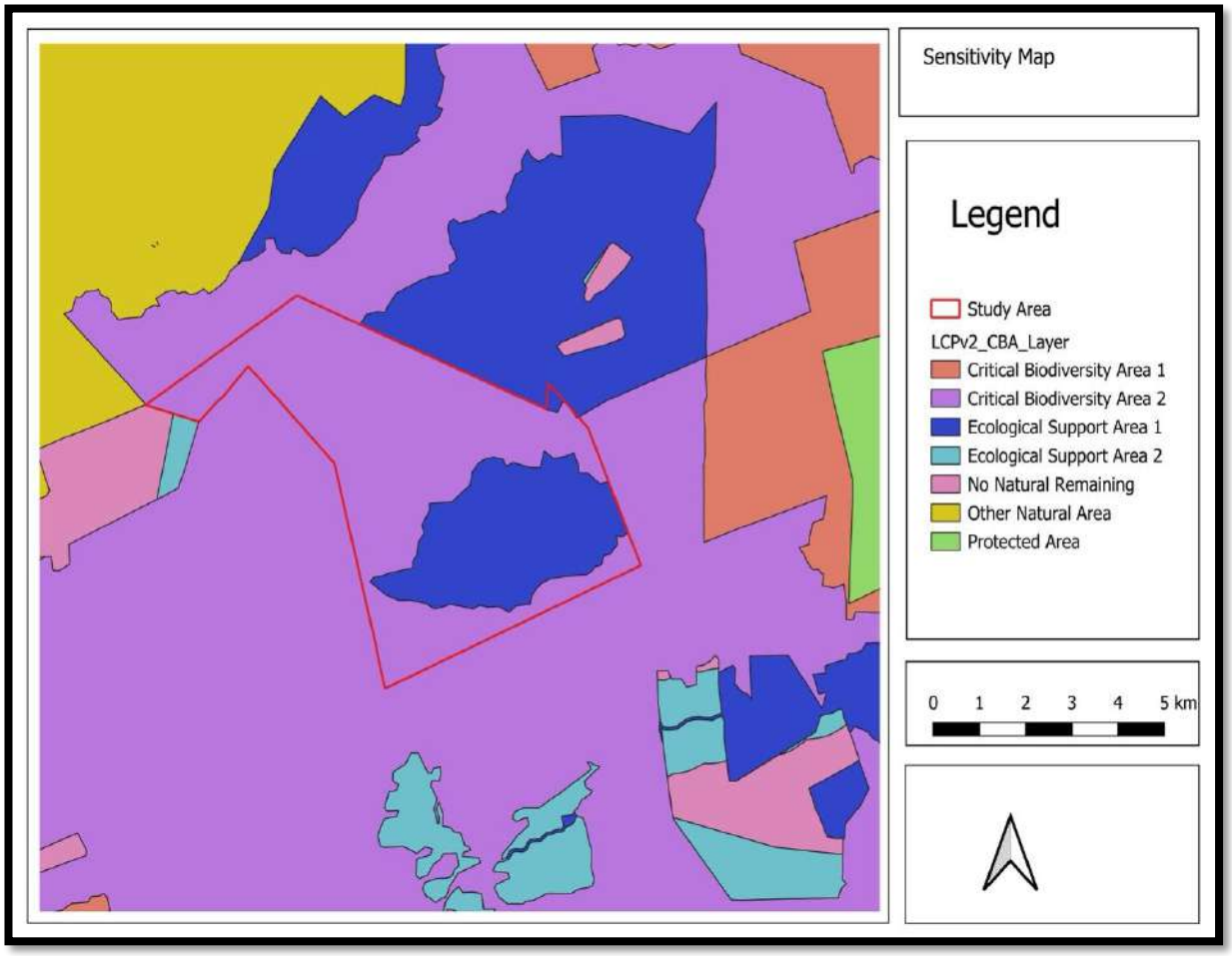

Figure 9 : Sensitivity Map

- The site falls largely within Ecological Support Areas (ESA).
- Surrounding areas include:
    - Critical Biodiversity Areas (CBA 1 & 2)
    - Other Natural Areas
- Limited transformation has occurred within the site itself.

This indicates:

- Moderate ecological sensitivity
- Need for careful planning to avoid fragmentation
- Importance of maintaining ecological corridors

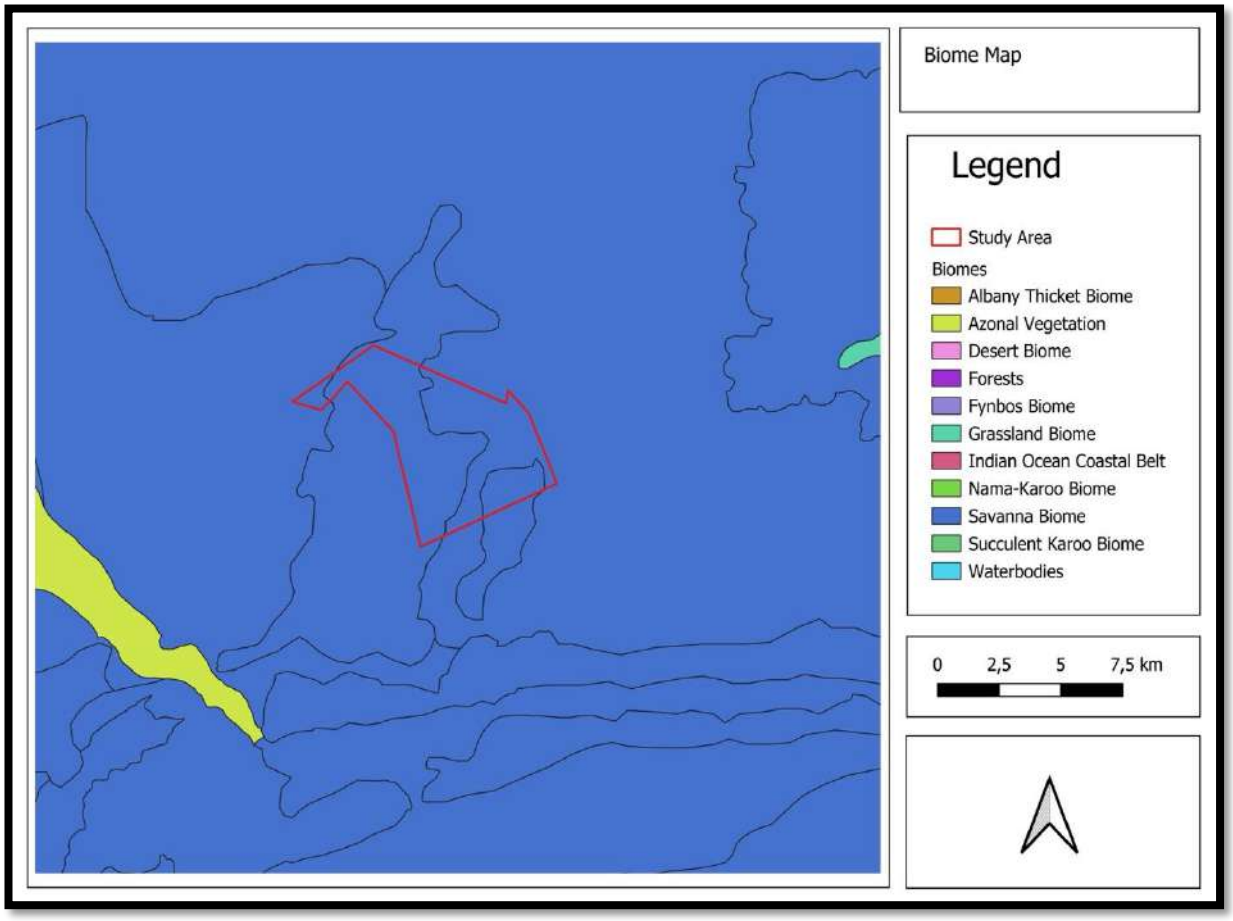

Figure 10 : Biome Map

The study area falls within the Savanna Biome, which is the dominant biome across much of Limpopo Province and is characterised by a combination of grassland and woody vegetation. This biome is known for its ecological resilience, biodiversity value, and importance for grazing and ecosystem services.

At a regional scale, the biome map confirms that the study area is entirely situated within the Savanna Biome, with no direct overlap into other major biome types. This reinforces the ecological consistency of the area and supports the vegetation classification observed at a finer scale.

Based on the vegetation map and regional datasets, the following vegetation types are present:

- Waterberg Mountain Bushveld
    - Dominant vegetation type within the study area.
    - Characterised by rocky terrain, mixed tree species, and dense shrub layers.

    - Associated with higher elevations and shallow soils.
- Western Sandy Bushveld
    - Occurs towards the eastern portions of the site.
    - Typically associated with deeper, sandy soils.
    - Supports a mix of grasses and scattered trees.
- Dwaalboom Thornveld
    - Occurs in localized areas.
    - Characterised by thorny species and more open vegetation structure.

The Savanna Biome within the study area exhibits the following characteristics:

- A combination of grasses and woody vegetation, with seasonal variation.
- Adaptation to periodic fire regimes, which maintain ecological balance.
- Support for a wide range of fauna species, including grazing and browsing animals.
- High dependence on rainfall patterns and soil conditions.

The vegetation within the study area provides several key ecosystem functions:

- Habitat provision for flora and fauna
- Soil stabilisation and erosion control
- Carbon storage and climate regulation
- Support for grazing and local livelihoods

Although the site is not located within a formally protected biome transition zone, the Savanna ecosystem remains sensitive to disturbance. Key risks include:

- Vegetation clearing leading to habitat loss
- Soil disturbance affecting regeneration capacity
- Increased erosion on exposed slopes
- Invasion by alien plant species following disturbance

The study area is situated entirely within the Savanna Biome and supports typical bushveld vegetation types associated with the Waterberg region. While the vegetation is relatively resilient, it remains ecologically important and moderately sensitive to disturbance. Careful management of vegetation clearing and rehabilitation will therefore be required to maintain ecosystem integrity.

4.9 Strategic Water Source Areas

The study area is located outside but in proximity to the Waterberg Strategic Water Source Area.

- The Waterberg SWSA is a nationally important water production area.
- Although the site is not directly within the SWSA:
    - It lies within the broader catchment
    - Activities may indirectly affect downstream water resources

4.10 Key Environmental Constraints

Based on the integrated analysis of all environmental layers, the following constraints have been identified:

High Sensitivity:

- Wetlands and drainage lines
- Steep slopes and rocky outcrops
- Areas near CBAs

Moderate Sensitivity:

- ESA zones
- Natural bushveld vegetation
- Shallow and plinthic soils

Lower Sensitivity:

- Previously disturbed or transformed areas
- Flat terrain with deeper soils

5. FIELD VERIFICATION

5.1 Site Visit Overview

A field verification exercise was conducted to ground-truth the findings from the desktop assessment and GIS-based analysis. The site visit aimed to confirm the presence and extent of wetlands, assess hydrological features, and evaluate current land use and environmental conditions within the study area.

The study area is currently utilised primarily as a **game farm**, with supporting infrastructure designed to sustain wildlife and agricultural activities. These include **man-made dams and water storage features**, which are used to temporarily store water for wild animals and other agricultural purposes.

5.2 Land Use Observations

Field observations confirmed that:

- The site is largely **undeveloped**, with natural bushveld vegetation dominating the landscape.
- Land use is primarily associated with:
    - Wildlife management (game farming)
    - Limited agricultural activities
- **Artificial water bodies (dams)** are present across the site:
    - Used for water supply to animals
    - Not all water features are natural wetlands

These findings align with the land use map and satellite imagery interpretation.

5.3 Wetland and Hydrological Observations

The wetland classification identified during the desktop study was verified on-site.

Key observations include:

- **Wetland Vegetation**

    - Wetland-associated vegetation was observed in areas identified as water bodies.
    - Vegetation indicators included:
        - Hydrophilic plant species
        - Denser and greener vegetation compared to surrounding areas
- **Wetland Types Confirmed**
    - Areas consistent with:
        - Valley-bottom wetlands
        - Seep systems
    - Some features correspond with mapped wetland polygons.
- **Wetland Testing**
    - Wetland delineation indicators were assessed in the field, including:
        - Soil characteristics (moisture content and colour)
        - Vegetation type and distribution
        - Evidence of periodic saturation
    - These observations were used to confirm wetland presence and boundaries.

5.4 Surface Water and Drainage

- Several **drainage lines and river channels** were observed within and around the site.
- These channels exhibited:
    - **Minor and temporary flow**, likely associated with rainfall events.
    - Characteristics of **non-perennial systems**.
- Some channels were dry at the time of assessment but showed clear evidence of episodic flow (e.g., scouring, sediment deposition).

5.5 Anthropogenic Influences

- The presence of **man-made dams** influences local hydrology by:
    - Altering natural flow patterns
    - Increasing localized water retention
- These features may create:
    - Artificial wet conditions
    - Confusion between natural wetlands and modified systems

It is therefore important to distinguish between:

- Natural wetland systems (ecologically significant)
- Artificial water bodies (functional but not regulated in the same way)

5.6 Photographic Record

- Photographs were taken during the site visit to document:
    - Wetland features
    - Vegetation conditions
    - Drainage lines and channels
    - Land use activities
- These images provide visual confirmation of field observations and support the delineation process.

Figure 11: Water Body Adjacent within the Study Area

Figure 12: Transition Zone between Disturbed and Natural Vegetation

Figure 13: Temporary Water Accumulation Area / Artificial Ponding

Figure 14: Sparse Vegetation Cover within Disturbed Area

Figure 15: Soil Sampling Activity and Profile Observation

Figure 16: Site Preparation Area with Temporary Storage Infrastructure

Figure 17: Site Preparation Area with Temporary Storage Infrastructure

5.7 Summary of Field Findings

The field verification confirmed that:

- The site is primarily a game farm with supporting infrastructure, including artificial dams.
- Wetland features are present**,** particularly in valley-bottom and seep areas.
- Wetland vegetation is clearly distinguishable in certain zones.
- Drainage lines are mostly non-perennial**,** with temporary flow following rainfall.
- Some water features are artificial and should not be classified as natural wetlands**.**

Overall, the field assessment supports the desktop findings, while providing improved confidence in the identification and classification of wetlands and hydrological features within the study area.

6. IMPACT ASSESSMENT

6.1 Approach to Impact Assessment

The impact assessment was conducted using an integrated approach combining desktop analysis, GIS mapping, and field verification findings. Potential impacts were identified for both the **construction** and **operational phases** of the proposed development.

Impacts were assessed based on:

- Nature of the impact
- Extent (site/local/regional)
- Duration (short/medium/long-term)
- Intensity (low/moderate/high)
- Probability of occurrence

The significance of impacts was then determined before and after mitigation.

6.2 Key Environmental Receptors

Based on the baseline and field verification, the following sensitive environmental receptors were identified:

- Wetlands (valley-bottom and seep systems)
- Drainage lines and non-perennial rivers
- Ecological Support Areas (ESA)
- Natural bushveld vegetation
- Shallow and erosion-prone soils
- Sloping and rocky terrain

6.3 Construction Phase Impacts

6.3.1 Impact on Wetlands and Hydrology

Impact Description:

Construction activities may lead to disturbance, infilling, or alteration of wetland areas and drainage lines.

Potential Impacts:

- Loss of wetland habitat
- Disruption of natural water flow
- Sedimentation of watercourses
- Degradation of water quality

Significance (Pre-Mitigation): HIGH

Mitigation Measures:

- Avoid all delineated wetlands and buffer zones
- Maintain at least a 32 m–50 m buffer (or as regulated)
- Install erosion and sediment control measures (e.g., silt fences)
- Prohibit construction within drainage lines
- Clearly demarcate no-go areas on-site

Significance (Post-Mitigation): LOW–MODERATE

6.3.2 Impact on Soils and Erosion

Impact Description:

Soil disturbance during construction may increase erosion risk, especially in areas with shallow or plinthic soils.

Potential Impacts:

- Soil loss and degradation
- Increased sediment runoff into wetlands
- Reduced soil stability on slopes

Significance (Pre-Mitigation): MODERATE–HIGH

Mitigation Measures:

- Limit vegetation clearing to required footprint only
- Stabilise exposed soils immediately after disturbance
- Implement stormwater management systems
- Avoid construction on steep slopes where possible

Significance (Post-Mitigation): LOW

6.3.3 Impact on Vegetation

Impact Description:

Clearing of vegetation for infrastructure development.

Potential Impacts:

- Loss of bushveld vegetation
- Habitat fragmentation
- Introduction of invasive species

Significance (Pre-Mitigation): MODERATE

Mitigation Measures:

- Minimise clearing footprint
- Avoid sensitive vegetation areas
- Implement rehabilitation plan post-construction
- Control invasive alien species

Significance (Post-Mitigation): LOW

6.3.4 Impact on Fauna

Impact Description:

Disturbance to wildlife due to noise, movement, and habitat loss.

Potential Impacts:

- Displacement of animals
- Disruption of movement patterns
- Temporary stress to wildlife

Significance (Pre-Mitigation): MODERATE

Mitigation Measures:

- Restrict construction to daylight hours
- Avoid sensitive breeding seasons if possible
- Maintain ecological corridors
- Limit unnecessary noise and disturbance

Significance (Post-Mitigation): LOW

6.4 Operational Phase Impacts

6.4.1 Impact on Hydrology

Impact Description:

Long-term alteration of drainage patterns and water flow.

Potential Impacts:

- Increased runoff from hardened surfaces
- Reduced infiltration
- Potential downstream impacts

Significance (Pre-Mitigation): MODERATE

Mitigation Measures:

- Implement sustainable drainage systems (SuDS)
- Maintain natural flow paths
- Avoid channelisation of watercourses

Significance (Post-Mitigation): LOW

6.4.2 Impact on Biodiversity

Impact Description:

Long-term ecological disturbance due to land use change.

Potential Impacts:

- Habitat loss within ESA areas
- Reduced ecological connectivity
- Edge effects on surrounding natural areas

Significance (Pre-Mitigation): MODERATE

Mitigation Measures:

- Maintain buffer zones and open spaces
- Avoid development in sensitive areas
- Implement biodiversity offset if required

Significance (Post-Mitigation): LOW–MODERAT

6.4.3 Impact of Artificial Water Bodies

Impact Description:

Existing dams may continue to influence hydrology and ecological processes.

Potential Impacts:

- Alteration of natural hydrological regimes
- Artificial wet conditions
- Attraction of wildlife to modified areas

Significance (Pre-Mitigation): LOW–MODERATE

Mitigation Measures:

- Manage dam water levels responsibly
- Prevent contamination of stored water
- Monitor ecological changes around dams

Significance (Post-Mitigation): LOW

6.5 Cumulative Impacts

- Combined effects of land transformation, agriculture, and water abstraction may:
    - Increase pressure on water resources
    - Reduce biodiversity over time
- However, due to the largely rural nature of the area, cumulative impacts are considered **moderate** if unmanaged.

6.6 No-Go Areas

Based on the assessment, the following areas are recommended as **no-go zones**:

- All delineated wetlands and seep areas
- Drainage lines and river channels

- Wetland buffer zones
- Steep slopes and rocky outcrops

6.7 Overall Impact Statement

The proposed development is considered **environmentally acceptable**, provided that:

- Wetlands and hydrological systems are strictly avoided
- Mitigation measures are implemented effectively
- Construction activities are properly managed

With mitigation in place, the majority of impacts can be reduced to **low significance**, and no fatal flaws have been identified.

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

An integrated environmental assessment was undertaken for the study area using a combination of desktop analysis, GIS mapping, and field verification. The assessment considered key environmental aspects including wetlands, hydrology, soils, vegetation, biodiversity sensitivity, topography, land use, and geology.

The study area is located within a predominantly rural landscape in the Waterberg region and is currently utilised as a game farm, with supporting infrastructure such as artificial dams for water provision. The site is largely characterised by natural bushveld vegetation, rocky terrain, and variable topography.

The assessment confirmed the presence of wetland systems, including:

- Channelled valley-bottom wetlands
- Unchannelled valley-bottom wetlands
- Seep systems

These features are of high ecological importance and are sensitive to disturbance. In addition, several non-perennial drainage lines were identified, indicating seasonal hydrological activity across the site.

The study area falls largely within Ecological Support Areas (ESA), with nearby Critical Biodiversity Areas (CBA)further increasing the ecological importance of the landscape. Soil conditions, including shallow and plinthic soils, as well as steep slopes and rocky outcrops, present additional environmental and engineering constraints.

Based on the findings:

- No fatal environmental flaws were identified that would prevent development entirely.
- However, significant sensitivities exist, particularly related to wetlands, drainage systems, and terrain.
- The site is considered conditionally suitable for development, provided that strict environmental management and avoidance measures are implemented.

7.2 Key Findings

- Wetlands are present and require strict protection.
- Hydrological systems are sensitive and largely seasonal.
- The site supports natural savanna (bushveld) vegetation.
- Land use is currently low intensity (game farming).
- Artificial dams influence local hydrology but are not natural wetlands.
- The area has moderate ecological sensitivity overall, with localized high-sensitivity zones.

7.3 Recommendations

7.3.1 Environmental Protection Measures

- All wetlands and seep areas must be designated as no-go areas**.**
- A minimum buffer of 32 m–50 m (or as per regulatory requirements) must be maintained around all wetlands and drainage lines.
- No infrastructure development should occur within wetland zones or buffers

7.3.2 Site Planning and Layout

- Infrastructure should be located within:
    - Previously disturbed areas
    - Areas with gentle slopes

        - Zones with lower ecological sensitivity
- Avoid:
    - Steep slopes
    - Rocky outcrops
    - High biodiversity areas

7.3.3 Stormwater and Hydrology Management

- Maintain natural drainage patterns.
- Implement sustainable drainage systems (SuDS) to manage runoff.
- Prevent concentration of flow that may lead to erosion or wetland degradation.

7.3.4 Vegetation Management

- Limit vegetation clearing to the minimum required footprint.
- Implement a rehabilitation plan post-construction.
- Control and monitor invasive alien plant species.

7.3.5 Construction Management

- Clearly demarcate no-go areas prior to construction.
- Implement erosion and sediment control measures.
- Restrict construction activities near sensitive areas.
- Appoint an Environmental Control Officer (ECO) to oversee compliance.

7.3.6 Monitoring and Compliance

- Conduct regular environmental monitoring during construction and operation.
- Monitor:
    - Wetland condition
    - Erosion and sedimentation
    - Vegetation recovery
- Ensure compliance with:
    - National Water Act (Act No. 36 of 1998)
    - National Environmental Management Act (NEMA)

7.4 Final Statement

The proposed development can be supported from an environmental perspective, provided that all recommended mitigation measures are implemented and sensitive areas are avoided. With appropriate planning and management, the development is unlikely to result in significant long-term environmental impacts.

The protection of wetlands and maintenance of ecological processes should remain the primary consideration throughout the project lifecycle.

APPENDICES

Appendix A: Specialist Declaration

I, Mpho Ramalivhana declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Mpho Ramalivhana Pri Sci. Nat (Hons. Bot.; SAAB; SACNASP).

I, Khumbelo Given Marabe declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
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- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Signature

Khumbelo Given Marabe

SACNASP NO: 132731

WISA REG NO :39885

IAIAsa: Membership no: 7837

IIAV Member No. 3163

Appendix B: Specialist CV

Mr Khumbelo Given Marabe

Principal Environmental Consultant | Director – KMG Environmental Solutions Services (Pty) Ltd

SACNASP Registered– Reg. No. **132731**

WISA Professional Process Controller – Reg. No. **39885**

Summary of Expertise:

Mr. Marabe is an experienced environmental specialist with over a decade of expertise in:

- Visual, Social, Wetland and Terrestrial Impact assessments
- Agricultural and soil capability impact assessments
- Noise, air quality, water, and dust monitoring
- Environmental awareness training
- Environmental audits and licensing applications
- NEMA and NWA compliance
- Environmental management and monitoring across sectors including mining, manufacturing, and renewable energy

Education & Certifications:

- BSc Environmental Sciences – University of Venda
- NEBOSH Environmental Management Certificate (2024)
- ISO 45001 & ISO 14001 Implementation & Internal Auditor – NOSA
- Health and Safety Regulations – HASLAC
- Certificates in Management Development (GIBS – AECI Programmes)
- Honours in Environmental Monitoring & Modelling (ongoing – UNISA)

Ms. Jeniffer Mutsila

Environmental GIS and Mapping Technician

Affiliation: KMG Environmental Solutions Services (Pty) Ltd

🎤 *Junior Environmental Assessment Practitioner, Environmental Mapping & spatial analysis*

Professional Overview:

Ms. Jeniffer Mutsila is a technically skilled Environmental Mapping and GIS Technician with a background in field-based wetland delineation and spatial data analysis. He provides vital support in environmental assessments by producing geospatial products and performing site-level data validation for use in Environmental Impact Assessments (EIAs), Basic Assessments (BAs), Wetland Impact Assessments, and Water Use Licence Applications (WULAs).

With hands-on experience in both **desktop and field applications**, Jeniffer brings a valuable blend of practical and digital expertise to complex projects that require environmental sensitivity mapping, buffer zone compliance checks, and spatial integration of biodiversity datasets.

Core Competencies:

- GIS Mapping & Spatial Analysis (ArcGIS, QGIS)
- GPS-based Field Surveying and Data Collection
- Wetland and Riparian Zone Delineation Support
- Environmental Reporting: BAR, EIA, EMPr, EMP, WULA, EPR
- Legislation Knowledge: NEMA, Water Act, Waste Act, Air Quality Act, MPRDA

Key Project Contributions:

◆ **Wetland Mapping and Sensitivity Overlay Support**

- Developed comprehensive map series for **prospecting right applications** in the North West and Limpopo provinces, including:
  - ✓ **Wetland Classification Maps** (HGM units: seep, valley-bottom, flat wetlands)
  - ✓ **30 m Riparian Buffer Sensitivity Maps**

- ✓ **500 m Regulated Area Compliance Maps**
- ✓ **Field-Verified Wetland Delineation Maps**

◆ **GIS Support for Impact Assessments**

- Integrated **soil, rainfall, vegetation, and biodiversity** datasets with national layers (e.g., NFEPA, Aquatic CBAs, ESA zones) to support:
  - ✓ Wetland Impact Assessments
  - ✓ Agricultural Impact Assessments (AIA)
  - ✓ Biodiversity screening and risk mapping

◆ **Field Data Management & GPS Verification**

- Accompanied environmental specialists on site visits to:
  - ✓ Capture **wetland and watercourse coordinates**
  - ✓ Assist with **transect layout and data recording**
  - ✓ Cross-check digital boundary outputs against **ground conditions**

◆ **Reporting and Compliance Visuals**

- Prepared high-resolution map figures used in:
  - ✓ **Basic Assessment Reports (BARs)**
  - ✓ **Environmental Management Programmes (EMPrs)**
  - ✓ **Water Use Licence Applications (WULAs)**
- Ensured maps met **legislative and formatting standards** for submission to DMRE, DWS, and DFFE.

Professional Strengths:

- Detail-oriented and deadline-driven
- Strong spatial logic and environmental understanding
- Collaborative work ethic with specialists and field teams
- Effective communication of spatial data to technical and non-technical audiences

Summary Value to Projects:

Ms. Jeniffer GIS and mapping expertise plays an essential role in ensuring that environmental reports are visually informative, spatially accurate, and legally aligned. His ability to translate field data into structured spatial products enhances the defensibility and scientific integrity of environmental applications, especially those involving wetland delineation, regulated activity compliance, and site sensitivity verification

MPHO RAMALIVHANA

09 Krinkhout Avenue, Glen Marais, 1619

ramalivhanam@naledznaies.co.za | ramalivhanam@gmail.com

078 901 4833

LinkedIn: Available upon request

Driver's License: Code C1 (10)

ZA Nationality: South African

Date of Birth: 07 February 1987

PROFESSIONAL PROFILE

A seasoned Environmental Consultant and Director with over 15 years of diverse experience in environmental management, impact assessment, ecological monitoring, and biodiversity studies. Demonstrates excellence in leading multidisciplinary projects across Prospecting, energy, infrastructure, and conservation sectors across South Africa and the SADC region. A specialist in terrestrial biodiversity assessments, with hands-on expertise in managing complex EIA and EMP processes in alignment with local legislation and international standards (IFC PS, Equator Principles).

AREAS OF EXPERTISE

- Terrestrial Biodiversity & Ecological Assessments
- Environmental Impact Assessments (EIA) & Management Programmes (EMP)
- Environmental Monitoring & Auditing
- Wetland and Water Resource Assessments
- Stakeholder Engagement & Public Participation
- Environmental Due Diligence & Site Assessments
- IFC Performance Standards & Equator Principles Implementation

EDUCATION

Honours Degree in Botany (Plant Ecology)

University of Limpopo | 2008

Bachelor of Science in Botany & Microbiology

University of Limpopo | 2007

Matriculation (Grade 12)

Mudinane Secondary School | 2004

PROFESSIONAL AFFILIATIONS

- **South African Council for Natural Scientific Professions (SACNASP)** – Reg. No. 400395/14
- **South African Association of Botanists (SAAB)** – Member
- **International Association for Impact Assessment South Africa (I AWIAsa)** – Member

SELECTED BIODIVERSITY / TERRESTRIAL PROJECTS

- Terrestrial Biodiversity Assessment for a proposed mixed-use development on Greater Giyani 891 LT, Limpopo
- Biodiversity Assessment for prospecting right on Zwartrand 145 IP, Ventersdorp, North West
- Terrestrial Ecological Assessment – Glencore Merafe Venture: Boshoek Smelter, North West
- Biodiversity Impact Assessment for Eskom 132/11/6.6kV Calcined Products Line, Westonaria
- Terrestrial Biodiversity Study – Westgate Randfontein 132kV Line Deviation, Gauteng
- Biodiversity Impact Assessment for township development on Fouriestrust 2525, Free State
- Ecological Assessment for lodge development on Kheto Agricultural Farm, Greater Giyani
- Terrestrial Ecological Assessment for a ±5km 88kV Power Line, City of Tshwane

CAREER HISTORY

Managing Director / Senior Environmental Consultant

Naledzani Environmental Services | Nov 2014 – Present

- Lead biodiversity and terrestrial assessment teams
- Manage full EIA and EMP processes
- Conduct environmental audits and monitoring
- Business development and client liaison

Associate Environmental Assessment Practitioner

Joan Construction and Projects | Jun 2015 – Present

- Prepare and review environmental reports, with focus on ecological assessments
- Manage Prospecting and infrastructure projects

Environmental Consultant

Parsons Brinckerhoff Africa (now WSP) | Mar 2013 – Oct 2014

- Managed EIA and EMP development
- Led biodiversity and ecological studies
- Conducted baseline surveys, compliance monitoring

Senior Environmental Consultant

Tshikovha Environmental & Communication Consulting | Feb 2011 – Feb 2013

- Coordinated EIA, EMP, and stakeholder engagement processes
- Mentored junior staff and oversaw technical reviews

Data Management Co-ordinator Trainee

South African National Biodiversity Institute (SANBI) | Apr 2010 – Jan 2011

- Plant species identification, data collection, and mapping using GIS

Biodiversity Management Intern

Limpopo Dept. of Economic Development, Environment and Tourism | Apr 2009 – Mar 2010

- Wetland identification and rehabilitation assessments
- Conducted biodiversity impact reviews and river health monitoring

KEY PROJECT EXPERIENCE SNAPSHOT

- **Namibia**: ESIA for City of Windhoek's Bus Depot & Waste Facilities
- **Mozambique**: ESIA for Ncondezi Thermal Power Plant
- **Rwanda**: 220 kV Transmission Line for EWSA
- **South Africa**: Chrome and coal Prospecting EIAs, solar facilities, landfill upgrades, transmission lines
- **Ecological Monitoring**: Randwater Pipelines, Davhana Bridge Construction, Majosi-Levubu Road.

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

PREPARED BY:

Rofhiwavhutali (Pty) Ltd
Environmental and Engineering Best Practices

Contact Number: 076 176 0655
Email: admin@rofhiwavhutali.co.za
Website: www.rofhiwavhutali.co.za

PREPARED FOR:

ARENGO 297
WE BUILD TO GIVE BACK

DMRE Ref No: LP 30/5/1/2/3/2/1 10287 MR

NAME OF THE APPLICANT: ARENGO 297 (PTY) LTD

MINING RIGHT APPLICATION FOR DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE, IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE., IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.

2026

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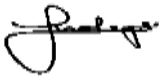
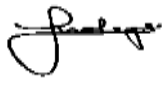
DOCUMENT TRACKING

Project Name	Terrestrial Biodiversity Impact Assessment for the Mining Right Application for Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore, in Respect of Portions Re/2/313, Re/3/313, and Re /4/313 of the Farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province.	
DMRE Ref No	LP 30/5/1/2/3/2/1 10287 MR	
Client Details	ARENGO 297 (PTY) LTD	
		Signature
Specialist	Mokgatla J. Molepo M.Sc. Zoology, Pr. Sci. Nat. British Ecological Society (Reg. No. 1010709)	
VERSION	V1	
CONTACT	admin@rofhiwavhutali.co.za	+27 76 176 0655
Date	23 March 2026	

INDEPENDENCE

I, Mokgatla J. Molepo, declare that –

- I act as the independent specialist in this matter;
- I do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014 (as amended in 2017);
- I performed the work relating to the application in an objective manner, even if it results in views and findings that are not favourable to the applicant;
- I declare that there were no circumstances that compromised my objectivity in performing such work;
- I have expertise in conducting the specialist assessment relevant to this application, including knowledge of the National Environmental Management Act (Act 107 of 1998) (NEMA), regulations and any guidelines that have relevance to the proposed activity;
- I comply with the NEMA Act, regulations and all other applicable legislation; and
- I disclosed to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct.
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B (1) of the National Environmental Management Act, 1998 (Act 107 of 1998).



Signature

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1. INTRODUCTION

Arengo 297 (Pty) Ltd (hereafter referred to as “the Applicant” or “Arengo”) has submitted an application for a mining right for Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore, in Respect of Portions Re/2/313, Re/3/313, and Re /4/313 of the Farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province, and covers an extent of approximately 3,892.0 hectares (Ha).

Arengo 297 (Pty) Ltd has appointed Rofhiwavhutali (Pty) Ltd to undertake a Terrestrial Biodiversity Impact Assessment as part of the specialist studies required for the project. This report has been compiled to meet the requirements for a Terrestrial Biodiversity Assessment in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes, as stipulated under Sections 24(5)(a) and (h) and Section 44 of the National Environmental Management Act (NEMA) (GNR 320), promulgated on 20 March 2020.

2. SITE DESCRIPTION

2.1. Site Locality

The proposed mining right area is located in the northern part of Thabazimbi, approximately 6.02 km from the town centre. The application area encompasses portions RE/2/313, RE/3/313, and RE/4/313 of the Farm Cornwall 313 KQ, as well as the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Farm Koedoevlei 128 KQ. The site falls within the jurisdiction of the Thabazimbi Local Municipality, which forms part of the Waterberg District Municipality in Limpopo Province.

The project area is located within a predominantly rural landscape characterised by a mix of agricultural activities, game farming, and natural vegetation typical of the Waterberg region. Access to the site is provided by a network of regional and local gravel roads that connect to the main arterial routes in and around Thabazimbi. The surrounding area is sparsely populated, with scattered farmsteads and privately owned properties.

Topographically, the area is characterised by gently undulating terrain interspersed with low ridges and drainage lines, which are typical of the broader Waterberg geological formation. The region supports a variety of terrestrial habitats, contributing to its ecological sensitivity and necessitating detailed environmental assessment.

The locality of the proposed mining right area is illustrated in Figure 2-1 and Figure 2-2, which provide a regional and site-specific context, respectively.

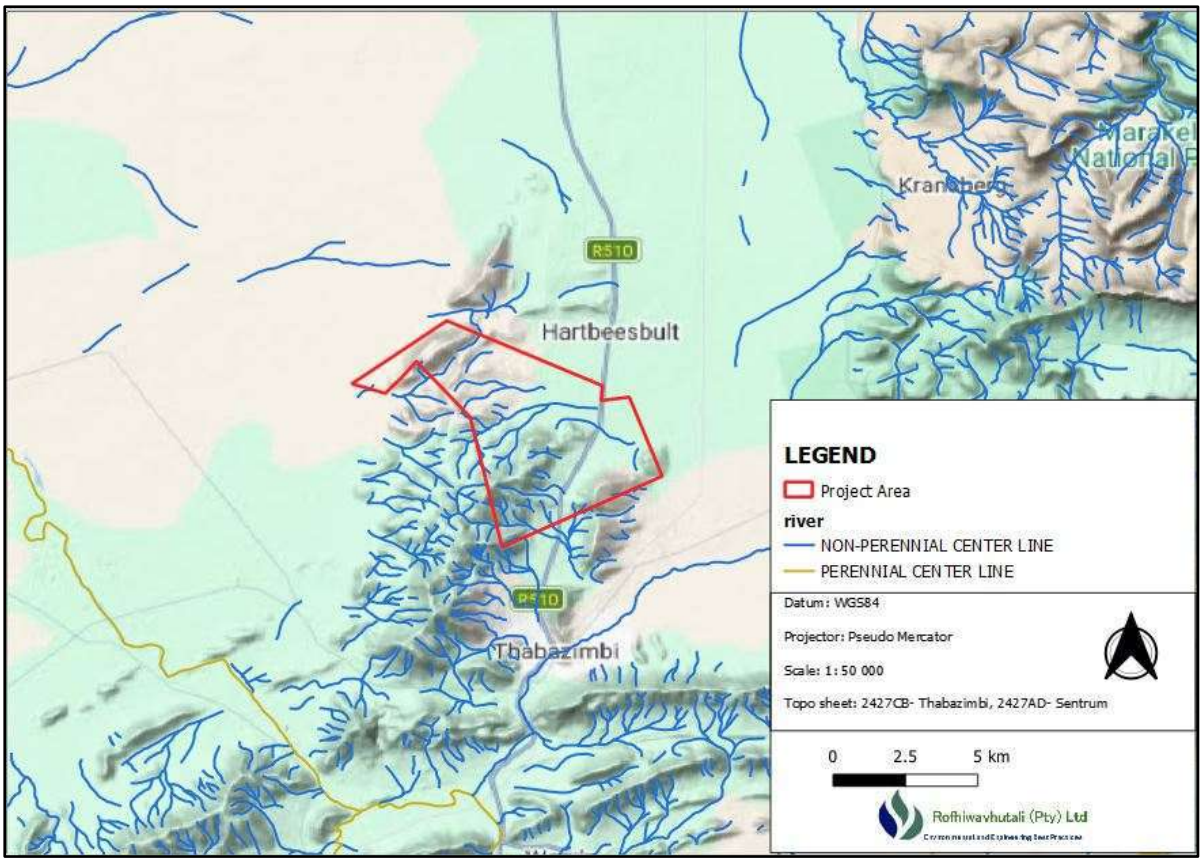

Figure 2-1: Locality map for the proposed mining right area.

Figure 2-2: Google earth view of the site proposed for the development.

3. PURPOSE OF THE REPORT

This report has been prepared as supporting documentation for the broader environmental application process and complies with the applicable regulatory requirements relating to Terrestrial Biodiversity.

Prior to undertaking the specialist assessment, a site sensitivity verification was conducted to confirm the current condition of the land and the environmental sensitivity of the project area, as initially identified by the National Web-based Environmental Screening Tool. The outcomes of the screening tool, together with the findings of the site sensitivity verification, inform the minimum reporting requirements and guide the identification of appropriate mitigation measures.

In accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes, published in terms of Sections 24(5)(a) and (h) and Section 44 of NEMA (Government Notice Regulation 320, gazetted on 30 October 2020), this report addresses all requirements relevant to the Terrestrial Plant and Animal Species themes.

The following is deduced from the National Web-based Environmental Screening Tool:

- Terrestrial Biodiversity Theme is “Very High” for the proposed project due to CBA 1; CBA 2; ESA 1; Lushof Private Nature Reserve; Paarl Private Nature Reserve; Parkveld Private Nature Reserve and Patrysbos Private Nature Reserve.
- The Plant Species Theme is “Medium” for the project, due to *Jamesbrittenia bergae* and *Hesperantha bulbifera*.
- Animal Species sensitivity is “High” due to sensitive species predicted to be present such as Aves-*Polemaetus bellicosus* (Martial Eagle), and Aves-*Aquila verreauxii* (Verreaux’s Eagle).

Where the Screening Tool assigns a Very High sensitivity rating, environmental regulations command the following two approaches:

- Undertaking a full Terrestrial Biodiversity Impact Assessment; or
- Where justified by a site inspection, and if the Environmental Assessment Practitioner (EAP) or specialist determines that the sensitivity is in fact lower, compiling a Terrestrial Biodiversity Compliance Statement. This statement must include a baseline description of the biodiversity and ecosystems within the project area.

3.1. Alternatives Considered

The consideration of alternatives is aimed at minimising potential impacts on fauna and flora within the project area. The following measures have been identified as practical alternatives and mitigation approaches during project planning and implementation:

- Limiting the extent of surface infrastructure and associated footprints, particularly in areas where a high density of protected flora is identified during site preparation.
- Avoiding construction activities and the movement of heavy machinery within environmentally sensitive areas, including riparian zones such as rivers and wetlands.
- Reducing the overall demand for water and land required for mining operations and associated infrastructure.

- Implementing an effective alien and invasive plant management programme.
- Minimising waste generation and reducing waste outputs.
- Rehabilitating disturbed areas through the re-establishment of identified indigenous vegetation.

4. Terms of Reference

This report has been prepared to meet the requirements for a Terrestrial Biodiversity Impact Assessment in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes, as stipulated under Sections 24(5)(a) and (h) and Section 44 of NEMA (GNR 320), promulgated on 20 March 2020.

The findings and recommendations presented herein are intended to inform and guide the EAP and relevant regulatory authorities during the Environmental Impact Assessment (EIA) and decision-making process for the proposed mining right application. The application relates to Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore mining over portions Re/2/313, Re/3/313, and Re/4/313 of the Farm Cornwall 313 KQ, as well as the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Farm Koedoevlei 128 KQ.

The terms of reference for this investigation are limited to an ecological assessment, with the following key objectives:

- Describe and map the vegetation types in the study area.
- Describe the biodiversity and ecological state of each vegetation unit.
- Establish and map sensitive vegetation areas showing the suitability for development and no-go areas.
- Identify plant and animal species of conservation concern (Red Data List). In the case of the fauna, this was done at a desktop level.
- Identify alien plant species, assess the invasive potential and recommend management procedures.
- Identify and assess the impacts of development on the site's natural vegetation and faunal species in terms of habitat loss, fragmentation and degradation of key ecosystems and, where feasible, provide mitigation measures to reduce these impacts.

5. Assumptions, Limitations, Uncertainties and Gap analysis

- The findings, results, observations, conclusions and recommendations provided in this report are based on the author's best scientific and professional knowledge, and available information regarding the potential impacts of mining right application on the vegetation composition.
- The layout provided to Rofhiwavhutali by the client is the preferred alternative and will be assessed as such. No alternatives will be considered within this study, however, recommendations on how to amend the layout to reduce the perceived impact on the receiving terrestrial environment will be provided where necessary.

- Plant species display a range of morphological and physiological attributes that determine their growth, reproduction and survival. It is therefore unlikely that all plant species identified on site will remain the same over temporal and spatial scales.
- Multiple plant species were observed to still be dormant during the site assessment and therefore it is likely that not all plant species were observed and identified during the site assessment.
- The assessment of impacts was based on the current environmental condition of the proposed project area.
- It is assumed that the information contained in existing databases, reports and publications is correct.
- Due to the constant moving nature of animal species as well as the common trait of animals to avoid humans, it is likely that not all animal species were identified within the study area.
- The assessment of impacts and recommendation of mitigation measures was informed by the site-specific ecological issues identified during the field survey.
- Evaluation of the significance of impacts with mitigation considered mitigation measures provided in this report and standard mitigation measures included in the project-specific Environmental Management Programme report (EMPr).
- Rofhiwavhutali (Pty) Ltd reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or significant information come to light.

6. LEGISLATIVE REQUIREMENTS

The importance of sustainable development and the protection of environmental resources have globally become a driving factor in the construction of new legislation governing industrial practices and their impact on the environment. South Africa has signed and ratified several global treaties, protocols and conventions, agreeing to implement the policies, which endorse sustainable development and promote a positive environmental legacy for future generations. A considerable international convention to which South Africa has in agreement within signatory, namely the Convention on Biological Diversity (CBD). The CBD is notably the key international convention for sustainable development. The CBD has three main objectives which lead and encourage a sustainable future. These are:

- The conservation of biological diversity.
- The sustainable use of its components; and
- The fair and equitable sharing of the benefits from the use of genetic resources.

The convention covers all possible domains that are directly or indirectly related to biodiversity and its role in development, ranging from science, politics and education to agriculture, business and culture. South African environmental law is primarily regulated by the environmental right contained in section 24 of the Constitution and the National Environmental Management Act 107 of 1998 (NEMA), which is the framework piece of environmental legislation and provides a basis for a comprehensive set of laws regulating various aspects of

the environment. This Terrestrial Biodiversity Impact Assessment was prepared in terms of the following, but not limited to, regulations, regulatory procedures, and guidelines Table 6-1):

Table 6-1: Applicable legislative requirements for the proposed development.

Legislation/Policy	Description
The Convention of Biological Diversity (Rio de Janeiro, 1992).	The purpose of the Convention on Biological Diversity is to conserve the variability among living organisms, at all levels (including diversity between species, within species and of ecosystems). Primary objectives include (i) conserving biological diversity, (ii) using biological diversity in a sustainable manner and (iii) sharing the benefits of biological diversity fairly and equitably.
South African Constitution 108 of 1996	The Constitution is the supreme law of the land and includes the bill of rights which is the cornerstone of democracy in South Africa and enshrines the rights of people in the country. It includes the right to an environment which is not harmful to human health or well-being and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures.
Strategic Framework for Sustainable Development in South Africa (SFSD)	The development of a broad framework for sustainable development was initiated to provide an overarching and guiding National Sustainable Development Strategy. The draft SFSD in South Africa (September 2006) is a goal orientated policy framework aimed at meeting the Millennium Development Goals. Biodiversity has been identified as one of the key crosscutting trends in the SFSD. The lack of sustainable practices in managing natural resources, climate change effects, loss of habitat and poor land management practices were raised as the main threats to biodiversity.
NEMA	This is a fundamentally important piece of legislation and effectively promotes sustainable development and entrenches principles such as the ‘precautionary approach’, ‘polluter pays’ principle, and requires responsibility for impacts to be taken throughout the life cycle of a project NEMA provides the legislative backing (Including Impact Assessment Regulations) for regulating development and ensuring that a risk-averse and cautious approach is taken when making decisions about activities.

Legislation/Policy	Description
EIA regulations	New regulations have been promulgated in terms of Chapter 5 of NEMA and were published on 7 April 2017 in Government Notice No. R. 326. Development and land use activities which require Environmental Authorisation in terms of the NEMA EIA Regulations, 2017, are in Listing Notice 3 (GG No. R.324, LN3) identified via geographic areas with the intention being that activities only require Environmental Authorisation when located within designated sensitive areas. These sensitive/geographic areas were identified and published for each of the nine provinces.
National Environmental Management: Biodiversity Act No 10 of 2004 (NEMBA)	The Biodiversity Act provides listing threatened or protected ecosystems, in one of four categories: CR, EN, VU or Protected (Government Gazette, 2011). The main purpose of listing threatened ecosystems is to reduce the rate of ecosystem and species extinction and includes the prevention of further degradation and loss of structure, function, and composition of threatened ecosystems.
Conservation of Agricultural Resources Act 43 of 1967 (CARA)	The intention of this Act is to control the over-utilisation of South Africa's natural agricultural resources, and to promote the conservation of soil and water resources and natural vegetation. The CARA has categorised a large number of invasive plants together with associated obligations of the landowner, including the requirement to remove categorised invasive plants and taking measures to prevent further spread of alien plants.
National Forest Act 84 of 1998	The protection, sustainable management and use of forests and trees within South Africa are provided for under the National Forests Act (Act 84 of 1998).
National Environmental Management: Protected Areas Act 57 of 2003	This Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It seeks to provide for the sustainable use of protected areas and to promote participation of local communities in the management of protected areas.
The RAMSAR Convention	Emphasis is placed on protecting wetlands and implementing initiatives to maintain or improve the state of wetland resources.
Convention on Biological Diversity	Countries are to rehabilitate or restore degraded ecosystem through the formulation of appropriate strategies and plans.

Legislation/Policy	Description
United Nations Convention to Combat Desertification	South Africa has responded to the UN Convention to Combat Desertification by developing a National Action Plan. The aim of the NAP is to implement current and future policies that affect natural resource management and rural development, and establish partnerships between government departments, overseas development agencies, the private sector and NGOs.
Threatened or Protected Species Regulations (2015)	These regulations, made under the National Environmental Management Biodiversity Act, 2004, provide for the protection and conservation of threatened species (including marine plants and animals).

7. STUDY METHODOLOGY

This Terrestrial Biodiversity Impact Assessment has been conducted in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes, as published in terms of Sections 24(5) (a) and 44 of the National Environmental Management Act (NEMA; Act No. 107 of 1998), applicable to Environmental Authorisation processes.

7.1. Desktop Study and Literature Review

Available desktop information and relevant data sources were reviewed to provide context for the proposed development site and to inform the assessment. The following desktop information and resources were used for the assessment:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006), to identify vegetation types and associated plant species likely to occur within the proposed development area.
- The Southern African Bird Atlas Project (SABAP2, 2017), to determine potentially occurring avifaunal species.
- Mammal distribution data obtained from the Animal Demography Unit (ADU, 2016), supplemented by Skinner and Chimimba (2005) and the IUCN spatial database (IUCN, 2017).
- Reptile and amphibian information sourced from the Animal Demography Unit (ADU, 2016), Bates et al. (2014), Du Preez and Carruthers (2009), and the IUCN spatial database (IUCN, 2017).
- The South African Protected Areas Database (DFFE, 2023) and the South African Conservation Areas Database (DEA, 2023), to identify protected and conservation areas within and surrounding the project site.

The following resources were used to identify floral and faunal species during and after the site assessment:

- Field Guide to Trees of Southern Africa (Braam and Piet van Wyk, 2013).
- Guide to Grasses of Southern Africa (Frits van Oudtshoorn, 2018).

7.2. Site Survey

The assessment focused on the classification of fauna, flora, and habitat types within the study area, with particular emphasis on identifying the actual and potential presence of Species of Conservation Concern (SCC), as defined by the IUCN (2017) and the National Environmental Management: Biodiversity Act (NEMBA, 2014).

7.3. Vegetation Assessment

The survey included the following:

- Compilation of expected species lists;
- A survey for Red and Orange Data plant species;
- Compilation of an observed plant species list;
- Compilation of listed Invasive and Alien Plant Species (IAPs); and
- Assessment of the presence degree of transformation and encroachment level due to invasive alien plant infestation.

7.4. Faunal Assessment

The survey included the following:

- Compilation of expected species lists;
- A survey of the terrestrial habitats within the proposed development area (where applicable);
- Compilation of identified species lists which included sights of occurrence such as spoor, burrows, dung and calls;
- Identification of any Red Data or listed species present or potentially occurring in the area; and
- A proximity assessment to any protected or ecologically important areas.

Emphasis was placed on the probability of the occurrence of species of provincial, national and international conservation importance.

7.5. Terrestrial Biodiversity Assessment

The survey included the following:

- Identification of any terrestrial landscape features of importance (e.g. SCC or TOPS Species; Strategic Water Sources or Freshwater Ecosystems);
- Identification of the main vegetation types;
- Assessment of the connectivity of the ecosystem, fragmentation of the habitat, ecological processes and fine scale habitats;
- Assessment of important ecological areas such as nesting sites, feeding grounds, and animal movement patterns.

8. GENERAL DESCRIPTION OF THE RECEIVING ENVIRONMENT

The following subsections provide an overview of the climatic conditions, broad ecological characteristics, and conservation context of the project area and its surrounding region.

8.1. Climate

Climate is the state of the atmosphere over long periods, such as over years, decades, centuries, or greater, and the weather is defined as the atmospheric conditions of an area over a short period (Naomi, 2004).

8.1.1. Average Temperature and Precipitation

Average temperature and precipitation for the proposed development area are illustrated in Figure 8-1 and Figure 8-2. Figure 8-1 presents the annual temperature profile, where the solid red line represents the mean daily maximum temperatures and the solid blue line represents the mean daily minimum temperatures. In addition, dashed red and blue lines depict historical temperature extremes, reflecting the hottest and coldest conditions recorded over approximately the past 30 years. This information provides insight into seasonal temperature variation and potential climatic stressors affecting the proposed development area.

Figure 8-2 presents the average annual precipitation for the site. The region is characterised by a summer rainfall regime, with predominantly dry winter conditions. Mean Annual Precipitation (MAP) varies across the different vegetation types occurring within the proposed development area. In the Waterberg Mountain Bushveld, precipitation ranges from approximately 500 mm in lower-lying areas to around 750 mm at higher elevations. The Dwaalboom Thornveld receives between 500 mm and 600 mm annually, while the Western Sandy Bushveld experiences rainfall of about 450 mm in the northern areas, increasing to approximately 650 mm in the southern parts.

These variations in precipitation are important for understanding the climatic drivers of the Savanna Biome in the region and their influence on local terrestrial biodiversity and ecosystem processes. Figure 2-1

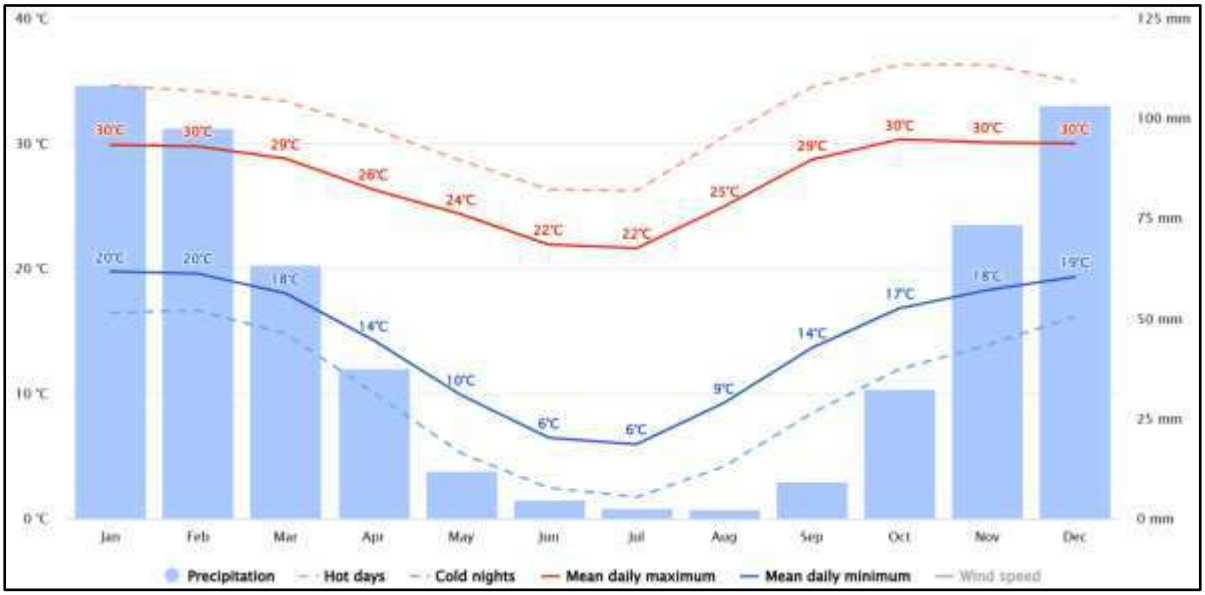

Figure 8-1: Average temperatures and precipitation (meteoblue.com).

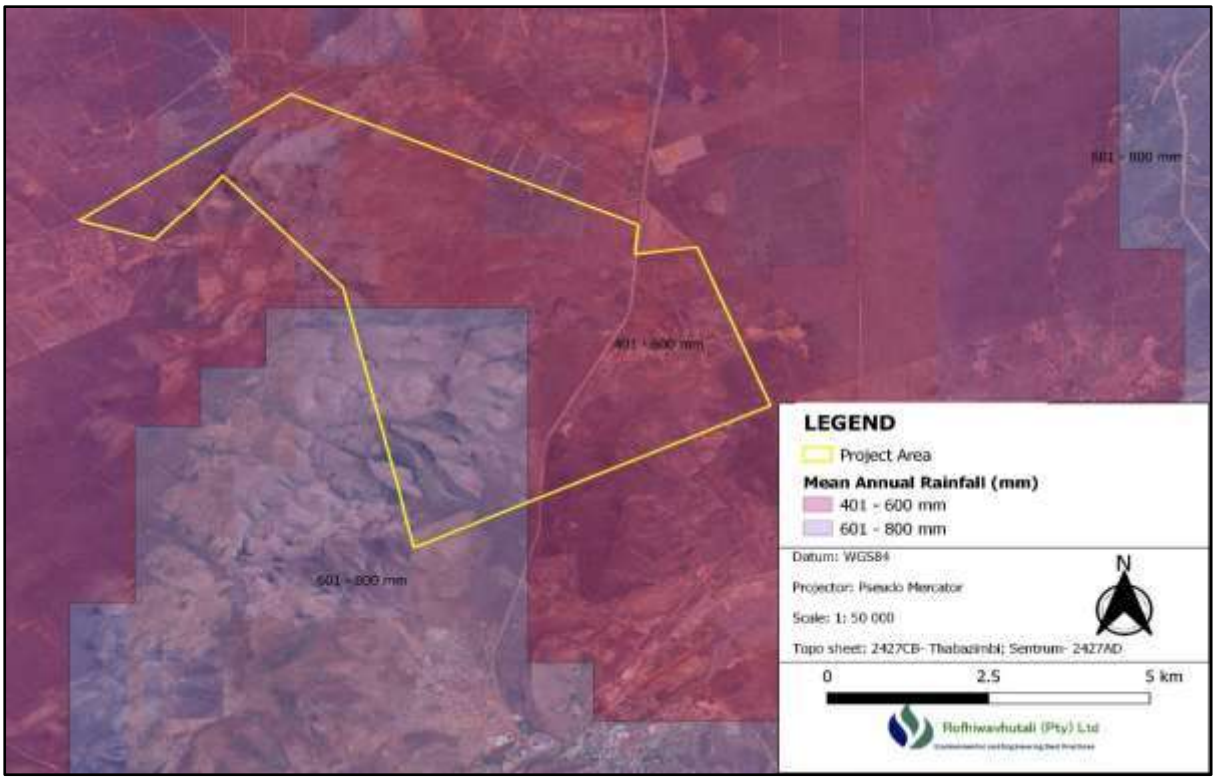

Figure 8-2: Mean annual precipitation.

8.1.2. Wind Characteristics

The wind rose for the project area (Figure 8-3), illustrates the frequency and direction of winds throughout the year, showing the number of hours per year that the wind blows from specific directions across different wind speed classes. The modelled data provides an accurate representation of actual wind conditions in the area, with the predominant wind direction blowing from the southwest (SW) toward the northeast (NE).

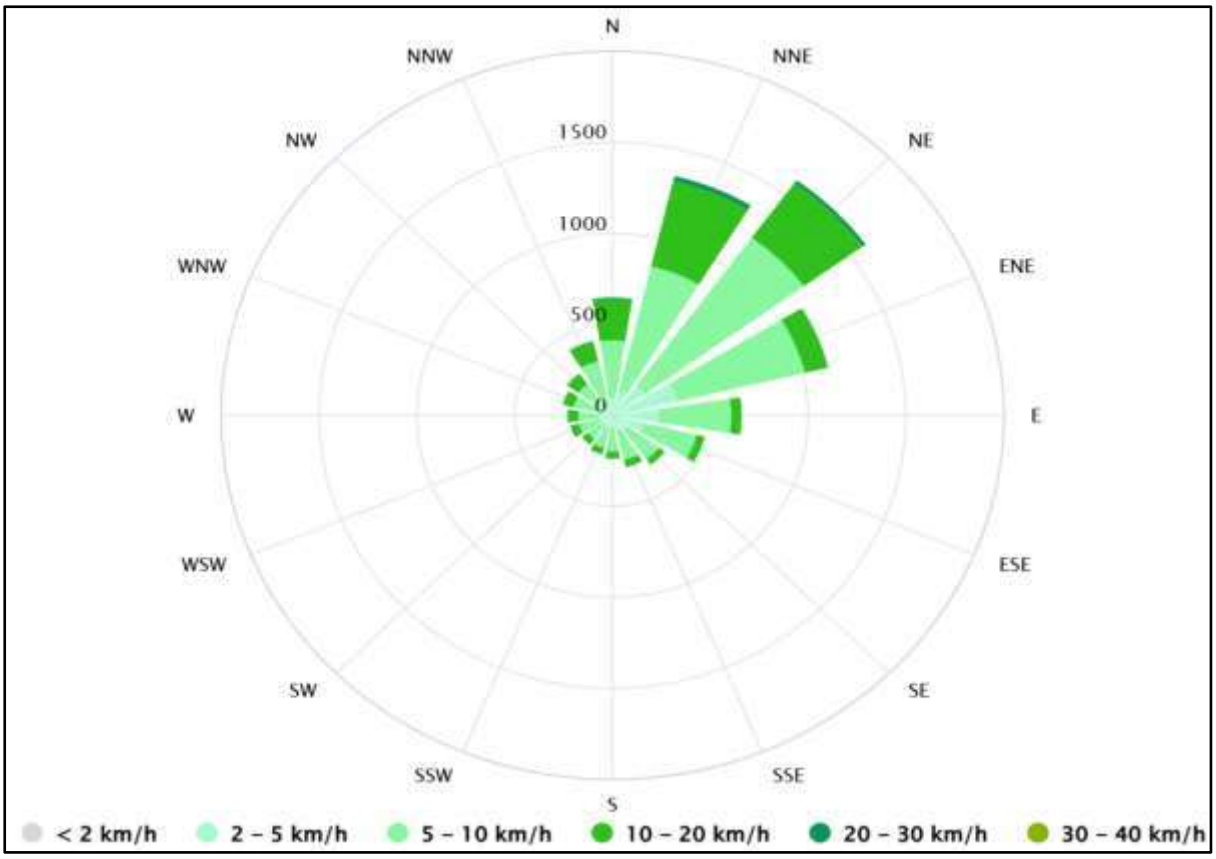

Figure 8-3: Wind rose (meteoblue.com).

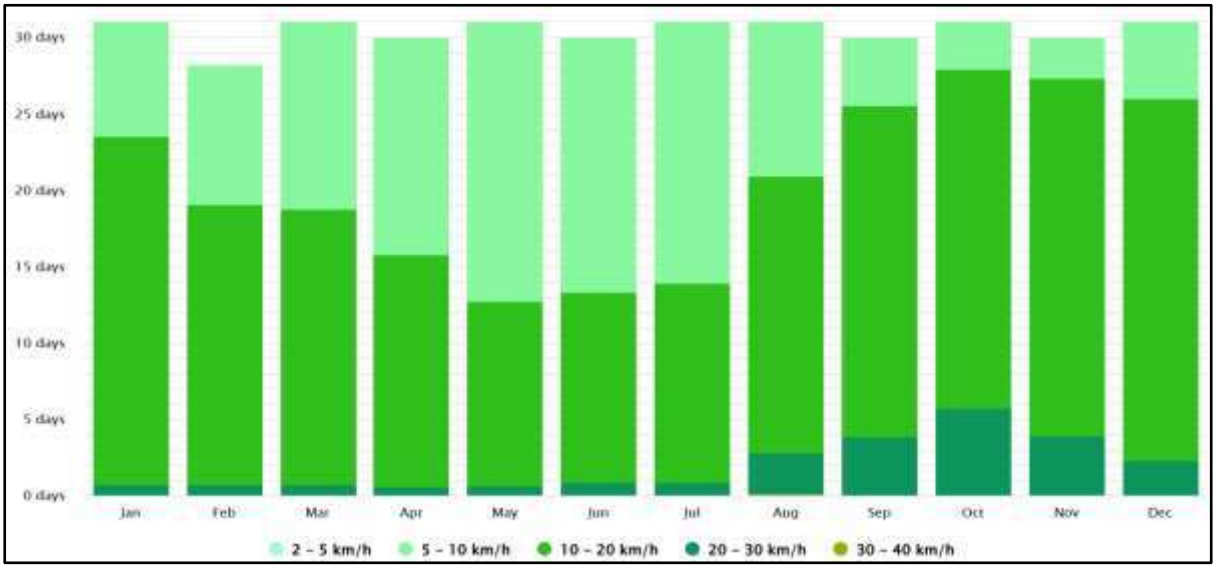

Figure 8-4: Wind speed (meteoblue.com).

Figure 8-4 presents the average number of days per month during which wind speeds reach specific thresholds. Wind speeds are generally highest during the spring months (August to October) and lowest during the autumn and winter periods. These wind patterns are important for understanding local climatic influences on the project area, including their potential effects on vegetation, soil erosion, and dust dispersion.

8.2. Terrestrial Biodiversity

Based on the national vegetation classification of South Africa (Mucina & Rutherford, 2006), the project area encompasses three distinct vegetation types: Waterberg Mountain Bushveld (SVcb 17), Western Sandy Bushveld (SVcb 16), and Dwaalboom Thornveld (SVcb 1). The Waterberg Mountain Bushveld is the dominant vegetation type within the study area, while Western Sandy Bushveld occupies a smaller portion, and Dwaalboom Thornveld is limited to a relatively small section in the north-western part of the site (Figure 8-5).

All three vegetation types form part of the Savanna Biome, which is characterised by a combination of woody vegetation and a well-developed grass layer, adapted to seasonal rainfall and periodic disturbances such as fire and grazing.

8.2.1. Waterberg Mountain Bushveld (SVcb 17)

The Waterberg Mountain Bushveld is found in Limpopo Province: Waterberg Mountains, including the foothills, escarpment and tablelands south of the line between Lephalale and Marken and north of Bela-Bela and west of Mokopane and with outliers in the southwest such as the Boshofsberge and Vlieëpoortberge near Thabazimbi. Altitude about 1 000–1 600 m and generally at a lower altitude than the Gm 29 Waterberg-Magaliesberg Summit Sourveld (Mucina & Rutherford, 2006).

8.2.1.1. Vegetation and landscape features:

This vegetation type is generally associated with rugged mountainous landscapes and rocky slopes, where vegetation structure varies along topographic gradients. Higher slopes are often dominated by Protea–Faurea bushveld, which transitions downslope into broad-leaved deciduous bushveld dominated by species such as *Diplorhynchus condylocarpon*. Lower valleys and sandy plateau areas typically support *Burkea africana–Terminalia sericea* savanna. The grass layer is generally moderately to well develop.

8.2.1.2. Geology and Soils:

The region's geology includes mainly sandstone, subordinate conglomerate, siltstone and shale of the Kransberg Subgroup and medium- to coarse-grained sandstone, conglomerate, trachytic lava and quartz porphyry of the Swaershoek Formation, Nylstroom Subgroup (both Mokolian Waterberg Group). Dystrophic, acidic sandy, loamy to gravelly soil. Glenrosa and Mispah Forms. Land types mainly Ib, Ac, Fa and Ad (Mucina & Rutherford, 2006).

8.2.1.3. Climate:

The region experiences summer rainfall with very dry winters. MAP from about 500 mm in the lower-altitude northwest to about 750 mm on the higher parts of the main east-west range. Frost fairly frequent in winter. See also climate diagram for SVcb 17 Waterberg Mountain Bushveld (Mucina & Rutherford, 2006).

8.2.1.4. Important Taxa:

- Tall Trees: *Acacia erioloba, A. nigrescens, Sclerocarya birrea subsp. caffra.*

- Small Trees: *Acacia erubescens (d), A. mellifera subsp. detinens (d), A. nilotica (d), A. tortilis subsp. heteracantha (d), Combretum apiculatum (d), C. imberbe (d), Terminalia sericea (d), Combretum zeyheri, Lannea discolor, Ochna pulchra, Peltophorum africanum.*
- Tall Shrubs: *Combretum hereroense (d), Euclea undulata (d), Coptosperma supra-axillare, Dichrostachys cinerea, Grewia bicolor, G. flava, G. monticola.*
- Low Shrubs: *Clerodendrum ternatum, Indigofera filipes, Justicia flava.*
- Graminoids: *Anthephora pubescens (d), Digitaria eriantha subsp. eriantha (d), Eragrostis pallens (d), E. rigidior (d), Schmidtia pappophoroides (d), Aristida congesta, A. diffusa, A. stipitata subsp. graciliflora, Eragrostis superba, Panicum maximum, Perotis patens*.
- Herbs: *Blepharis integrifolia, Chamaecrista absus, Evolvulus alsinoides, Geigeria burkei, Kyphocarpa angustifolia, Limeum fenestratum, L. viscosum, Lophiocarpus tenuissimus, Monsonia angustifolia.*

8.2.2. Dwaalboom Thornveld (SVcb 1)

The Dwaalboom Thornveld is found in Limpopo and North West Provinces, Flats north of the Dwarsberge and associated ridges mainly west of the Crocodile River in the Dwaalboom area but including a patch around Sentrum. South of the ridges it extends eastwards from the Nietverdiend area, north of the Pilanesberg to the Northam area. Altitude 900–1 200 m (Mucina & Rutherford, 2006).

8.2.2.1. Vegetation and landscape features:

The Dwaalboom Thornveld in Plains with layer of scattered, low to medium high, deciduous microphyllous trees and shrubs with a few broad-leaved tree species, and an almost continuous herbaceous layer dominated by grass species. *Acacia tortilis* and *A. nilotica* dominate on the medium clays (at least 21% clay in the upper soil horizon but high in the lower horizons). On particularly heavy clays (>55% clay in all horizons) most other woody plants are excluded and the diminutive *A. tenuispina* dominates at a height of less than 1 m above ground. On the sandy clay loam soils (with not more than 35% clay in the upper horizon but high in the lower horizons) *A. erubescens* is the most prominent tree (Pauw, 1988). The alternation of these substrate types creates a mozaic of patches typically 1–5 km across, for example in the unit west of Thabazimbi (Mucina & Rutherford, 2006).

8.2.2.2. Geology and Soils:

The region's geology includes mainly vertic black ultramafic clays which developed from norite and gabbro, also locally in small depressions along streams. Some areas have less clay. Some with high base status and eutrophic red soils. Underlying geology is an Archaean granite-gneiss terrane of the Swazian Erathem that is covered in parts by the mainly clastic as well as chemical sediments and volcanics of the Rayton and Silverton Formation, both of the Pretoria Group (Transvaal Supergroup). Mafic intrusive rocks of the Rustenburg Layered Suite, Bushveld Igneous Complex (Late Vaalian) are present in the east and include the

Bierkraal Manetite Gabbro. Bronzite, harzburgite, norite and anorthosite are the major mafic rocks of the Rustenburg Suite. Land types mainly Ea and Ae (Mucina & Rutherford, 2006).

8.2.2.3. Climate:

Summer rainfall with very dry winters. MAP ranges from about 500–600 mm. This unit has the highest mean annual potential evaporation of savanna vegetation units outside the two Kalahari bioregions. Frost is fairly frequent in winter. See also climate diagram for SVcb 1 Dwaalboom Thornveld (Mucina & Rutherford, 2006).

8.2.2.4. Important Taxa:

- Tall Tree: *Acacia erioloba.*
- Small Trees: *Acacia erubescens (d), A. nilotica (d), A. tortilis subsp. heteracantha (d), A. fleckii, A. mellifera subsp. detinens, Combretum imberbe, Rhus lancea, Ziziphus mucronata.*
- Tall Shrubs: *Acacia hebeclada subsp. hebeclada, Combretum hereroense, Diospyros lycioides subsp. lycioides, Euclea undulata, Grewia flava, Tarchonanthus camphoratus.*
- Low Shrubs: *Acacia tenuispina (d), Abutilon austro-africanum, Aptosimum elongatum, Hirpicium bechuanense, Pavonia burchellii, Solanum delagoense.*
- Succulent Shrubs: *Kalanchoe rotundifolia, Talinum caffrum.*
- Herbaceous Climber: *Rhynchosia minima.*
- Graminoids: *Aristida bipartita (d), Bothriochloa insculpta (d), Digitaria eriantha subsp. eriantha (d), Ischaemum afrum (d), Panicum maximum (d), Cymbopogon pospischilii, Eragrostis curvula, Sehima galpinii, Setaria incrassata.*
- Herbs: *Heliotropium ciliatum, Kohautia caespitosa subsp. brachyloba, Nidorella hottentotica.*

8.2.3. Western Sandy Bushveld (SVcb 16)

As presented in Figure 8-5 below, the proposed study area (Thabazimbi site) is located within the Western Sandy Bushveld. The Western Sandy Bushveld is found in Limpopo and North West Provinces, primarily on flat and gently undulating plains. It extends from Assen, moving northward beyond Thabazimbi, remaining west of the Waterberg Mountains, and reaching as far as Steenbokpan. Isolated patches also occur between the Crocodile and Marico Rivers in the west, at altitudes ranging from 900 to 1200 meters (Mucina & Rutherford, 2006).

8.2.3.1. Vegetation and landscape features:

The Western Sandy Bushveld varies from tall, open woodland to low woodland. It features a mix of broad-leaved and microphyllous tree species, with dominant species including *Acacia erubescens* on flat areas, *Combretum apiculatum* on gravelly upland soils, and *Terminalia sericea* on deep sandy soils. This vegetation type is characteristic of slightly undulating plains (Mucina & Rutherford, 2006).

8.2.3.2. Geology and Soils:

The region's geology includes sandstone and mudstone of the Matlabas Subgroup, along with sandstone, subordinate conglomerate, siltstone, and shale of the Kransberg Subgroup, both parts of the Mokolian Waterberg Group. In the north, Archaean granite and gneiss from the Swazian Erathem are prominent, while granite from the Lebowa Granite Suite (Bushveld Igneous Complex) is found in the west and southeast. Soils are characterized by a plinthic catena, with eutrophic, red yellow apedal, free-draining types of high base status. These include Hutton and Clovelly forms, with some Glenrosa and Mispah soils. Certain areas have less sandy soil compared to the SVcb 12 Central Sandy Bushveld. The predominant land types are Bd, Ah, Ae, and Fa (Mucina & Rutherford, 2006).

8.2.3.3. Climate:

The region experiences summer rainfall with very dry winters. Mean annual precipitation ranges from approximately 450 mm in the north to 650 mm in the south. Light frost occurs fairly frequently during winter (Mucina & Rutherford, 2006).

8.2.3.4. Important Taxa:

- Tall Trees: *Acacia erioloba, A. nigrescens, Sclerocarya birrea subsp. caffra.*
- Small Trees: *Acacia erubescens (d), A. mellifera subsp. detinens (d), A. nilotica (d), A. tortilis subsp. heteracantha (d), Combretum apiculatum (d), C. imberbe (d), Terminalia sericea (d), Combretum zeyheri, Lannea discolor, Ochna pulchra, Peltophorum africanum.*
- Tall Shrubs: *Combretum hereroense (d), Euclea undulata (d), Coptosperma supra-axillare, Dichrostachys cinerea, Grewia bicolor, G. flava, G. monticola.*
- Low Shrubs: *Clerodendrum ternatum, Indigofera filipes, Justicia flava.*
- Graminoids: *Anthephora pubescens (d), Digitaria eriantha subsp. eriantha (d), Eragrostis pallens (d), E. rigidior (d), Schmidtia pappophoroides (d), Aristida congesta, A. diffusa, A. stipitata subsp. graciliflora, Eragrostis superba, Panicum maximum, Perotis patens.*
- Herbs: *Blepharis integrifolia, Chamaecrista absus, Evolvulus alsinoides, Geigeria burkei, Kyphocarpa angustifolia, Limeum fenestratum, L. viscosum, Lophiocarpus tenuissimus, Monsonia angustifolia.*

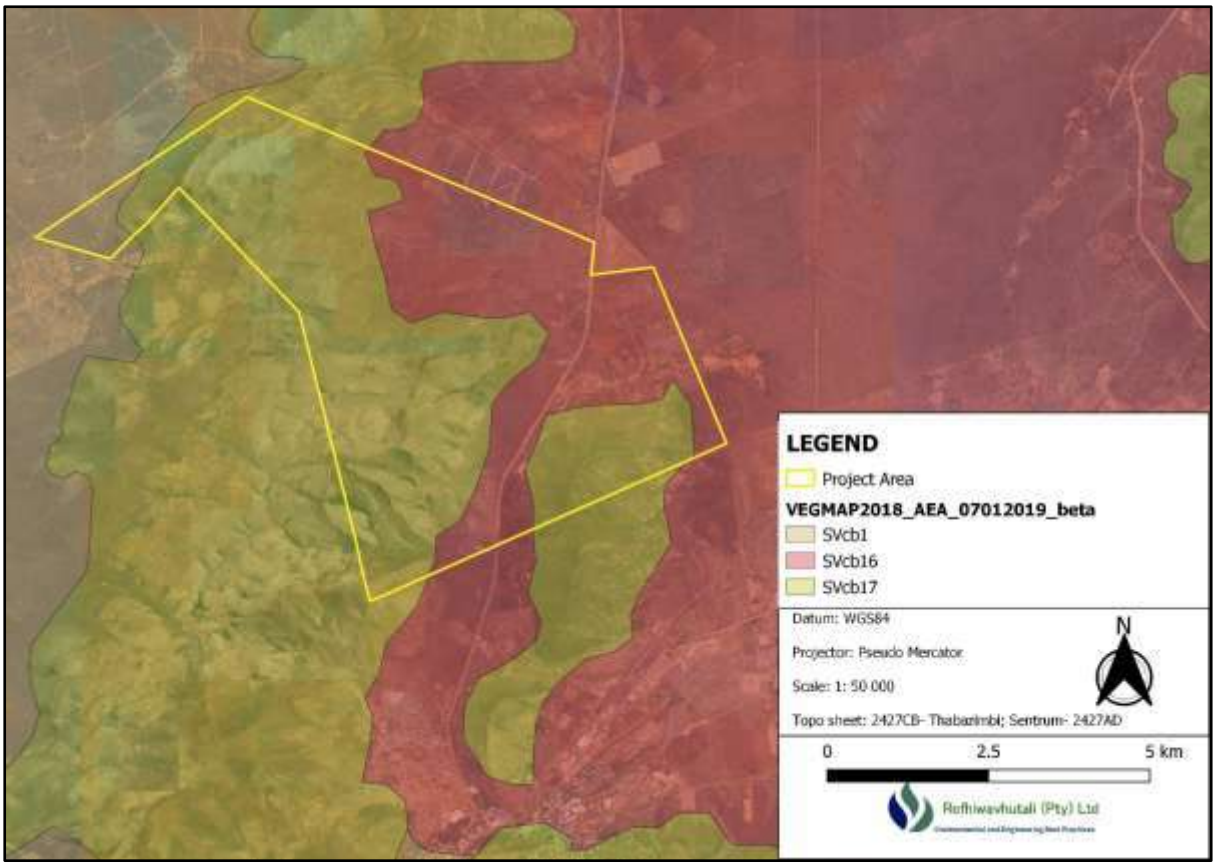

Figure 8-5: Vegetation distribution map.

8.2.4. Critical Biodiversity Areas and Ecological Support Areas

The Limpopo Conservation Plan (2018) and Waterberg Bioregional Plan (2019) provide a framework for identifying and managing areas of high ecological importance within the region. These plans classify the landscape into several biodiversity categories, including:

- Critical Biodiversity Area 1 (CBA 1);
- Critical Biodiversity Area 2 (CBA 2);
- Ecological Support Area 1 (ESA 1);
- Ecological Support Area 2 (ESA 2);
- Other Natural Areas (ONA);
- Protected Areas (PA); and
- No Natural Remaining (NNR).

Critical Biodiversity Areas (CBAs) are regions essential for maintaining biodiversity, supporting threatened species, and sustaining ecological processes. These areas are intended to remain in a natural or near-natural state, with limited tolerance for intensive land uses. Ecological Support Areas (ESAs), while not always pristine, play a key role in maintaining ecosystem functionality, including connectivity, hydrological processes, and landscape resilience, and therefore require appropriate management.

Based on the current spatial assessment, the project area falls within a combination of CBA 1, CBA 2, and ESA 1 classifications, indicating a high level of ecological sensitivity. The CBA

1 classification is derived from the Waterberg Bioregional Plan (2019), while the CBA 2 and ESA 1 classifications are based on the Limpopo Conservation Plan (2018), as illustrated in the conservation map (Figure 8-6).

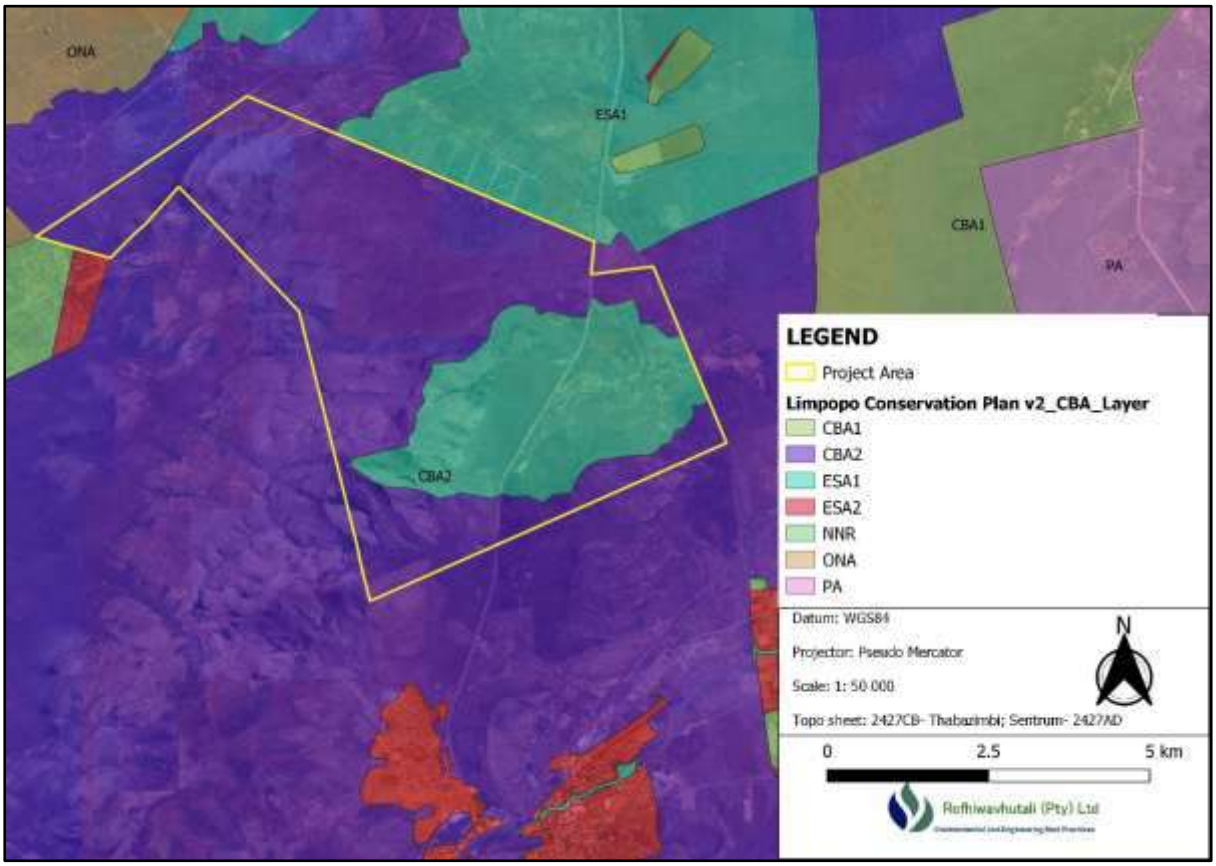

Figure 8-6: Project area conservation status.

The Waterberg Bioregional Plan (2019) indicates that a substantial portion of the site (approximately 50%) is classified as CBA 1, representing the highest biodiversity priority within the planning framework. In addition, portions of the site overlap with declared Private Nature Reserves (refer to subsection 8.2.5), indicating the presence of legally protected areas within the broader project context.

8.2.5. Protected Areas

According to the DFFE Screening Tool and the protected areas spatial dataset from SAPAD, the project area borders several protected areas, including Marakele National Park, Karel Coetzee Private Nature Reserve, Parkveld Private Nature Reserve, Lushof Private Nature Reserve, and Patrysbos Private Nature Reserve. These areas are located to the north, west, and east of the project area, as illustrated in Figure 8-7 below.

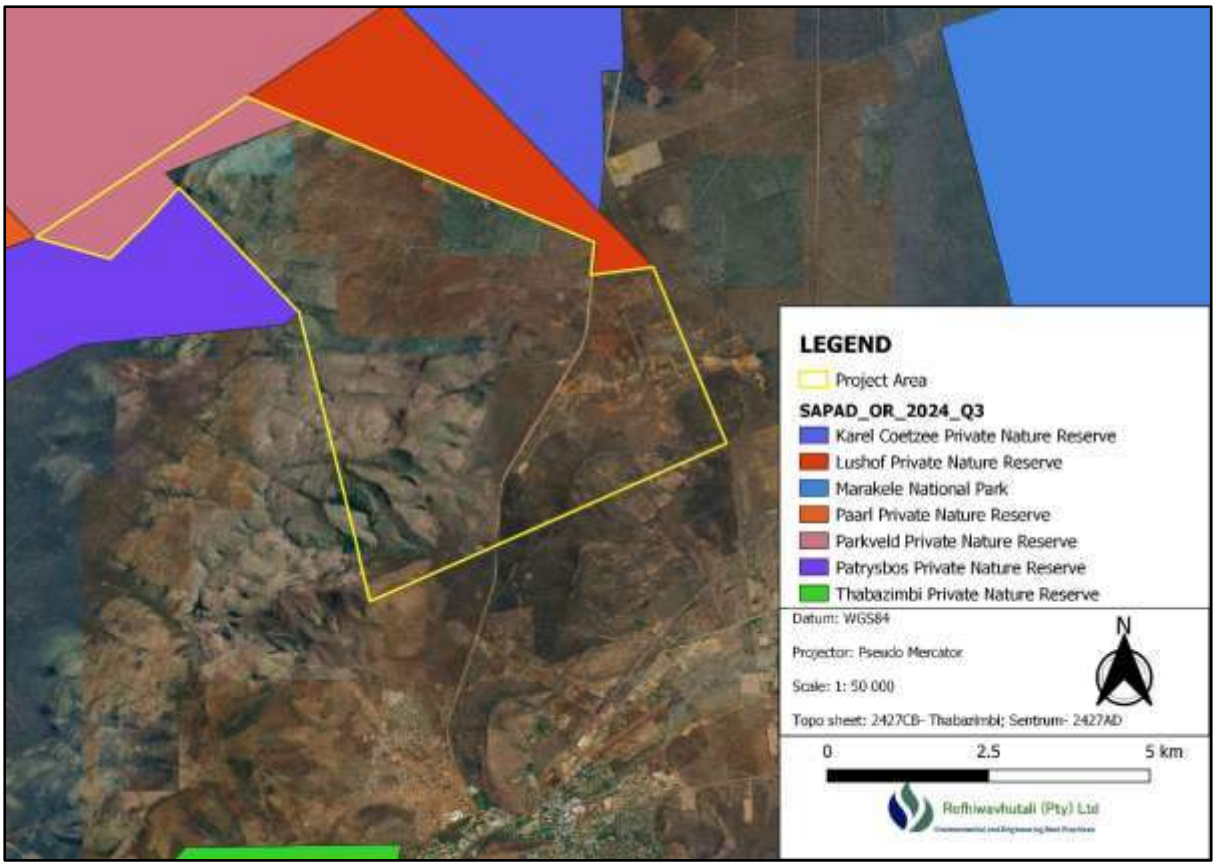

Figure 8-7: Project area SAPAD map.

8.3. Plant Species Assessment

The study area is situated within the Savanna Biome, as illustrated in Figure 8-8. This biome is the largest in South Africa, covering approximately one-third of the country, predominantly across the northern and eastern regions. It is characterised by a combination of grasslands interspersed with scattered trees and shrubs, forming a diverse mosaic of habitats.

The Savanna Biome supports a high level of biodiversity, including numerous protected plant and animal species, which are discussed in further detail in subsequent sections. It typically occurs in regions with seasonal rainfall patterns, characterised by hot, wet summers and cool, dry winters. The biome plays a vital role in ecosystem services like water regulation and supporting cultural and economic livelihoods.

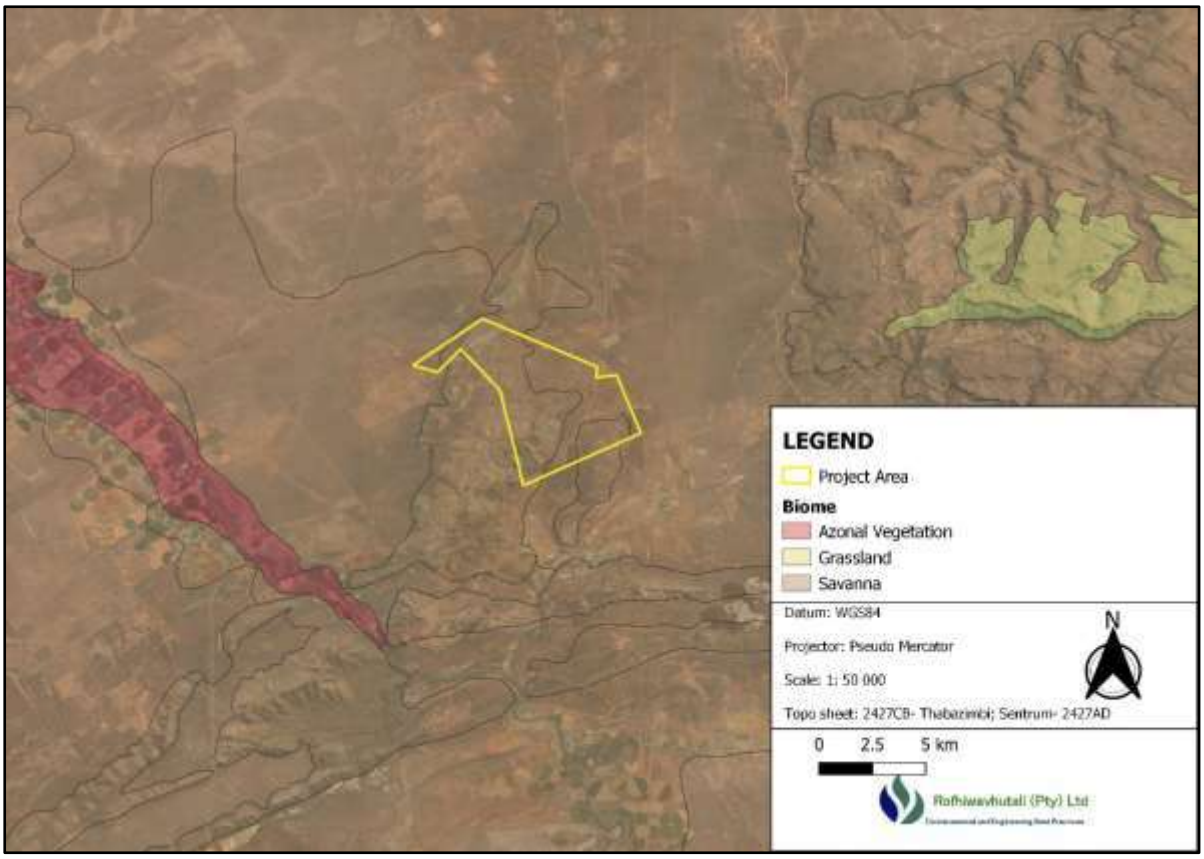

Figure 8-8: Biome map of the project area.

Plant species within Limpopo Province that are of high conservation priority were identified using Raimondo et al. (2009) and updates from the SANBI Threatened Species Programme. The species are presented in Table 8-1, Table 8-2, Table 8-3 and Table 8-4, while Table 8-5 includes species listed as protected trees under the National Forests Act (Act No. 84 of 1998).

Many of the listed species can be excluded from occurring within the study area based on their known habitat preferences and distribution ranges, following a preliminary desktop review. For species that could not be excluded in this manner, habitat assessments conducted during the site visit were used to determine their likely presence or absence within the project area.

Table 8-1: List of Critically Endangered plant species in Limpopo.

Species Name	Status (Global/National)	Likelihood of Occurrence on Site
Brackenridgea zanguebarica	Critically Endangered	Low
Chlorophytum radula	Critically Endangered	Low
Encephalartos cupidus	Critically Endangered	Low
Encephalartos dolomiticus	Critically Endangered	Low
Encephalartos dyerianus	Critically Endangered	Low

Species Name	Status (Global/National)	Likelihood of Occurrence on Site
Encephalartos eugene-maraisii	Critically Endangered	Low
Encephalartos hirsutus	Critically Endangered	Low
Encephalartos inopinus	Critically Endangered	Low
Encephalartos laevifolius	Critically Endangered	Low
Euphorbia clivicola	Critically Endangered	Low
Euphorbia groenewaldii	Critically Endangered	Low
Gladiolus macneilii	Critically Endangered	Low
Gladiolus pavonia	Critically Endangered	Low
Kniphofia crassifolia	Critically Endangered	Low
Oberonia disticha	Critically Endangered	Low
Orbea elegans	Critically Endangered	Low
Raphionacme villicorona	Critically Endangered	Low
Siphonochilus aethiopicus	Critically Endangered	Low
Vachellia sekhukhuniensis	Critically Endangered	Low

Table 8-2: List of Endangered plant species in Limpopo.

Species Name	Status (Global/National)	Likelihood of Occurrence on Site
Argyrolobium muddii	Endangered	Low
Asparagus sekukuniensis	Endangered	Low
Aster nubimontis	Endangered	Low
Brachystelma gerrardii	Endangered	Low
Cineraria cyanomontana	Endangered	Low
Euphorbia barnardii	Endangered	Low
Inezia speciosa	Endangered	Low
Ledebouria crispa	Endangered	Low
Leucospermum saxosum	Endangered	Low
Mondia whitei	Endangered	Low
Nemesia zimbabwensis	Endangered	Low

Species Name	Status (Global/National)	Likelihood of Occurrence on Site
Ocotea bullata	Endangered	Low
Ophioglossum gracillimum	Endangered	Low
Pearsonia callistoma	Endangered	Low
Plinthus rehmannii	Endangered	Low
Warburgia salutaris	Endangered	Low

Table 8-3: List of Vulnerable plant species in Limpopo

Species Name	Status (Global or National Status)	Likelihood of occurring on site
Alepidea amatymbica	Vulnerable	Low
Aloe chortolirioides var. chortolirioides	Vulnerable	Low
Aloe monotropa	Vulnerable	Low
Asparagus fourei	Vulnerable	Low
Asparagus hirsutus	Vulnerable	Low
Barleria dolomiticola	Vulnerable	Low
Bowiea volubilis subsp. volubilis	Vulnerable	Low
Brachycorythis conica subsp. transvaalensis	Vulnerable	Low
Ceropegia cimiciodora	Vulnerable	Low
Ceropegia stentiae	Vulnerable	Low
Cheilanthes deltoidea subsp. nov.	Vulnerable	Low
Crassula setulosa var. deminuta	Vulnerable	Low
Cucumis humifructus	Vulnerable	Low
Cullen holubii	Vulnerable	Low
Cyphostemma hardyi	Vulnerable	Low
Cyrtanthus junodii	Vulnerable	Low
Diplolophium buchananii subsp swynnertonii	Vulnerable	Low
Dioscorea sylvatica	Vulnerable	Low
Disa aristata	Vulnerable	Low
Disa cernua	Vulnerable	Low
Elytrophorus globularis	Vulnerable	Low

Species Name	Status (Global or National Status)	Likelihood of occurring on site
Eulophia coddii	Vulnerable	Low
Festuca dracomontana	Vulnerable	Low
Gladiolus sekukuniensis	Vulnerable	Low
Huernia nouhuysii	Vulnerable	Low
Jamesbrittenia bergae	Vulnerable	Low
Ledebouria dolomiticola	Vulnerable	Low
Lithops coleorum	Vulnerable	Low
Marsilea farinosa	Vulnerable	Low
Plectranthus porcatus	Vulnerable	Low
Prunus africana	Vulnerable	Low
Rhynchosia vendae	Vulnerable	Low
Sartidia jucunda	Vulnerable	Low
Searsia batophylla	Vulnerable	Low
Streptocarpus longiflorus	Vulnerable	Low
Streptocarpus makabengensis	Vulnerable	Low
Thesium davidsonae	Vulnerable	Low
Thesium gracilentum	Vulnerable	Low
Zantedeschia jucunda	Vulnerable	Low

Table 8-4: List of Near-Threatened plant species of Limpopo

Species Name	Status (Global/National)	Likelihood of Occurrence on Site
Adenia fruticosa subsp. fruticosa	Near Threatened	Low
Alepidea attenuata	Near Threatened	Low
Brachystelma hirtellum	Near Threatened	Low
Ceropegia turricula	Near Threatened	Low
Clivia caulescens	Near Threatened	Low
Curtisia dentata	Near Threatened	Low
Disa extinctoria	Near Threatened	Low
Drimia sanguinea	Near Threatened	Low
Elaeodendron transvaalense	Near Threatened	Low
Eulalia aurea	Near Threatened	Low

Species Name	Status (Global/National)	Likelihood of Occurrence on Site
Euphorbia rowlandii	Near Threatened	Low
Gasteria batesiana var. batesiana	Near Threatened	Low
Habenaria kraenzliniana	Near Threatened	Low
Holothrix randii	Near Threatened	Low
Isoetes transvaalensis	Near Threatened	Low
Jamesbrittenia macrantha	Near Threatened	Low
Kniphofia typhoides	Near Threatened	Low
Lithops leslei subsp. leslei	Near Threatened	Low
Lydenburgia cassinoides	Near Threatened	Low
Mystacidium brayboniae	Near Threatened	Low
Panicum dewinteri	Near Threatened	Low
Vachellia ormocarpoide	Near Threatened	Low

Several SCC plant species across various IUCN conservation categories were identified for Limpopo Province. However, based on habitat suitability and known distribution ranges, most are unlikely to occur within the project area. In total, 19 Critically Endangered, 16 Endangered, 39 Vulnerable, and 22 Near Threatened species were identified, all of which have a low likelihood of occurrence based on the desktop assessment.

Table 8-5: List of Nationally Protected tree species (National Forest Act of 1998).

Species Name	Common Name	Likelihood of Occurrence on Site
Acacia erioloba	Camel thorn	Low
Acacia haematoxylon	Gray camel thorn	Low
Adansonia digitata	Baobab	Low
Afzelia quanzensis	Pod mahogan	Low
Balanites subsp. Maughamii	Torchwood	Low
Barringtonia racemosa	Powder-puff tree	Low
Brachystegia spiciformis	Msasa	Low
Boscia albitrunca	Sheperd's tree	Low
Breonadia salicina	Matumi	Low
Bruguiera gymnhorrhiza	Black mangrove	Low
Cassipourea swaziensis	Swazi onionwood	Low

Species Name	Common Name	Likelihood of Occurrence on Site
Catha edulis	Bushman's tea	Low
Ceriops tagal	Indian mangrove	Low
Cleistanthus schlectheri var. schlechteri	False tamboti	Low
Colubrina nicholsonii	Pondo weeping thorn	Low
Combretum imberbe	Leadwood	Low
Curtisia dentata	Assegai	Low
Elaedendron transvaalensis	Bushveld saffron	Low
Erythrophysa transvaalensis	Bushveld red balloon	Low
Euclea pseudebenus	Ebony guarri	Low
Ficus trichopoda	Swamp fig	Low
Leucadendron argenteum	Silver tree	Low
Lumnitzera racemosa var. racemosa	Tonga mangrove	Low
Lydenburgia abbottii	Pondo bushman's tea	Low
Lydenburgia cassinoides	Sekhukhuni bushman's tea	Low
Mimusops caffra	Coastal red milkwood	Low
Newtonia hildebrandtii var. hildebrandtii	Lebombo wattle	Low
Ocotea bullata	Stinkwood	Low
Ozoroa namaquensis	Gariep resin tree	Low
Philenoptera violacea	Apple-leaf	Low
Pittosporum viridiflorum	Cheesewood	Low
Podocarpus elongatus	Breede River yellowwood	Low
Podocarpus falcatus	Outeniqua yellowood	Low
Podocarpus henkelii	Henkel's yellowwood	Low
Podocarpus latifolius	Real yellowwood	Low
Protea comptonii	Saddleback sugarbush	Low
Protea curvata	Serpentine sugarbush	Low
Prunus africana	Red stinkwood	Low
Pterocarpus angolensis	Wild teak	Low

Species Name	Common Name	Likelihood of Occurrence on Site
Rhizophora mucronata	Red mangrove	Low
Sclerocarya birrea subsp. caffra	Marula	High
Securidaca longepedunculata	Violet tree	Low
Sideroxylon inerme subsp. inerme	White milkwood	Low
Tephrosia pondoensis	Pondo poison pea	Low
Warburgia salutaris	Pepper-bark tree	Low
Widdringtonia cedarbergensis	Clanwilliam cedar	Low
Widdringtonia schwarzii	Willowmore cedar	Low

Additionally, 47 tree species protected under the National Forests Act were assessed for their potential presence within the proposed development area. Of these, only *Sclerocarya birrea* subsp. *caffra* (Marula) is considered likely to occur within the project area, while the remaining 46 species have a low likelihood of occurrence.

8.4. Animal Species Assessment

8.4.1. Provincially Protected Species

Table 8-6, Table 8-7, and Table 8-8 present animal species categorised as protected under the Limpopo Environmental Management Act (Act 7 of 2003). These species were identified through a desktop assessment using data from the Southern African Bird Atlas Project (SABAP2), the Animal Demography Unit (ADU), and the IUCN spatial database.

Table 8-6: List of provincially protected mammal species.

Common Name	Species Name
African elephant	*Loxodonta africana*
Ant bear	*Orycteropus afer*
Black footed cat	*Felis nigripes*
Lichtenstein's hartebeest	*Alcelaphus lichtensteinii*
Pangolin	*Manis temmincki*
Red duiker	*Cephalophus natalensis*
Rhinoceros, Black	*Diceros bicornis*
Rhinoceros, White	*Ceratotherium simum*
Roan antelope	*Hippotragus equinus*

Common Name	Species Name
Sharpe's grysbok	*Raphicerus sharpei*
Suni	*Neotragus moschatus*
Wild dog	*Lycaon pictus*

Table 8-7: List of provincially protected avifauna species.

Common Name	Species Name
African Finfoot	*Podica senegalensis*
African Marsh Harrier	*Circus ranivorus*
Bald ibis	*Geronticus calvus*
Barred Owl	*Glaucidium capens*
Bat hawk	*Macheirhamphus alcinus*
Bateleur	*Terathopius ecaudatus*
Bittern	*Botaurus stellaris*
Blue crane	*Tetrapteryx paradisea*
Blue swallow	*Hirundu atrocaerulae*
Bustard, Kori	*Ardeotis kori*
Bustard, Stanley's	*Neotis denhami*
Cape parrot	*Poicephalus robustus*
Cape vulture	*Gyps coprotheres*
Corncrake	*Crex crex*
Crested guineafowl	*Guttera edouardi*
Eagle- Tawny	*Aquila rapax*
Falcon, Peregrine	*Falco peregrinus*
Falcon, Taita	*Falco fasciinucha*
Grass Owl	*Tyto capensis*

Common Name	Species Name
Ground hornbill	*Bucorvus leadbeateri*
Lesser Kestrel	*Falco naumanni*
Long-tailed Starling	*Lamprotornis mevesii*
Martial eagle	*Polemaëtus bellicosus*
Parrot, Cape	*Poicephalus robustus*
Parrot, Grey headed	*Poicephalus fuscicollis*
Pel's fishing owl	*Scotopelia peli*
Pigmy Goose	*Nettapus auritus*
Rufous-bellied Heron	*Ardeola rufiventris*
Saddlebill stork	*Ephippiorhynchus senegalensis*
Shortclawed Lark	*Certhilauda chuana*
Short-tailed Pipit	*Anthus brachyurus*
Striped Flufftail	*Sarothrura affinis*
Vulture- African White-backed	*Gyps africanus*
Vulture- Egyptian	*Neophron percnopterus*
Vulture- Hooded	*Necrosyrtes monachus*
Vulture- Lappet-faced	*Torgos tracheliotus*
Vulture- White-headed	*Trigonoceps occipitalis*
Whitebacked Night Heron	*Gorsachius leuconotus*
Whitebellied Korhaan	*Eupodotis cafra*
Whitecrowned Plover	*Vanellus albiceps*
Yellow-billed Oxpecker	*Buphagus africanus*
Yellow-throated Sandgrouse	*Pterocles gutturalis*

The assessment identified a total of 22 provincially protected mammals, including several large herbivores. A total of 42 bird species were also identified as provincially protected, with notable species including various raptors and scavengers.

Table 8-8: List of provincially protected reptile species.

Common Name	Species Name
Nile crocodile	*Crocodylus niloticus*

For reptiles (Table 8-8), the Nile crocodile (*Crocodylus niloticus*) was the only species listed as provincially protected.

While these lists provide a valuable baseline at desktop level, site surveys were conducted to verify species presence, as many animals are mobile and often avoid human presence. As a result, some species may not have been detected during the desktop assessment or initial fieldwork, highlighting the importance of ongoing field verification surveys for an accurate species inventory.

9. RESULTS AND DISCUSSIONS

9.1.1. Plant Species Assessment

The vegetation of the proposed development area comprises a heterogeneous mix of broadleaf trees, shrubs, and grassland savanna, reflecting the characteristic composition of the Waterberg Mountain Bushveld, Western Sandy Bushveld, and Dwaalboom Thornveld.

Field surveys recorded a total of 18 plant species observed on-site (Table 9-1), including both locally dominant and regionally typical taxa. Among these, *Sclerocarya birrea* (Marula Tree) is the only nationally protected species and was observed scattered throughout the study area. As a Nationally Protected Species, Marula trees may not be removed, damaged, or disturbed without the appropriate permits under the National Forests Act (1998), and all management and development activities within the project area must avoid impacts on this species. Should any removal be deemed necessary due to development activities, a formal permit application process must be followed in accordance with the National Forests Act (1998).

Additional regional baseline species, which were directly observed during the survey and are typical of the local vegetation units, include *Heteropyxis natalensis* (Lavender Tree), *Burkea africana* (Wild Seringa), *Combretum apiculatum* (Red Bushwillow), *Ochna pulchra* (Peeling-plane), *Lannea discolor* (Live-long), and *Panicum maximum* (Guinea Grass). These taxa were readily identifiable within their respective habitats, including rocky uplands, sandy plateaus, and open woodland sections, and serve to provide a comprehensive representation of local plant diversity.

Table 9-1: Plant species observed on-site.

Species Name	Common Name	Conservation Status
Aloe excelsa	Zimbabwe Aloe	LC
Aloe vera	Barbados Aloe	LC
Burkea africana	Wild Seringa	LC
Combretum apiculatum	Red Bushwillow	LC

Species Name	Common Name	Conservation Status
Combretum zeyheri	Large-fruited Bushwillow	LC
Commiphora marlothii	Paperbark Corkwood	LC
Heteropyxis natalensis	Lavender Tree	LC
Lannea discolor	Live-long	LC
Ochna pulchra	Peeling-plane	LC
Panicum maximum	Guinea Grass	LC
Pappea capensis	Jacket Plum	LC
Pogonarthria squarrosa	Sickle Grass	LC
Pseudolachnostylis maprouneifolia	Kudu-berry	LC
Sclerocarya birrea	Marula Tree	Nationally Protected
Senegalia erubescens	Blue Thorn	LC
Sporobolus africanus	Rat's Tail Grass	LC
Terminalia sericea	Silver Clusterleaf	LC
Ziziphus mucronata	Buffalo Thorn	LC

9.1.2. Invasive Alien Plant Species (IAPs)

IAPs observed on site were predominantly associated with riparian corridors, roadsides, and areas of anthropogenic disturbance, reflecting their capacity to colonize and persist in modified habitats. During the site assessment, *Opuntia ficus* (Prickly Pear) was recorded at multiple locations, while lower-density occurrences, covering less than 30% of affected areas, were noted for *Melia azedarach* (Syringa), *Lantana camara* (Lantana), *Cereus jamacaru* (Queen of the Night), *Jacaranda mimosifolia*, *and Psidium guajava* (Guava). All observed IAPs, with the exception of *Psidium guajava,* are classified as NEMBA Category 1b species, necessitating active control and management to prevent further spread and mitigate ecological impacts.

9.1.3. Animal Species Assessment

Faunal assessments were conducted across representative habitats, including rocky uplands, open savanna plains, riparian corridors, and woodland areas. Observed species were categorized according to taxonomic group and conservation status, including Species of Conservation Concern (SCC), Threatened or Protected Species (TOPS), and species assessed as Least Concern (LC) by the IUCN Red List.

9.1.3.1. Mammals

Fourteen (14) mammal species were observed within the proposed development area during surveys. *Papio ursinus* (Chacma Baboon) were particularly abundant in the western mountainous regions, while *Hippopotamus amphibius* (Hippopotamus) were recognised via vocalizations along the eastern river corridor. All other observed mammals were present in

varying abundances depending on habitat type. No additional SCC or TOPS mammals were observed (Table 9-2).

Table 9-2: Mammal species observed on site.

Species Name	Common Name	Conservation Status
Sylvicapra grimmia	Common Duiker	LC
Raphicerus campestris	Steenbok	LC
Phacochoerus africanus	Common Warthog	LC
Mungos mungo	Banded Mongoose	LC
Hippopotamus amphibius	Hippopotamus	LC
Tragelaphus strepsiceros	Greater Kudu	LC
Papio ursinus	Chacma Baboon	LC
Pelea capreolus	Grey Rhebok	LC
Chlorocebus pygerythrus	Vervet Monkey	LC
Tragelaphus sylvaticus	Bushbuck	LC
Lupulella mesomelas	Black-backed Jackal	LC
Giraffa giraffa	Giraffe	LC
Lepus saxatilis	Scrub Hare	LC
Kobus ellipsiprymnus	Waterbuck	LC

9.1.3.2. Avifauna

A total of 19 bird species were recorded on-site, representing a combination of raptors, waterbirds, and terrestrial species (Table 9-3). Birds were recorded across riparian areas, open savanna, and woodland sections.

Table 9-3: Bird species observed on site.

Species Name	Common Name	Conservation Status
Numida meleagris	Helmeted Guineafowl	LC
Ortygornis sephaena	Crested Francolin	LC
Pternistis natalensis	Natal Francolin	LC
Pternistis swainsonii	Swainson's Francolin	LC
Centropus burchellii	Burchell's Coucal	LC
Dryoscopus cubla	Black-backed Puffback	LC
Urocolius indicus	Red-faced Mousebird	LC
Uraeginthus angolensis	Blue Waxbill	LC
Streptopelia semitorquata	Red-eyed Dove	LC
Haliaeetus vocifer	African Fish-Eagle	LC
Halcyon albiventris	Brown-hooded Kingfisher	LC
Ceryle rudis	Pied Kingfisher	LC
Buphagus erythrorhynchus	Red-billed Oxpecker	LC
Tockus nasutus	African Grey Hornbill	LC
Glaucidium perlatum	Pearl-spotted Owlet	LC
Turtur chalcospilos	Emerald-spotted Wood-dove	LC
Vanellus armatus	Blacksmith Lapwing	LC

Species Name	Common Name	Conservation Status
Dicrurus adsimilis	Fork-tailed Drongo	LC
Malaconotus blanchoti	Grey-headed Bushshrike	LC

9.1.3.3. Reptiles

Reptile observations were concentrated in riparian and rocky habitats. The Nile Crocodile was observed within the river corridor along the eastern boundary of the study area and is classified as a Provincially Protected Species. In addition, *Stigmochelys pardalis* (Leopard Tortoise) was present throughout open savanna sections. No other SCC or NEMA listed invasive reptiles were recorded.

Figure 9-1: Images of faunal observations during site surveys.

9.1.4. Site Ecological Importance (SEI)

The proposed project area is situated within a region of high ecological importance, forming part of the Savanna Biome and encompassing Waterberg Mountain Bushveld, Western Sandy Bushveld, and Dwaalboom Thornveld. The site is located within a landscape that supports CBA2 and ESA1 areas (Figure 8-6), as identified in the Limpopo Conservation Plan (2018), indicating notable biodiversity value and ecological functionality. The site further contributes to regional ecological functioning through its proximity to Marakele National Park and associated Key Biodiversity Areas (KBAs), forming part of an important ecological corridor.

The eastern riparian system plays a critical role in maintaining connectivity between aquatic and terrestrial ecosystems and supports species such as Nile Crocodile and Hippopotamus. These corridors are essential for species movement and ecological resilience.

The western mountainous and rocky habitats, characteristic of the Waterberg region, represent high-sensitivity ecological features. These areas support specialized fauna and provide suitable habitat for rock-dwelling and cliff-associated species, including raptors. High abundances of the Chacma Baboon were recorded in these habitats, indicating relatively low disturbance and good habitat quality.

Furthermore, portions of the application area overlap with declared Private Nature Reserves, which are legally protected under the National Environmental Management: Protected Areas Act (Act 57 of 2003). These areas are of very high conservation value, and mining activities within such areas are prohibited.

From a specialist perspective, on an overall, the site demonstrates moderate to high ecological integrity, with intact vegetation, functional faunal assemblages, and strong landscape

connectivity. The ecological importance of the site is therefore considered high to very high, particularly in relation to conservation planning priorities and regional biodiversity persistence.

10. IMPACTS ASSESSMENT METHODOLOGY

The impact assessment was undertaken in accordance with the NEMA EIA Regulations (2014, as amended) and the Protocols for the Assessment of Terrestrial Biodiversity. The purpose of the impact assessment is to identify and evaluate potential risks to the terrestrial environment associated with the proposed development. Impacts were identified based on the proposed mining footprint, associated infrastructure, and operational activities. Where impacts cannot be avoided, appropriate and practical mitigation measures are proposed. In line with regulatory expectations, only activities assessed as low to low-moderate risk within the receiving environment would be considered acceptable (Table 10-3).

Potential impacts were evaluated using data collected during the field survey and desktop analysis to determine their relevance and significance within the project area.

The impacts assessment (Table 11-1) follows the methodology based on a Consequence × Probability approach.

Consequence (C) (Table 10-1) is calculated as the sum of four criteria, each rated on a scale from 1 to 5:

Table 10-1: Consequence impact rating guideline.

Criterion	Description	Rating Scale (1–5)
Nature	Type and severity of impact	1 = negligible, 5 = severe
Extent	Spatial area affected	1 = very localised, 5 = regional/ broader scale
Duration	Time over which impact occurs	1 = very short, 5 = permanent
Intensity	Magnitude of effect on environment	1 = minimal, 5 = irreversible

Probability (P) (Table 10-2) reflects the likelihood of the impact occurring, rated from 1 to 5:

Table 10-2: Probability impact rating guideline.

Rating	Description
1	Rare
2	Unlikely
3	Possible
4	Likely
5	Definite

Table 10-3 is a guideline to understanding impacts significance before and after mitigation.

Table 10-3: Significance rating guide.

Significance Score (S)	Rating
1 – 20	Low
21 – 40	Low–Moderate
41 – 60	Moderate
61 – 80	High
81 – 100	Very High

11. TERRESTRIAL BIODIVERSITY IMPACTS MATRIX

The key potential impacts associated with the proposed development are summarised in Table 11-1 below.

Table 11-1: Terrestrial Biodiversity Assessment Impacts Matrix for the Proposed Mining Right Application

Impact	Development Phase	Consequence (C)	Probability (P)	Significance (Pre-Mitigation)	Significance Rating	Mitigation Applied	Significance (Post-Mitigation)	Residual Rating
Impacts on CBA1, CBA2 and ESA1 areas	Construction & Operation	18	5	90	Very High	Avoidance of CBA1 where possible; follow EIA mitigation hierarchy, layout refinement; no-go areas; biodiversity offsets (if required)	45	Moderate
Disturbance of protected areas and ecological corridors	Construction & Operation	17	4	68	High	Implement buffer zones; maintain ecological corridors; restrict activities near protected areas	34	Low–Moderate
Loss of SCC and protected species (e.g. Marula)	Construction	16	4	64	High	Pre-construction walk-through; species rescue/relocation; permit compliance; selective clearing	32	Low–Moderate
Habitat fragmentation (linkages to Marakele	Construction & Operation	15	4	60	Moderate	Maintain corridors; phased mining; rehabilitation; avoid sensitive linkages	30	Low–Moderate

Impact	Development Phase	Consequence (C)	Probability (P)	Significance (Pre-Mitigation)	Significance Rating	Mitigation Applied	Significance (Post-Mitigation)	Residual Rating
National Park)								
Impacts on riparian habitats	Construction & Operation	17	4	68	High	Establish buffer zones; no-go areas; erosion control; water management measures	34	Low–Moderate
Impacts on rocky and mountainous habitats	Construction	14	4	56	Moderate	Avoid high-sensitivity rocky outcrops; minimise blasting footprint; rehabilitation	28	Low–Moderate

12. MITIGATION REQUIREMENTS

To ensure compliance with environmental legislation and reduce ecological impacts, the following mandatory mitigation measures must be implemented:

1. Avoidance and Planning:
    - All portions of the development footprint overlapping with declared Private Nature Reserves must be excluded from the project layout, as mining within these areas is legally prohibited.
    - All CBA1 areas must be avoided where possible. Where avoidance is not feasible, impacts must be minimised and may require a formal biodiversity offset strategy in line with DFFE guidelines.
2. Habitat Protection:
    - The eastern riparian corridor must be designated as a no-go area, with appropriate buffer zones implemented to protect aquatic and riparian ecosystems.
    - Rocky outcrops, escarpments, and mountainous habitats must be treated as high-sensitivity areas and avoided or buffered to preserve specialized habitats and associated fauna.
3. Vegetation Management:
    - Vegetation clearing must be restricted to already disturbed areas as far as reasonably possible.
    - A phased clearing approach must be implemented to allow fauna to migrate to adjacent habitats.
    - A search and rescue programme must be conducted prior to clearing, with specific focus on *Sclerocarya birrea* (Marula Tree) and other SCC. Where removal of protected species is unavoidable, the necessary permits must be obtained prior to disturbance.
4. Faunal Protection:
    - Pre-construction surveys must be conducted to identify and relocate fauna where necessary.
    - Movement corridors must be maintained to ensure continued connectivity for large mammals and other species between the site and surrounding conservation areas.
5. Invasive Species Management:
    - All recorded NEMBA Category 1b invasive species, including *Opuntia ficus, Melia azedarach, Lantana camara, Cereus jamacaru,* and *Jacaranda mimosifolia*, must be subject to active control and eradication measures.
    - A long-term monitoring and management plan must be implemented to prevent reinfestation.
6. Biodiversity Offsets:
    - Develop a biodiversity offset strategy to address residual impacts from habitat loss, fragmentation, and connectivity disruption, especially in CBA1, CBA2 and ESA1 areas.

- The strategy must ensure no net loss or net gain of biodiversity, integrate corridor protection, rehabilitation, and long-term monitoring, and comply with DFFE guidelines.

12.1.1. Environmental Management Programme (EMPr) Mitigation Measures

All project activities must follow the mitigation hierarchy (Figure 12-1), prioritizing avoidance of sensitive areas, including CBA1, CBA2, ESA2, riparian zones, rocky habitats, and declared Private Nature Reserves, which must be demarcated as no-go areas with appropriate buffers.

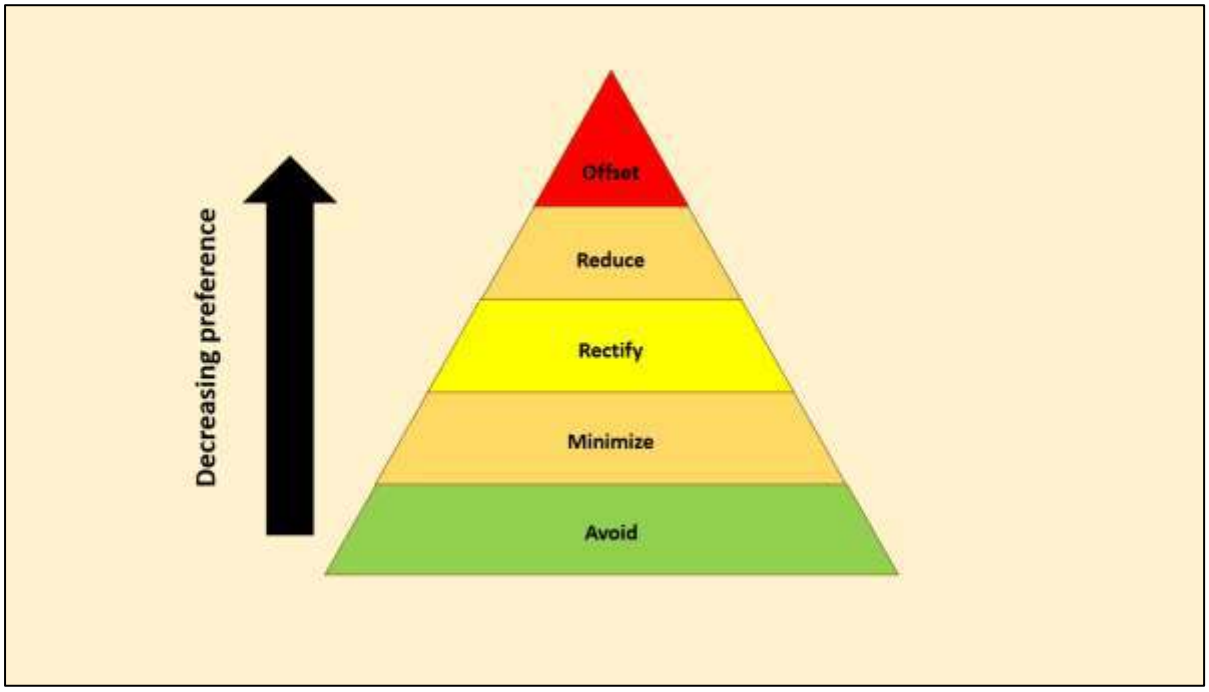

Figure 12-1: EIA impacts mitigation hierarchy.

Vegetation clearing must be limited to the approved footprint and undertaken in a phased manner to allow faunal movement. A pre-clearing search and rescue operation must be conducted, with particular attention to the protected species Marula trees. No removal of the Marula tree may occur without the required permits.

Faunal disturbance must be minimised through controlled site access, speed restrictions, and prohibition of hunting or harm to wildlife, while maintaining ecological corridors to support species movement. Riparian systems must be protected from disturbance, with measures implemented to prevent erosion, sedimentation, and pollution.

All recorded NEMBA Category 1b invasive alien plant species, including *Opuntia ficus*, *Melia azedarach*, *Lantana camara*, *Cereus jamacaru*, and *Jacaranda mimosifolia*, must be actively controlled through an ongoing management programme. Rehabilitation must be implemented progressively using indigenous species and conserved topsoil, supported by long-term monitoring to assess ecosystem recovery.

A biodiversity offset strategy must be developed during the EIA phase to address residual impacts, particularly those associated with habitat loss and fragmentation. An Environmental Control Officer must oversee compliance, and regular audits must be conducted to ensure effective implementation of all mitigation measures.

13. CONCLUSION

The proposed mining development is located within a highly sensitive ecological landscape, characterised by the presence of CBA1 and CBA2, ESA1, intact savanna vegetation, and functional ecological corridors linked to Marakele National Park. The study area supports a diversity of flora and fauna, including protected species such as *Sclerocarya birrea* and *Crocodylus niloticus*, and demonstrates moderate to high ecological integrity.

The proposed development footprint, indicating up to 95% disturbance, is associated with very high pre-mitigation impacts, including large-scale habitat loss, fragmentation, and disruption of ecological connectivity. Although standard mitigation measures can reduce some impacts, the residual impacts remain high, particularly in relation to biodiversity conservation targets and landscape-level ecological processes.

A biodiversity offset strategy is therefore required as a critical component of the mitigation hierarchy to address residual impacts that cannot be avoided. However, offsets alone are not sufficient to justify development within highly sensitive areas such as CBA1, and must be implemented in conjunction with strict avoidance of no-go areas, protection of riparian systems, and maintenance of ecological corridors.

In its current form, the proposed development presents a high risk to terrestrial biodiversity and ecological functioning. Environmental acceptability is therefore conditional upon a substantial revision of the mine layout, including:

- The exclusion of all CBA1 areas and legally protected nature reserves;
- The protection of riparian corridors and rocky/mountainous habitats; and
- The integration of a robust biodiversity offset and ecological corridor strategy.

Should these requirements not be met, the development is likely to result in unacceptable and irreversible ecological impacts, and may not be supported from a biodiversity perspective. Conversely, with appropriate avoidance, mitigation, and offset measures, the impacts may be reduced to acceptable levels in less sensitive areas, subject to strict environmental management and regulatory compliance.

14. REFERENCES

Animal Demography Unit (ADU). (2016). *Mammal, Reptile, and Amphibian Distribution Databases.*

Bates, M.F., et al. (2014). *Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland.*

Databases, Plans, and Online Tools

Department of Environmental Affairs (DEA). (2023). *South African Conservation Areas Database (SACAD).*

Department of Forestry, Fisheries and the Environment (DFFE). (2023). *South African Protected Areas Database (SAPAD).*

Du Preez, L. & Carruthers, V. (2009). *A Complete Guide to the Frogs of Southern Africa.*

International Union for Conservation of Nature (IUCN). (2017). *Spatial Database and Red List of Threatened Species.*

Limpopo Provincial Government. (2018). *Limpopo Conservation Plan v.2.*

Meteoblue. (2026). *Climate and Wind Data for Thabazimbi.*

Mucina, L. & Rutherford, M.C. (2006). *The Vegetation of South Africa, Lesotho and Swaziland.* Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Naomi, R.C. (2004). *Climate and Weather Concepts.*

Pauw, J.C. (1988). *A Vegetation Description of the Dwaalboom Area, North-West Province.*

Raimondo, D., et al. (2009). *Red List of South African Plants.* Strelitzia 25. South African National Biodiversity Institute, Pretoria.

Skinner, J.D. & Chimimba, C.T. (2005). *The Mammals of the Southern African Subregion.*

Southern African Bird Atlas Project (SABAP2). (2017).

Van Oudtshoorn, F. (2018). *Guide to Grasses of Southern Africa.*

Van Wyk, B. & Van Wyk, P. (2013). *Field Guide to Trees of Southern Africa.*

Waterberg District Municipality. (2019). *Waterberg Bioregional Plan.*

GEOHYDROLOGICAL INVESTIGATION REPORT

PREPARED BY:

Rofhiwavhutali (Pty) Ltd
Environmental and Engineering Best Practices

Contact Person: Mutali Guduvheni
Contact No: 076 176 0655
Email: info@rofhiwavhutali.co.za
Website: www.rofhiwavhutali.co.za

PREPARED FOR:

VAHLENGWE MINING ADVISORY AND CONSULTING

DMRE Ref No: LP 30/5/1/2/3/2/1 10287 MR

NAME OF THE APPLICANT: ARENGO 297 (PTY) LTD

MINING RIGHT APPLICATION FOR DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE, IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE., IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.

2026

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Project Name	Geohydrological Investigation Report for Mining Right Application for Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore, in Respect of Portions Re/2/313, Re/3/313, and Re /4/313 of the Farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province.	
FILE REFERENCE NUMBER SAMRAD:	LP 30/5/1/2/3/2/1 10287 MR	
Client Details	Vahlengwe Mining Advisory and Consulting	
		Signature
Prepared by	Mutali Guduvheni (Principal Consultant) South African Council for Natural Scientific Professions (Pr. Sci. Nat); Geological Society of South Africa (GSSA) Environmental Assessment Practitioners Association of South Africa (EAPASA) International Association for Impact Assessment South Africa (IAIASA)- Professional Member.	
VERSION	V1	
CONTACT	mutali@rofhiwavhutali.co.za	+27 76 176 0655
Date	24 March 2026	

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LIST OF ACRONYMS, ABBREVIATIONS AND DEFINITION

Arengo	Arengo 297 (Pty) Ltd
CARA	The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
cm	Centimeter
CMA	Catchment Management Agencies
CSIR	Council for Scientific and Industrial Research
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EC	Electrical Conductivity (mS/m).
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
K	Hydraulic Conductivity.
MAE	Mean Annual Evaporation
m.a.m.s. l	Meters above mean sea level
m.b.g.l	Meters below ground level
TDS	Total Dissolved Solids (mg/l).
WMA	Water Management Area
WULA	Water Use License Application

1. BACKGROUND

Arengo 297 (Pty) Ltd, hereafter referred to as 'the applicant' or Arengo', has applied for a mining right application for Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore, in Respect of Portions Re/2/313, Re/3/313, and Re /4/313 of the Farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province, covering an area extent of 3 892.0 ha.

Vahlengwe Mining Advisory and Consulting, as the Arengo' appointed lead consultant, appointed Rofhiwavhutali (Pty) Ltd to compile a geohydrological assessment as part of Specialist Studies required for the Project.

A Geohydrological assessment is required to predict and quantify the potential impacts on water resources as well as to recommend reasonable mitigation measures. This assessment is fundamental to the discipline of environmental management and is a requirement of environmental impact assessments (EIA), water use license applications (WULA), Environmental Management Programmes (EMP) and other studies.

The assessment was undertaken in accordance with the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended) and the National Water Act, 1998 (Act 36 of 1998), which collectively provide the framework for the protection, use, development, and management of South Africa's water resources. These Acts establish the legal basis for implementing tools and measures to safeguard water resources.

Additional legislation relevant to the Mining right, including Section 16 and the provisions for removal and disposal of minerals under Section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (as amended), has also been considered.

This report serves as a Geohydrological Investigation for the proposed Project.

1.1. Scope of work

The scope of work can be defined as follows:

- Desk study to study the geology and groundwater regime.
- Hydro-census of existing boreholes and surface water bodies in a radius around the planned development area.
- Collect information on existing threats to groundwater quality.
- Hydrogeological impact assessment for the site.
- Compilation of a hydrogeological study report which will contain the hydro-census information, geological description, groundwater flow directions, surface water bodies and boreholes.
- Groundwater monitoring network and monitoring programme for long term monitoring of the groundwater regime.

2. SITE DESCRIPTION

2.1. Site Locality

The proposed mining right is located in the northern part of Thabazimbi and approximately 6.02 km, in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality (Figure 2-1 and Figure 2-2).

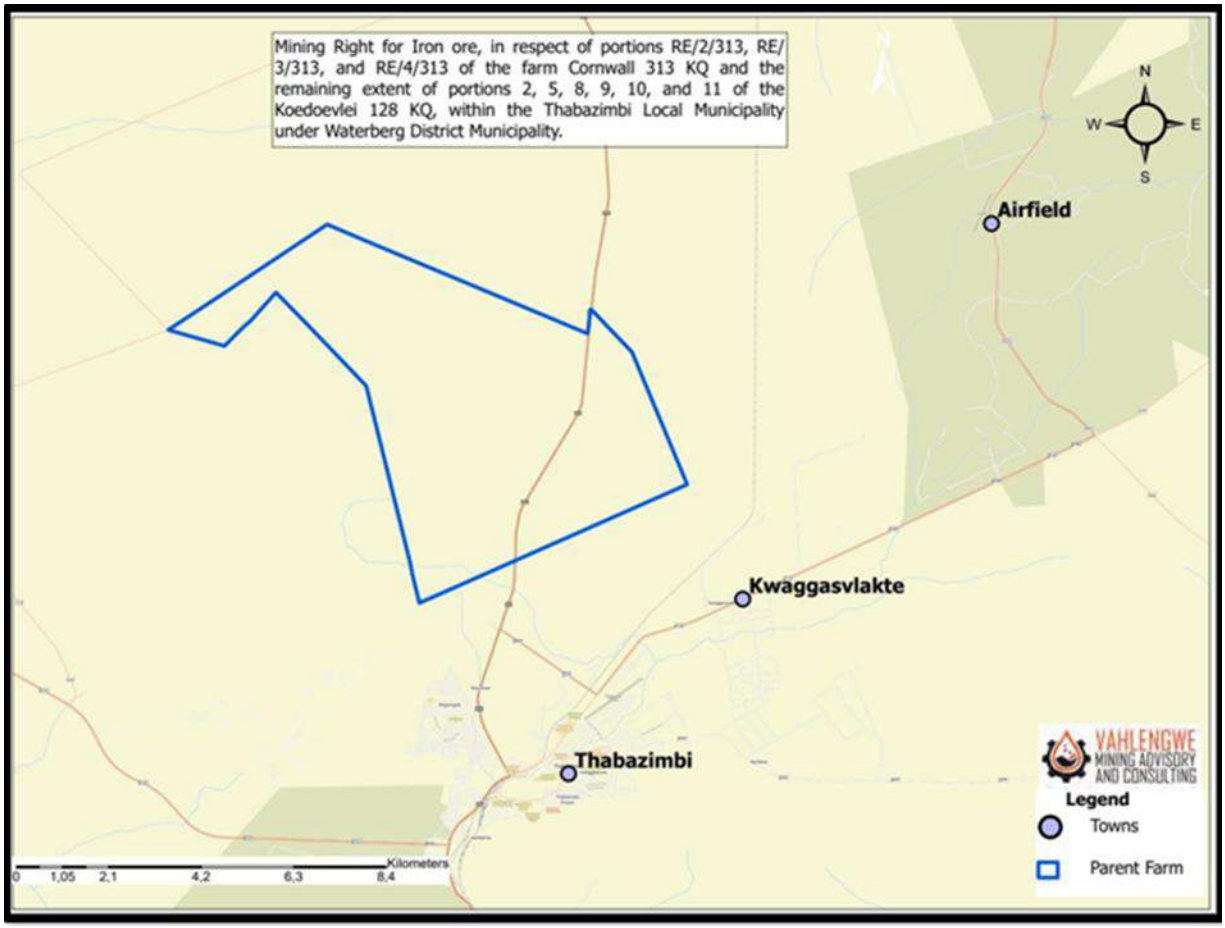

Figure 2-1: Locality Map of the site proposed for the development

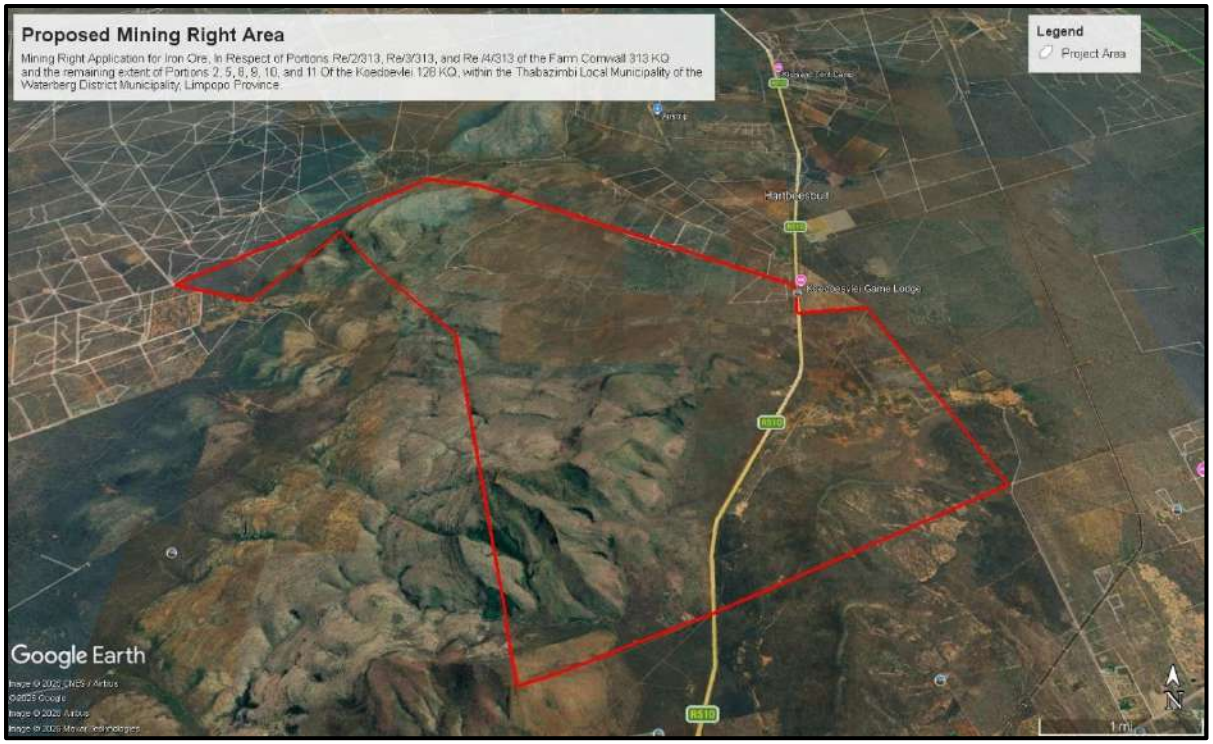

Figure 2-2: Google Earth view of the site proposed for the development

3. STUDY METHODOLOGY:

The methodological approach for the study consisted of the following:

i. A comprehensive assessment of available reports, maps, and scientific literature was undertaken to understand the study area's geographic setting, climate, and geological framework.
ii. A hydro-census was conducted following the desktop review to obtain information such as groundwater levels, borehole depths, and the status of existing boreholes within the vicinity of the proposed Mining right area. The survey aimed to gather essential geohydrological data, including current groundwater use, water level depths, and borehole coordinates.
iii. Relevant hydrological and topographic information was collected to define catchment characteristics.
iv. Aquifer types, recharge zones, and groundwater flow properties were identified to inform the conceptual understanding of the groundwater system.
v. Geohydrological investigation was undertaken to identify and evaluate potential impacts on groundwater and geological conditions associated with the proposed mining activities. Appropriate mitigation measures were proposed to reduce identified risks.
vi. Recommendations and conclusions were formulated to guide the sustainable management of groundwater and geological resources during the lifecycle of the project.

3.1. Assumptions, limitations and gaps

The following assumptions, limitations and gaps were applicable for the basic Geohydrological Assessment Report:

- The desktop study was based on information obtained via literature, google maps, ArcGIS, Qgis which is assumed to be correct and of the latest information available;
- The study is based on field observations conducted in accessible areas, and where there was no access, it was supported by using desktop-derived information, including geological maps, satellite imagery, and regional groundwater datasets. It is assumed that the available published and database information is accurate and reasonably representative of site conditions, and that subsurface conditions between observed points are consistent with regional geological patterns.
- Rofhiwavhutali (Pty) Ltd reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or significant information come to light.

4. DESKTOP STUDY

4.1. Climate

Climate is the state of the atmosphere over long periods, such as over years, decades, centuries, or greater, and the weather is defined as the atmospheric conditions of an area over a short period (Naomi, 2004).

4.1.1. Average temperature and precipitation

Average temperature and precipitation are shown Figure 4-1 and Figure 4-2. Figure 4-1 shows the temperature variations throughout the year are shown in where the solid red line represents the mean daily maximum temperature and the solid blue line indicates the mean daily minimum; the dashed red and blue lines reflect the historical extremes, highlighting the hottest days and coldest nights recorded over the past 30 years. To further illustrate temperature trends.

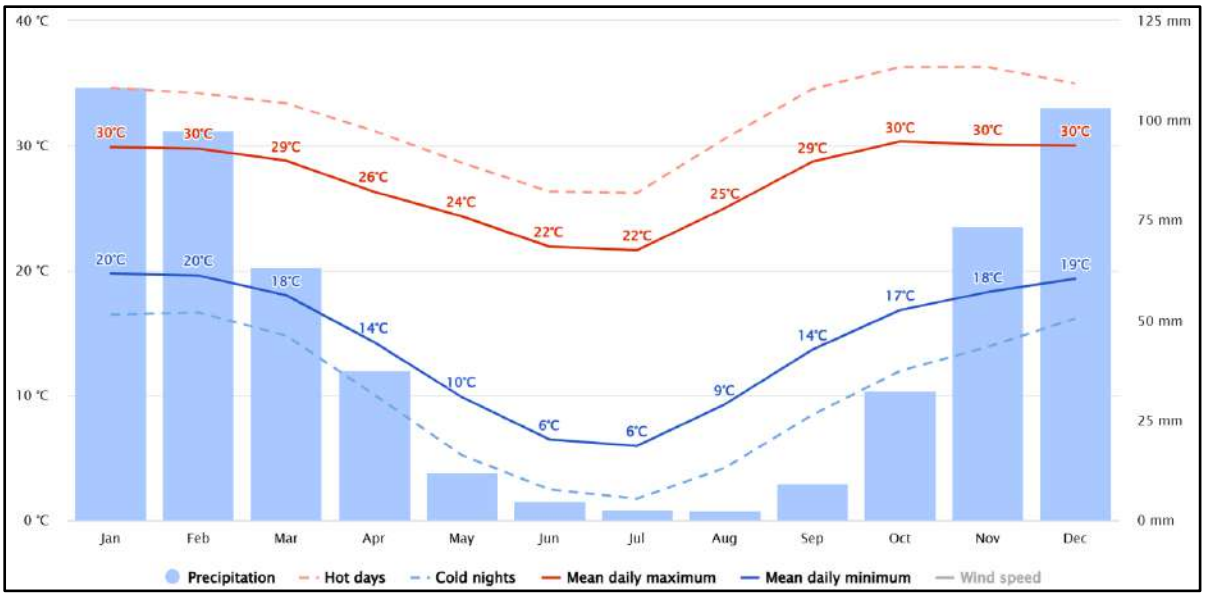

Figure 4-1: Average temperatures and Precipitation (meteoblue.com)

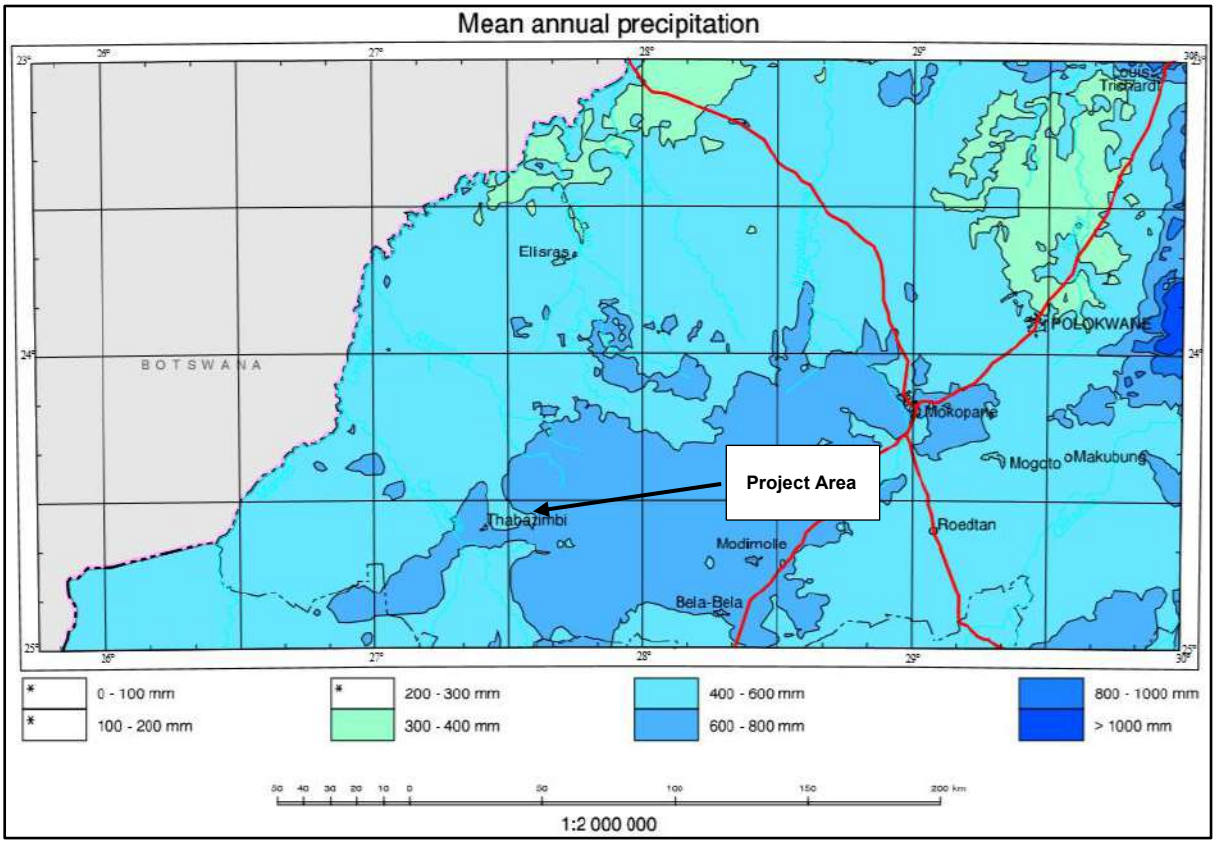

Figure 4-2: Mean Annual Precipitation

4.1.2. Wind Characteristics

The wind rose for the Project Area (Figure 4-3), shows how many hours per year the wind blows from the indicated direction per wind speed class the modelled data is an accurate representation of actual winds.

Wind blowing from the southwest (SW) toward the northeast (NE). Figure 4-4 shows the days per month, during which the wind reaches a certain speed. Wind speeds are generally highest during the spring months (August to October) and lowest during autumn and winter.

(Figure 4-3) presents the wind rose diagram for the area, depicting the frequency and direction of wind patterns throughout the year, for example, wind blowing from the southwest (SW) toward the northeast (NE).

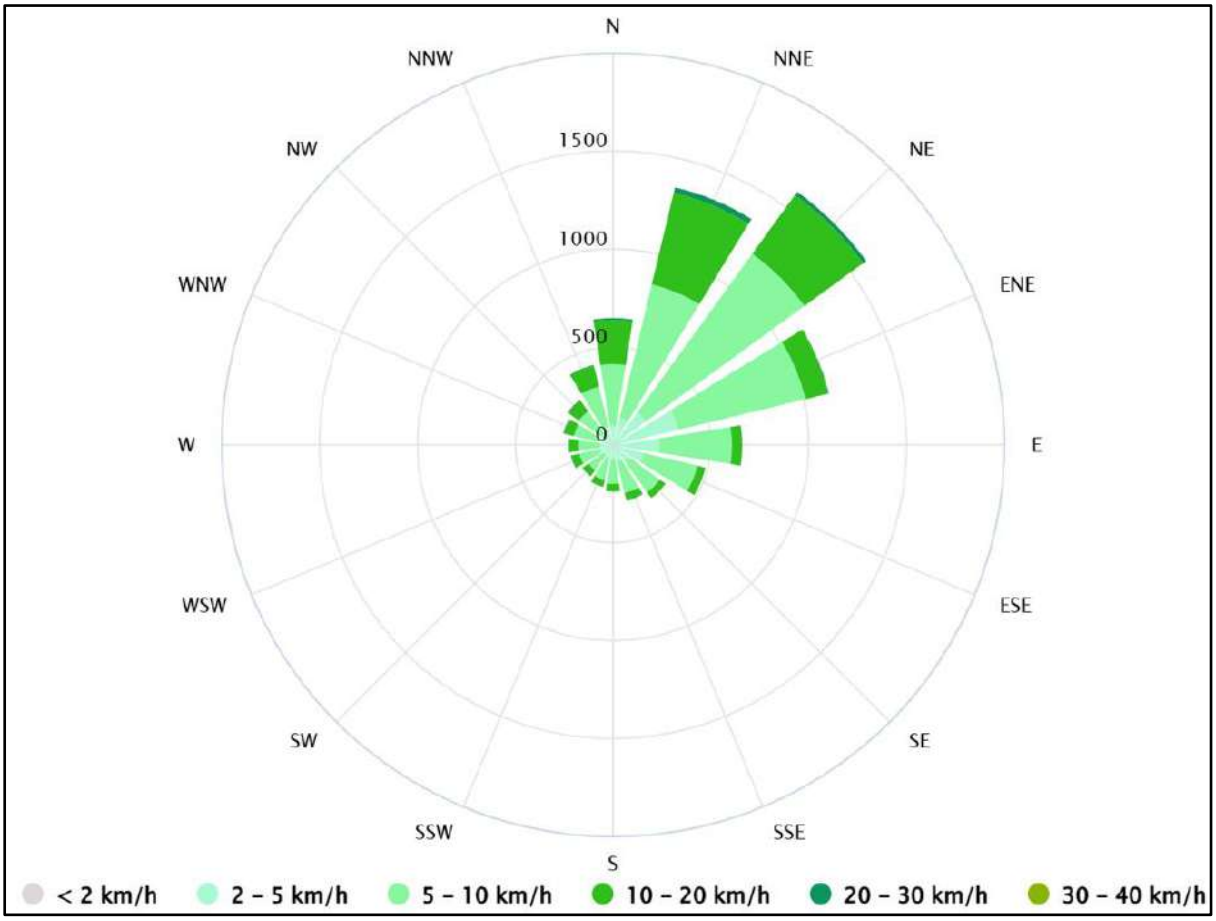

Figure 4-3: Wind rose (Meteoblue.com)

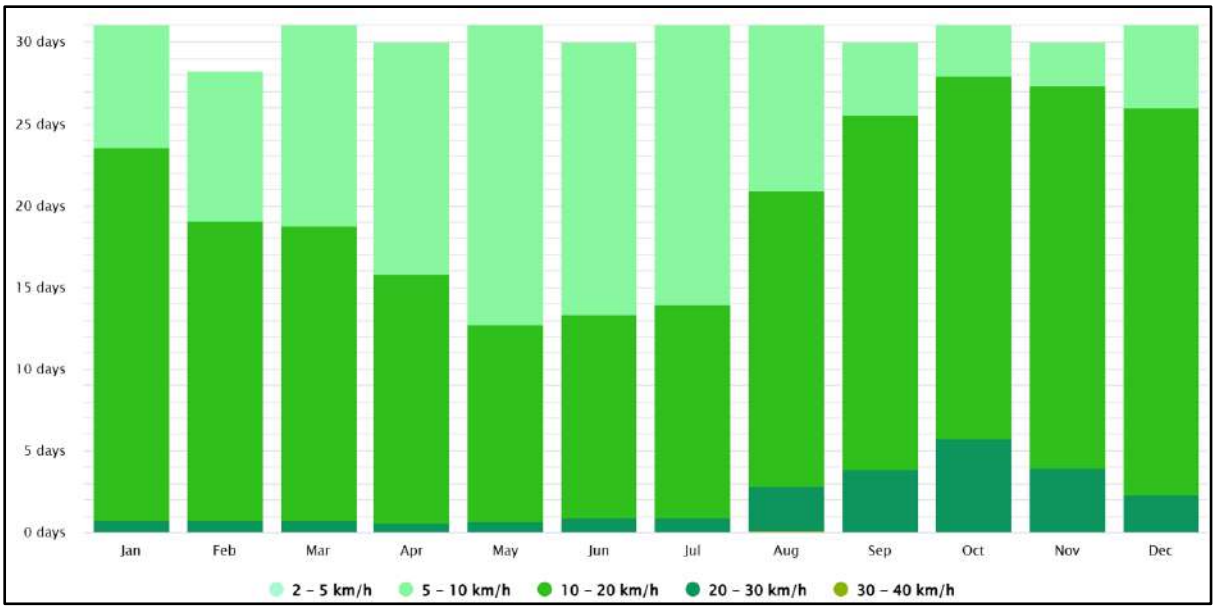

Figure 4-4: Wind speed Richards Bay (Meteoblue.com)

4.1.3. Topography and Drainage

Topography, especially variations in slope, plays a vital role in groundwater vulnerability by controlling the drainage and movement of water across the land surface. Slopes direct surface water flow, channeling it toward lower-lying areas or depressions, which influences whether contaminants are more likely to run off or infiltrate into the ground (Musekiwa & Majola, 2011). The topography is mainly flat and rolling but includes the escarpment itself.

Altitude varies from near sea level to 1100 to 1600 m above sea level, as illustrated in Figure 4-5 and Figure 4-6.

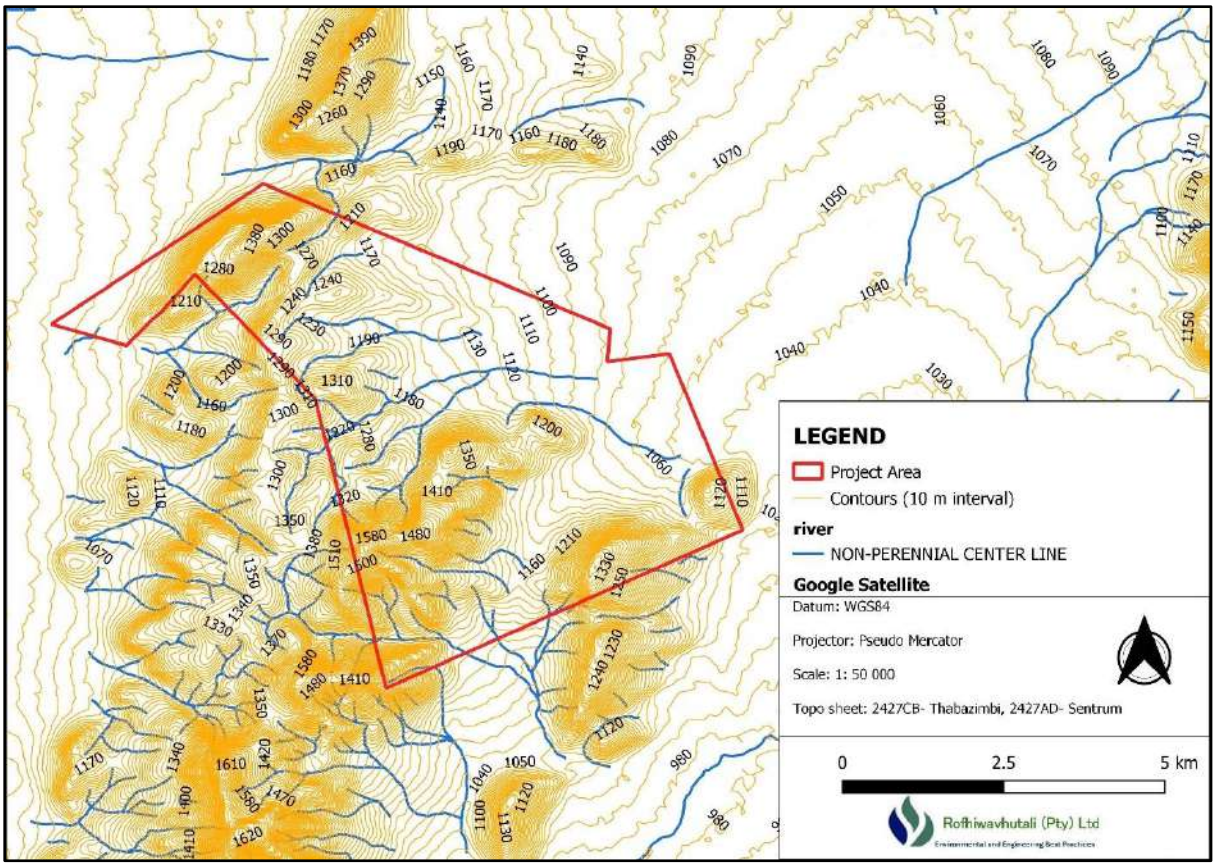

Figure 4-5: Elevation Map

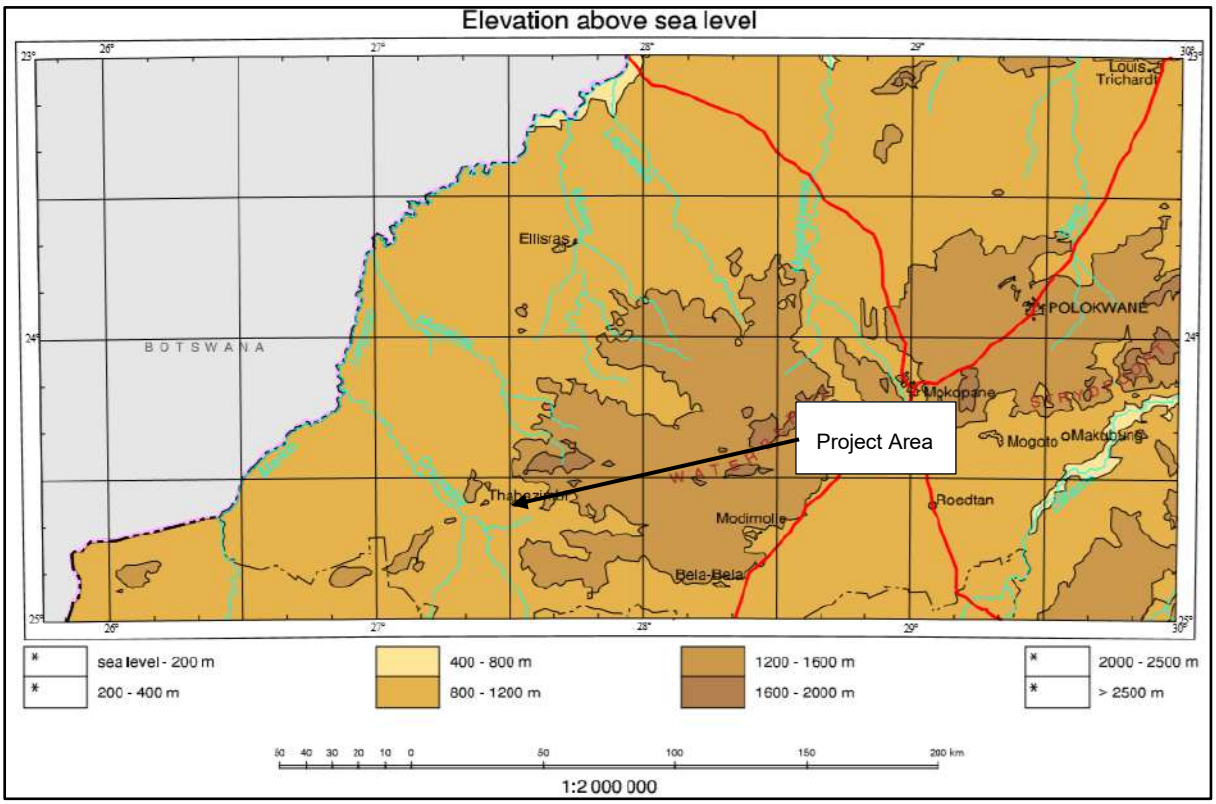

Figure 4-6: Elevation above level

5. CATCHMENT INFORMATION

The study area is located in the third water management area, the Crocodile (West) and Marico. In this water management area, The Crocodile-West catchment spans over part of the North West, Limpopo and Gauteng provinces (DWAF, 2004b) and was further divided into four tertiary-catchment areas the Upper Crocodile (A21), Elands River (A22), Apies-Pienaars River (A23) and Lower Crocodile River (A24). The quaternary catchment is A24J and A24H (Table 5-1). The WR2012 study presents hydrological parameters for each quaternary catchment including area, mean annual precipitation (MAP) and mean annual runoff (MAR). Based on the WR2012 study, the project area falls within the quaternary catchment A24J and A24H. The catchment area information is shown on Table 5-1.

Table 5-1: WRS of 2012, Water Management Area, MAP and QC

Water Management Area (WMA or primary catchment W)	MAE	Quaternary Catchment	Area of the quaternary catchment (KM2)	MAP (mm)	Evaporation Zone	MAR (WR2012)
Limpopo	1750	A24H	1339	639	3A	29.13
Limpopo	1900	A24J	2518	538	3A	4.89

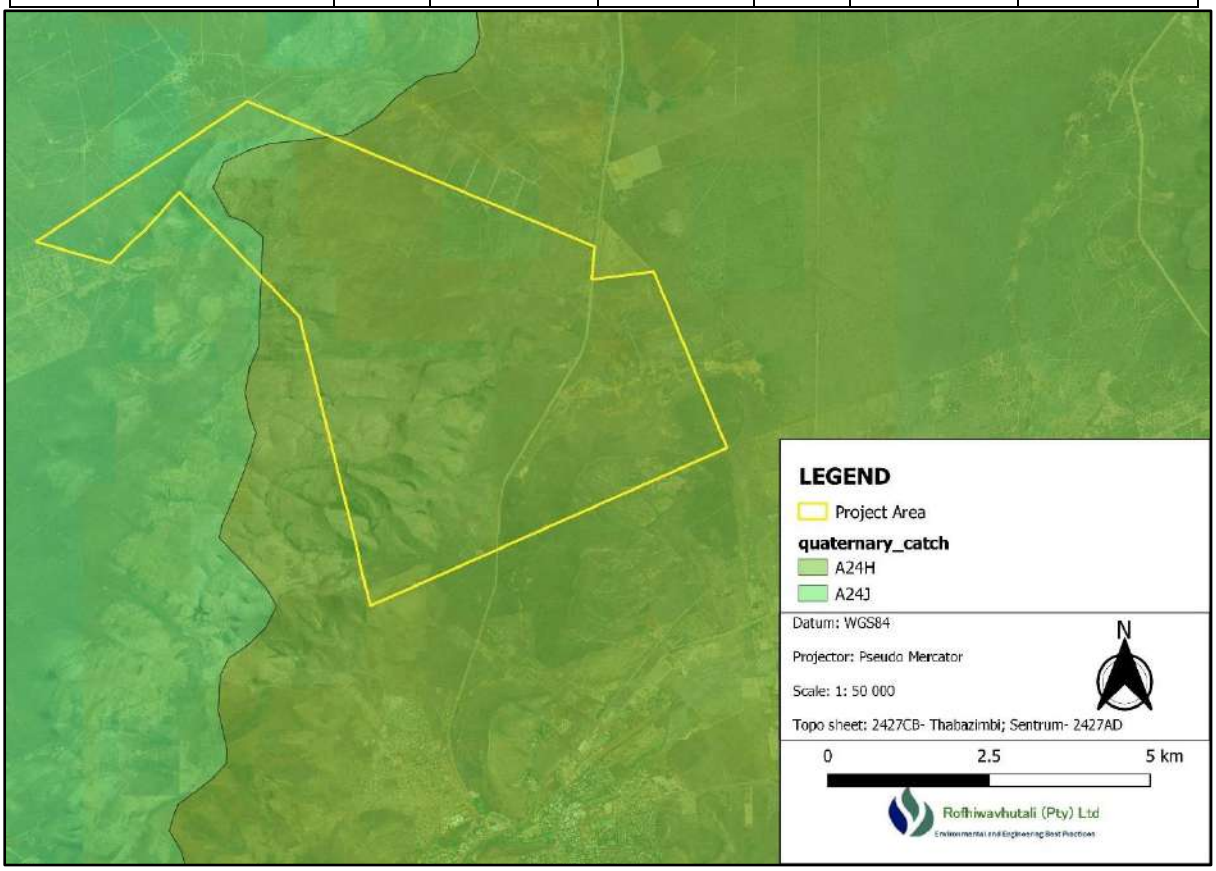

Figure 5-1: Quaternary Catchment

6. GEOLOGY

6.1. Regional Geology

The project area is situated within the Kaapvaal Craton and is underlain by the Transvaal Supergroup, a major Neoarchaean to Palaeoproterozoic stratigraphic unit extending across northern South Africa and southern Botswana. The Transvaal Supergroup is dated to approximately 2.58–2.06 Ga and is bounded by the older Witwatersrand Basin (~2.7 Ga) and the younger Bushveld Igneous Complex (~2.05 Ga) (Eriksson et al., 1995; Altermann and Nelson, 1998; Walraven et al., 1990; Zeh et al., 2016).

Regionally, the geology of the Thabazimbi area comprises supracrustal sequences including the Transvaal Supergroup (2.58–2.06 Ga), the Bushveld Igneous Complex (~2.06 Ga), and the overlying Waterberg Group (2.05–1.87 Ga) (Du Plessis and Clendenin, 1988; Netshiozwi, 2002; Dorland et al., 2006). The Transvaal Supergroup is subdivided into the Black Reef Formation (2642.2 ± 2.3 Ma), the Chuniespoort Group (2587 ± 49 Ma), and the Pretoria Group (2.35–2.06 Ga) (Walraven and Martini, 1995; Eriksson and Reczko, 1995; Zeh et al., 2016). Sedimentation within the Transvaal Basin commenced with clastic rocks of the Black Reef Formation, followed by carbonate rocks and banded iron formations (BIFs) of the Chuniespoort Group. These BIFs consist of alternating layers of iron oxides and chert and are characteristic of Precambrian depositional environments associated with early oceanic oxygenation. The Chuniespoort Group includes the Malmani Subgroup, composed predominantly of dolomite, stromatolitic chert, minor carbonaceous shale, limestone, and quartzite (de Beer, 2019). The Penge Iron Formation occurs within the contact metamorphic aureole of the Bushveld Complex and exhibits variable thickness due to deformation and erosion prior to Pretoria Group deposition (Schwellnus et al., 1962; Button, 1973). Thickness variations have been documented by Cilliers (1964), ranging from approximately 74 m at Kromellenboog to 178 m at Penge.

Locally, the study area is predominantly mantled by Quaternary deposits comprising unconsolidated materials such as alluvium, colluvium, eluvium, gravel, sand, soil, and debris (de Beer, 2019). These deposits overlie a complex assemblage of bedrock units derived from the 1:250 000 Geological Map Sheet 2426 (Thabazimbi), as illustrated in Figure 6-1 and Figure 6-2. The underlying geology is characterised by a variety of sedimentary and metamorphic lithologies, including dolomite, chert and shale with interbedded quartzite (T2), quartzite, arkose and conglomerate (VQ), as well as T3TQ quartzite and T3TS ferruginous shale and hornfels. Banded ironstone (T2i), locally associated with dolomitic and shaly units, is also present. Intrusive rocks such as granite and granite gneiss (1G), together with sandstone, grit, conglomerate and breccia (W), further contribute to the geological complexity of the area.

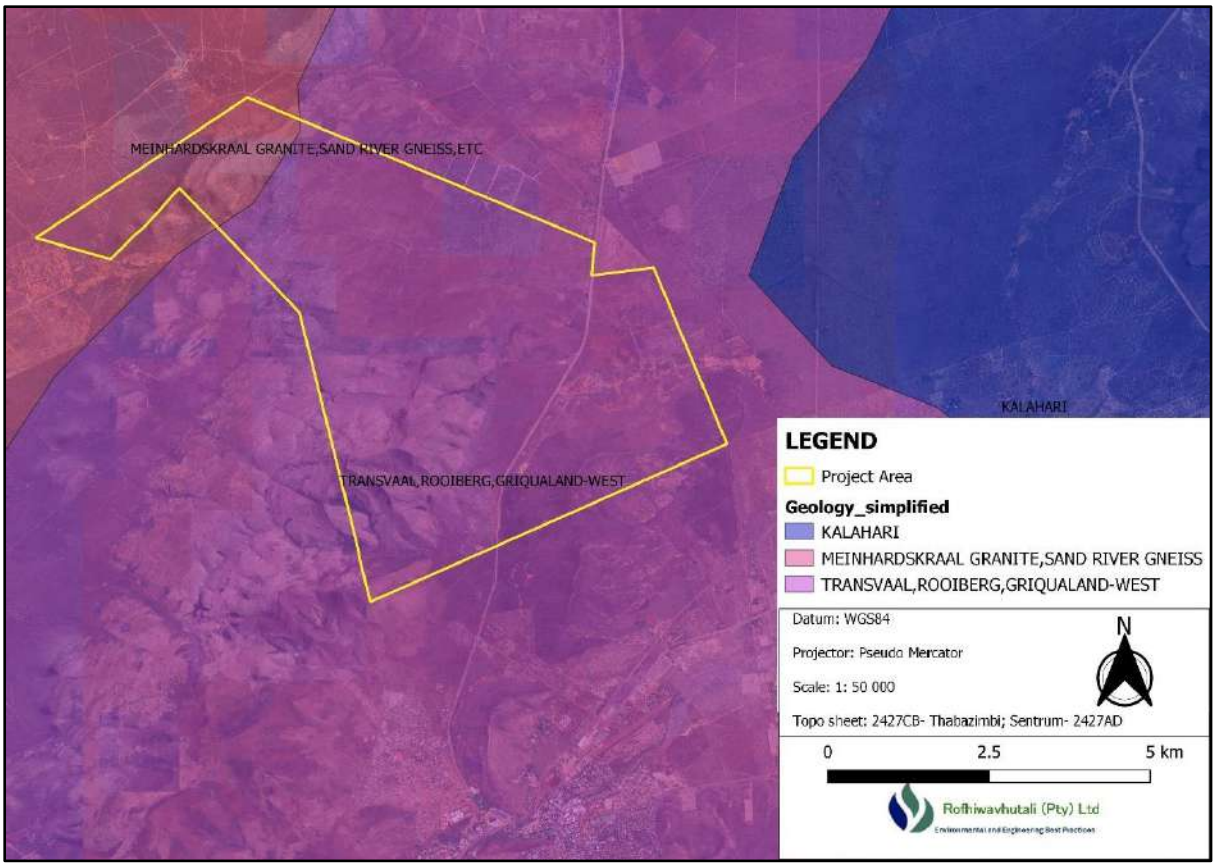

Figure 6-1: Geology Associated with the Project Area

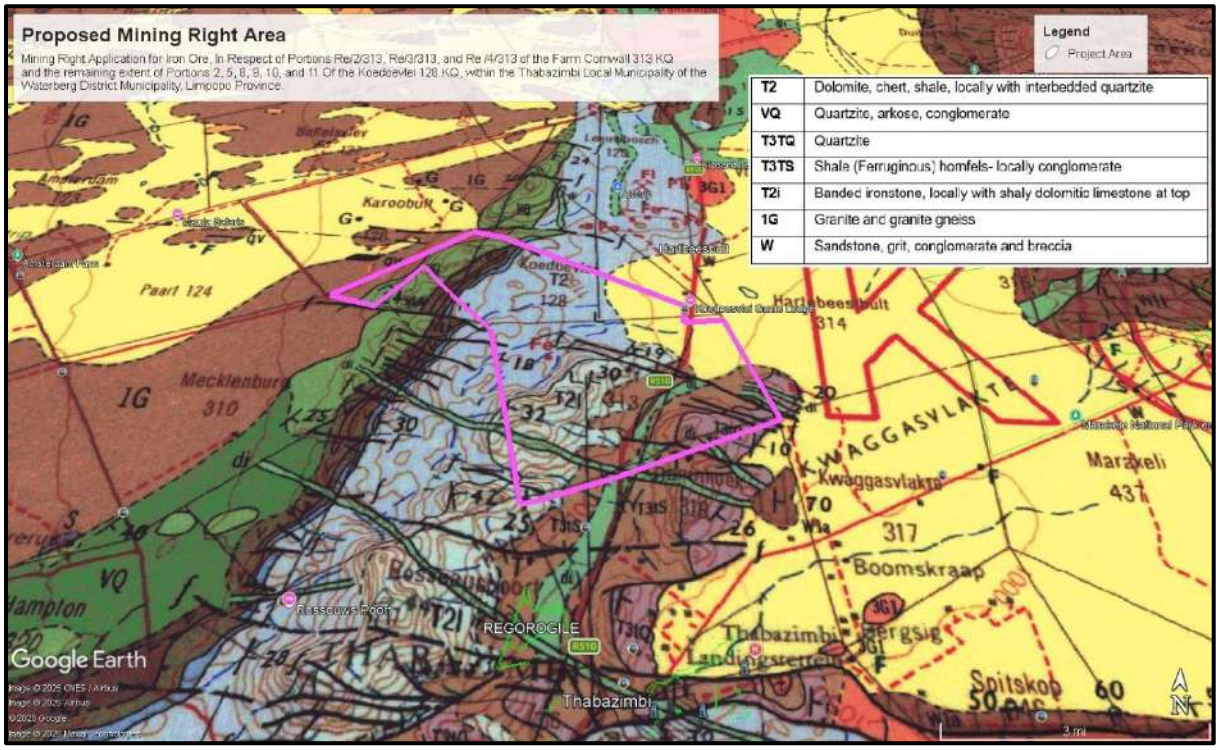

Figure 6-2: localised Geology Map

7. GEOHYDROLOGY

7.1. General groundwater understanding

Groundwater refers to the water located within the saturation zone, which lies beneath the unsaturated (aeration) zone. The unsaturated zone functions like a sponge, permitting water to seep down into the saturation zone (Kruseman & de Ridder, 1991). These two zones are separated by the water table, as illustrated in Figure 7-1.

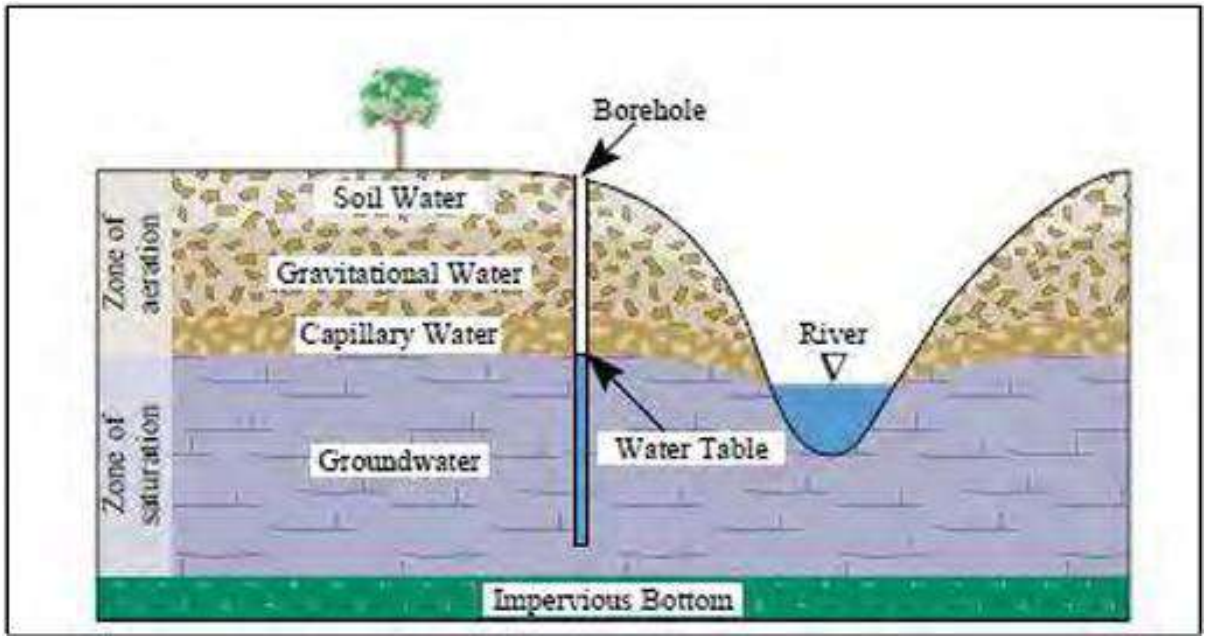

Figure 7-1: The basic concept of groundwater (Kruseman & de Ridder, 1991)

An aquifer is defined as a geological formation that holds sufficient water to be utilized for economically viable purposes, such as domestic use (van Tonder et al., 2001). There are two primary types of aquifers, as depicted in Figure 7-2: porous shallow weathered aquifers and deep fractured rock aquifers. Porous shallow weathered aquifers are composed of loosely packed grain materials like sand, gravel, and silt, while fractured rock aquifers consist of geological structures where groundwater flows through fractures, joints, and other breaks in the rock (Kruseman & de Ridder, 1991). It is crucial to recognize the strong relationship between geology and groundwater, as geological characteristics directly influence groundwater flow (van Tonder et al., 2001).

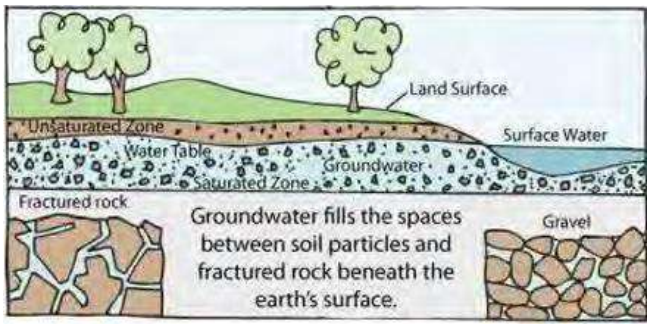

Figure 7-2: The basic Concept of Aquifers

7.2. Regional Geohydrology and Conceptual Groundwater flow

The type of aquifer plays an important role in groundwater vulnerability and availability, as these characteristics are largely controlled by the geohydrological composition of the aquifer materials. Aquifers developed in unconsolidated and semi-consolidated sediments typically exhibit primary (intergranular) porosity and are generally more susceptible to contamination than fractured bedrock aquifers. According to the 1:500 000 scale hydrogeological map series (Vryheid, Map Sheet 2730) and available hydrogeological information, groundwater in the project Area occurs predominantly within an intergranular primary aquifer hosted by semi-consolidated and unconsolidated sediments of Tertiary and Quaternary age as seen in Figure 7-3. These aquifers are associated with either loose and unconsolidated formations such as sands and gravels or with rock that has weathered to only partially consolidated material. The median borehole yields associated with the study Area has a yield between 0.5-2.0l/s. This aquifer type is characterised as a low to medium yielding 'Minor' aquifer in terms of the South African Aquifer Classification System. The saturated zone encompasses the section below the water table. The saturation within the intergranular aquifer is high relating to porosity of the overburden compared to the fractured aquifer. Within the fractured secondary aquifer, water saturation is limited to the fractures.

The Karst aquifers of the Carbonate rocks of the Chuniespoort Group unit has a dolomitic rock which generally display moderate to high porosity, enabling them to store considerable volumes of groundwater within their void spaces. It is further noted that the dolomitic areas are also associated with high yielding aquifers. The connectivity between fractures and solution cavities enhances permeability, allowing for efficient groundwater movement. This combination of storage and transmissive properties provides the aquifer with a relatively high yield potential. The two associated aquifers include a primary aquifer which consist of alluvial sediments having inherent porosity and restricted to a zone all along the Crocodile River and a secondary aquifer in which groundwater occurs along fault and shear zones associated with intense deformation resulting in the occurrence of fractures, joints, and cavities subsequently enlarged by dissolution processes in the dolomites.

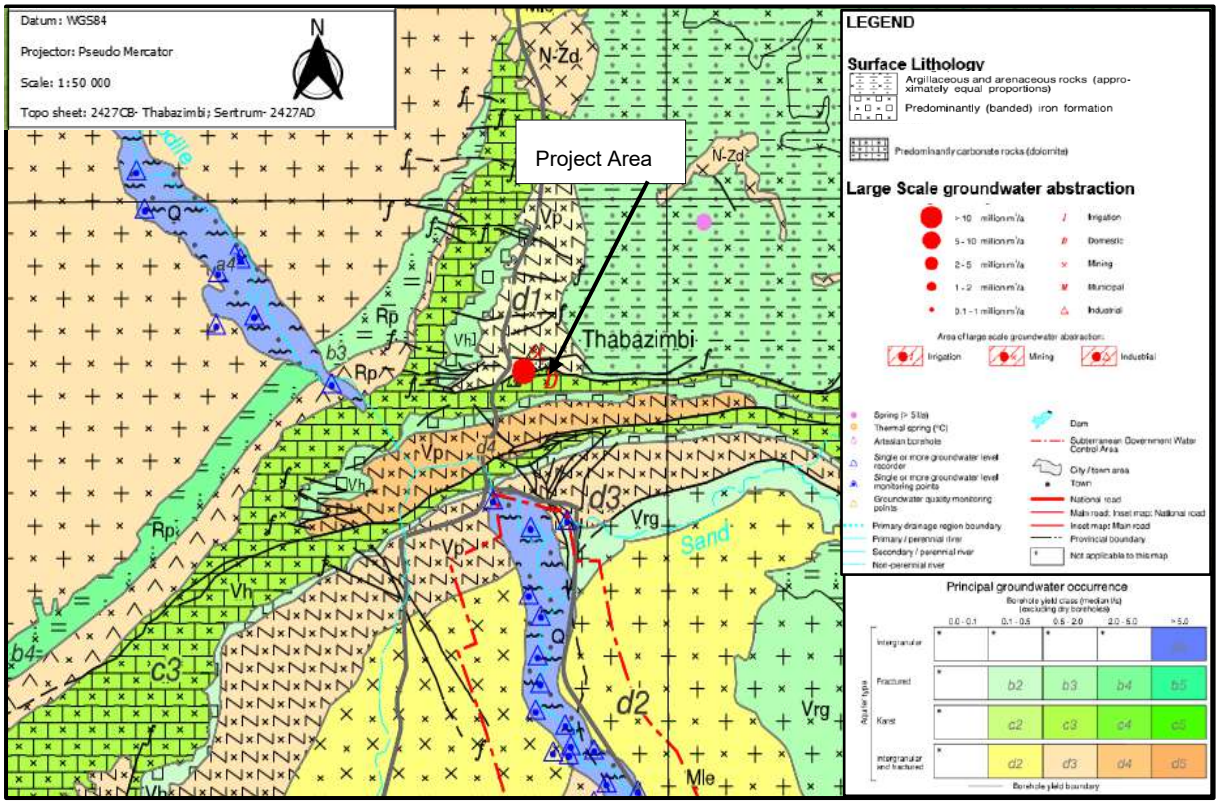

Figure 7-3: Geohydrological map, indicating the Geohydrology in the vicinity of the study area (Barnard, 1999).

7.3. Surface Groundwater Interaction

Hydrogeological terrains in South Africa have been broadly categorised according to how groundwater contributes to river systems, with several studies (e.g., Colvin et al., 2003 and others) identifying six major aquifer types. The study area is situated within the carbonate aquifer group, which exhibits distinctive characteristics that strongly influence the interaction between groundwater and surface water systems.

Carbonate aquifers are primarily associated with dolomite and limestone formations. These are considered secondary aquifers, as groundwater is mainly stored within voids, fractures, and solution cavities formed through the chemical dissolution of carbonate rock. This results in relatively high permeability and storage capacity. However, groundwater movement within these systems is often uneven due to the presence of impermeable dykes, which can divide the aquifer into separate compartments.

In terms of hydrological behaviour, carbonate aquifers are capable of releasing substantial volumes of groundwater, which can significantly support river baseflow. This discharge is typically persistent and occurs through natural outlets such as springs, eyes, and wetlands. As a result, these aquifer systems play an important role in sustaining streamflow and maintaining the ecological functioning of connected aquatic environments.

8. GROUNDWATER INVESTIGATION AND FIELD WORK

8.1. Hydrocensus

8.1.1. Background

The Hydrocensus main objective is to record the groundwater data available i.e., counting the number of boreholes if present, recording their names, conditions, coordinates as well as measuring the water levels. This helps to identify the baseline groundwater use and users within the study area. On the 7th of March 2026, a hydrocensus was conducted in and around the Mining right area.

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 (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.

The primary goal of the hydrocensus survey is to document the utilization of groundwater within the region. This involves visiting local farmers and villages to identify any operational boreholes they may have, potentially serving as water sources. During this process, we will assess temperature, pH levels, conductivity (EC), dissolved oxygen (DO), and collect water samples. Prior to the field hydrocensus, borehole data is obtained from the National Groundwater Archive (NGA) of the Department of Water and Sanitation (DWS) (refer to Appendix A). Figure 8-1 illustrates the locations of boreholes identified during the field hydrocensus, as well as those obtained from the NGA database within and surrounding the project area. The field water quality results presented in Table 8-1 were obtained during the hydrocensus survey conducted on the existing on-site boreholes. Photographs of the site are provided in Table 8-2.

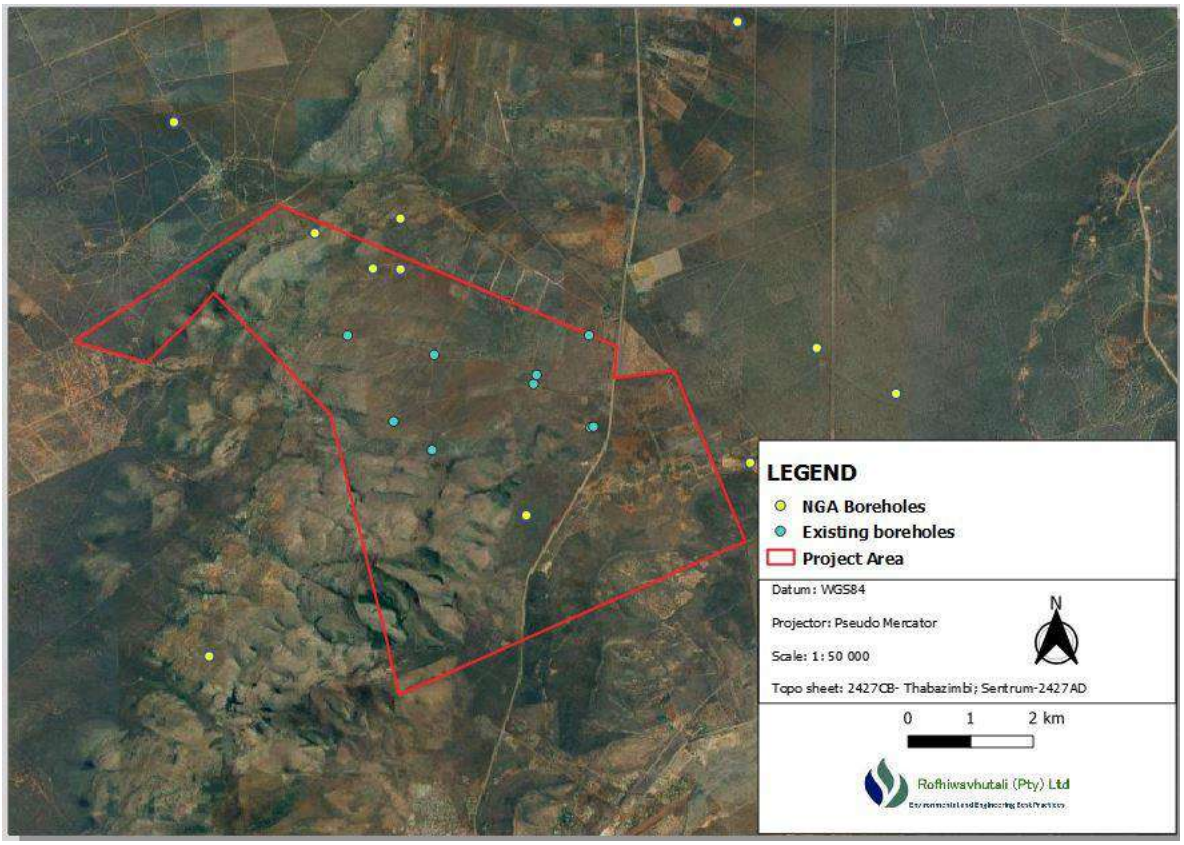

Figure 8-1: A map showing the existing boreholes

Table 8-1: Field Hydrocensus Measurement Parameters

SAMPLE ID	Latitude	Longitude	PH	TDS (mg/L)	EC (µs/cm)	DO (mg/L)	Temperature (°C)
BH01	-24.518200°	27.384840°	8.23	661	942	2.36	25
BH02	-24.513683°	27.378774°	8.79	603	853	4.95	28.3
BH03	-24.503178°	27.385172°	6.84	972	1472	2.44	28
BH04	-24.500135°	27.371524°	8.81	861	1242	4.63	27.6
BH05	-24.506343°	27.401332°	7.3	843	1241	1.70	29.9
BH06	-24.507790°	27.400861°	8.66	687	942	6.08	28.6
BH07	-24.500110°	27.409623°	N/A	N/A	N/A	N/A	N/A
BH08	-24.514518°	27.410315°	6.96	752	1064	1.36	27.3
BH09	-24.514630°	27.409860°	7.21	765	1121	1.80	28

Table 8-2: Site Pictures showing activities onsite

9. HYDROCHEMISTRY

Groundwater samples were collected to establish the background groundwater quality status quo. The groundwater samples were collected from a borehole within the site. The samples were collected directly into sample bottles supplied by the laboratory and refrigerated. The water samples were submitted to Water lab for chemical analysis. The analysis included compounds associated with standard drinking water parameters to determine the use and strategic value of the resource. The results were compared to the maximum concentrations for domestic use defined by the South African National Standards (SANS 241:2015).

9.1. Results Analysis

The results of the analysis of the water sample are summarized in Table 9-2, with the detailed test results included as Appendix B of this report. Table 9-1 below gives the risk guideline.

Table 9-1: Risk Guideline Legend

RISK	EFFECT
Aesthetic	Determinants that taint water with respect to taste, odour and colour and that does not pose an unacceptable health risk if present at concentration values exceeding the numerical limits specified.
Chronic Health	Determinants that pose an unacceptable health risk if ingested over an extended period if present at concentration values exceeding the numerical limits specified.
Operational	Determinants that is essential for assessing the efficient operation of treatment systems and risks to infrastructure.
Acute Health - 1	Routinely quantifiable determinand that poses an immediate health risk if consumed with water at concentration values exceeding the numerical limits specified.
Acute Health - 2	Determinants that is presently not easily quantifiable and lacks information pertaining to viability and human infectivity which, however, does pose immediate unacceptable health risks if consumed with water at concentration values exceeding the numerical limits specified.

Table 9-2: Water Quality Results

Analyses in mg/ℓ (Unless specified otherwise)	Risk	SANS 241: 2015 Limits	Sample Identification	
			BH01	BH06
pH - Value @ 25 ºC	Operational	≥5 to ≤ 9.7	8.1	8.7
Electrical Conductivity in mS/m @ 25°C	Aesthetic	≤170	65.1	70.0
Total Dissolved Solids @ 180°C	Aesthetic	≤1200	414	424
Colour in PtCo Units	Aesthetic	≤15	13	7
Turbidity in N.T.U	Operational/Aest	≤1 / ≤5	2.0↓	3.3↓
Total Alkalinity as $CaCO_3$	---	---	356	388
Langelier Index at 25°C	---	---	0.2	1.0
Chloride as Cl	Aesthetic	≤300	16	18
Sulphate as SO_4	Acute health/Aest	≤500 / ≤250	16	27
Fluoride as F	Chronic health	≤1.5	0.2	0.4
Nitrate as N	Acute health	≤11	<0.1	<0.1
Nitrite as N	Acute health	≤0.9	<0.05	<0.05
Combined Nitrate & Nitrite	Acute health	≤1	<0.1	<0.1
Silica as SiO_2	---	---	19.9	34

Total Organic Carbon as C	Chronic health	≤10	23↓	13↓
E. coli (MPN/100 mℓ)	Acute health	Not detected	14↓	<1
Free and Saline Ammonia as N	Aesthetic	≤1.5	0.8	0.1
Sodium as Na	Aesthetic	≤200	10	13
Potassium as K	---	---	4.0	4.7
Calcium as Ca	---	---	13	19
Magnesium as Mg	---	---	78	80
Aluminium as Al (µg/ℓ)	Operational	≤300	<100	<100
Antimony as Sb (µg/ℓ)	Chronic health	≤20	<1	<1
Arsenic as As (µg/ℓ)	Chronic health	≤10	<1	8
Barium as Ba (µg/ℓ)	Chronic health	≤700	<25	28
Boron as B (µg/ℓ)	Chronic health	≤2400	<25	<25
Cadmium as Cd (µg/ℓ)	Chronic health	≤3	<1	<1
Total Chromium as Cr (µg/ℓ)	Chronic health	≤50	<25	<25
Copper as Cu (µg/ℓ)	Chronic health	≤2000	<10	<10
Iron as Fe (µg/ℓ)	Chronic health/Aest	≤ 2000 / ≤300	<25	27
Lead as Pb (µg/ℓ)	Chronic health	≤10	<1	<1

Manganese as Mn (µg/ℓ)	Chronic health/Aest	≤ 400 / ≤100	28	64
Mercury as Hg (µg/ℓ)	Chronic health	≤6	<1	<1
Nickel as Ni (µg/ℓ)	Chronic health	≤70	<25	<25
Selenium as Se (µg/ℓ)	Chronic health	≤40	1	<1
Uranium as U (µg/ℓ)	Chronic health	≤ 30	<1	1
Zinc as Zn	Aesthetic	≤5	<0.025	<0.025
% Anion-Cation Balance	---	---	98.4	96.4

9.1.1. Physical Determinants

The pH values recorded for all groundwater samples ranged between 8.1 and 8.7, which fall within the acceptable limits of 5.0–9.7 as per applicable drinking water standards. This indicates slightly alkaline conditions, typical of groundwater systems influenced by carbonate geology.

The total dissolved solids (TDS) represent the total concentration of dissolved inorganic salts in water and serve as an indicator of overall water quality. TDS concentrations measured at BH1 and BH6 were 414 mg/L and 424 mg/L, respectively, which are well below the SANS guideline limit of ≤1200 mg/L. These values indicate good water quality with respect to salinity. An increase in TDS generally reflects a corresponding increase in dissolved inorganic constituents.

- Effects: Elevated TDS concentrations may result in aesthetic concerns such as poor soap lathering and potential skin dryness during bathing. High TDS is often associated with elevated calcium and magnesium concentrations.
- Mitigation: Measures to mitigate the effects of having consumed water containing a high TDS concentration are unnecessary since salts are rapidly eliminated in the urine once consumption of such water has been discontinued. Any electrolyte imbalances that may result can be restored by consuming water with more acceptable levels of dissolved salts. Water with high concentrations of TDS may be diluted with other sources, e.g. rainwater. The total dissolved solids (TDS) is a measure of the amount of various inorganic salts dissolved in water. The TDS concentration is directly proportional to the electrical conductivity (EC) of water.

Electrical Conductivity: Measured EC values of 65.1 mS/m (BH1) and 70.0 mS/m (BH6) are below the SANS 241 guideline limit of ≤170 mS/m for potable water. These values indicate low salinity and a relatively low concentration of dissolved ions. The groundwater within the study area can therefore be classified as non-saline.

9.1.2. Macro Elements

Calcium: Calcium concentrations measured at BH1 and BH6 were 13 mg/L and 19 mg/L, respectively, indicating low to moderate hardness and no associated health concerns.

Sodium: Sodium concentrations were 10 mg/L (BH1) and 13 mg/L (BH6), which are well within the Department of Water and Sanitation (DWS) guideline limit of 200 mg/L.

Chloride: Chloride concentrations at BH1 and BH6 were 16 mg/L and 18 mg/L, respectively, which are significantly below the recommended limit of 300 mg/L. These values indicate minimal salinity impact.

Magnesium: Magnesium concentrations of 78 mg/L (BH1) and 80 mg/L (BH6) were recorded.

- Effects: The effect of high Magnesium could result to diarrhoea in sensitive users. As excess magnesium is readily excreted by the kidney, adverse effects such as the suppression of the central nervous system and heart function are rarely seen. Excess magnesium intake, particularly as the sulphate, results in diarrhoea (DWAF, 1996).

- Mitigation: Regular cleansing is necessary for household appliances. When possible, magnesium carbonate should be removed using moderate acid treatments. Regular use of a proprietary, moderately abrasive cleaner is recommended to remove scum deposits from the enamelled surfaces of hand basins and bathrooms. alkaline cleaning solutions to avoid stains.

Nitrate: Nitrate concentrations were below 0.1 mg/L, which is well within the drinking water limit of 11 mg/L. These low concentrations indicate no impact from agricultural or anthropogenic contamination sources.

- Effects: Nitrate high levels on drinking water can be a result of runoff or leakage from fertilized soil (agricultural practices), wastewater, landfills, septic systems or urban drainage (Minnesota Department of Health). Severe toxic effects are possible in infants with high levels of nitrate.
- Mitigation: Reverse osmosis, which will remove nitrate effectively from water, along with high percentages of virtually all other ions and many organic compounds. The mitigation of Nitrates if ingested, a diet, adequate in Vitamin C, partially protects against the adverse effects of nitrate/nitrite.

Fluoride: Fluoride concentrations were 0.2 mg/L (BH1) and 0.4 mg/L (BH6), both within the acceptable limit of ≤1.5 mg/L.

9.1.3. Micro Elements

Iron concentrations were <25 mg/L and 27 mg/L, respectively. These values are within acceptable limits and do not pose significant health concerns, although elevated iron may cause staining and taste issues in water.

9.1.4. Heavy Metals

Manganese concentrations were within the acceptable limits prescribed by SANS 241 and DWS guidelines. Recorded values were 28 mg/L and 64 mg/L indicate no risk to human health.

Copper concentrations were below 10 mg/L, which is within the acceptable limit of ≤2000 mg/L. These levels are not associated with any adverse health effects.

10. AQUIFER CHARACTERIZATION

10.1. Groundwater vulnerability

Groundwater vulnerability is described as a relative, non-measurable property, according to the International Association of Hydrogeologists (IAH, 1994), based on the notion that certain land areas are more susceptible to groundwater contamination (Vrba and Zaporozec, 1994).

Figure 10-1 indicates the tendency or likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer. The aquifer vulnerability from possible pollution sources is classed as “Moderate and Most” as shown on Figure 10-1. Yellow represents the moderately vulnerable region which is vulnerable to some pollutants, but only when continuously discharged or leached, and Red

represents the most vulnerable aquifer region, which is vulnerable to many pollutants except those strongly absorbed or readily transformed in many pollution scenarios (Vegter, JR; Seymour , AJ, 2013).

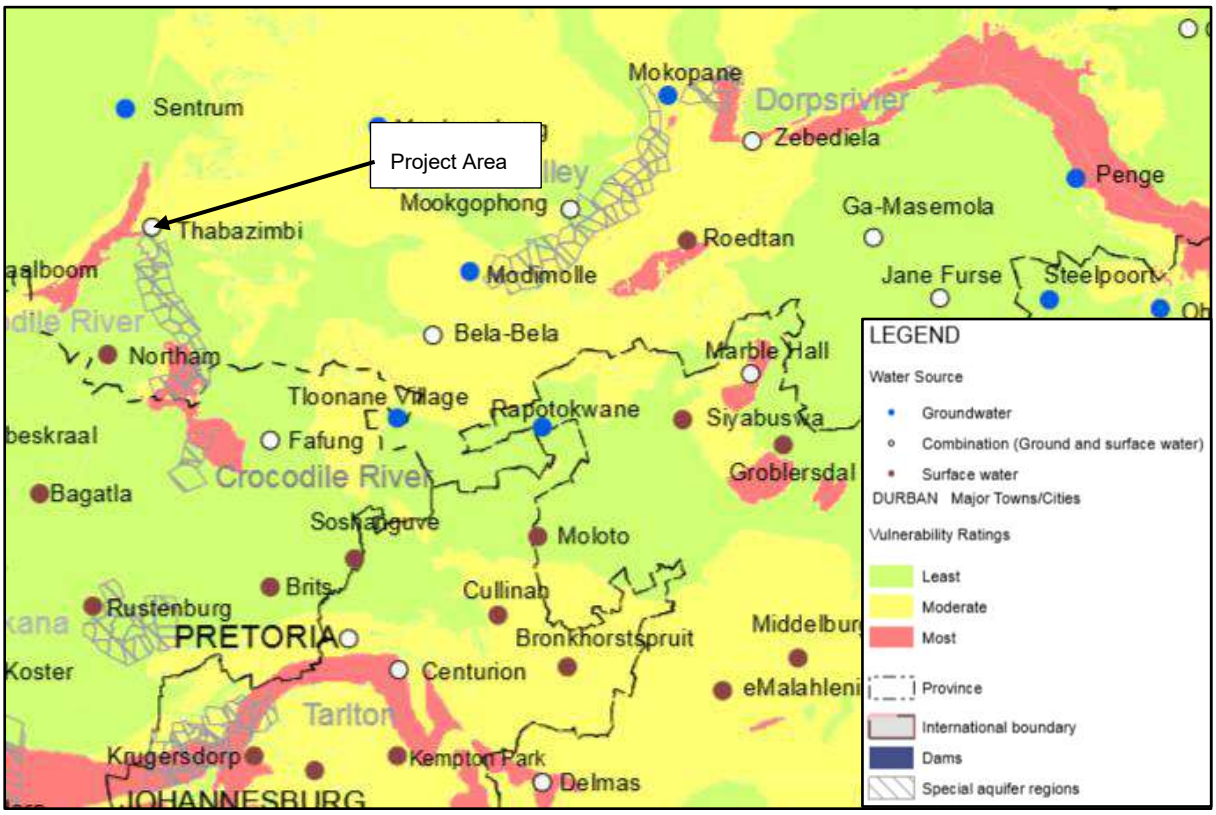

Figure 10-1: Aquifer Vulnerability of the study area.

10.2. Aquifer classification

The (Figure 10-2) below illustrates aquifer classification of different areas in South Africa. It can be deduced that the project area comprises of minor aquifers, with dominant water source being both groundwater and surface water (Vegter & Seymour, 2012). Minor aquifers are moderately yielding aquifers with acceptable quality or high yielding aquifer of poor-quality water (Table 10-1). Regions occur in parts of the project area, associated with karst aquifers within the carbonate rocks of the Chuniespoort Group. These dolomitic formations exhibit moderate to high porosity due to dissolution features, allowing for the storage of significant groundwater volumes. As a result, these dolomitic areas are often linked to high-yielding aquifers.

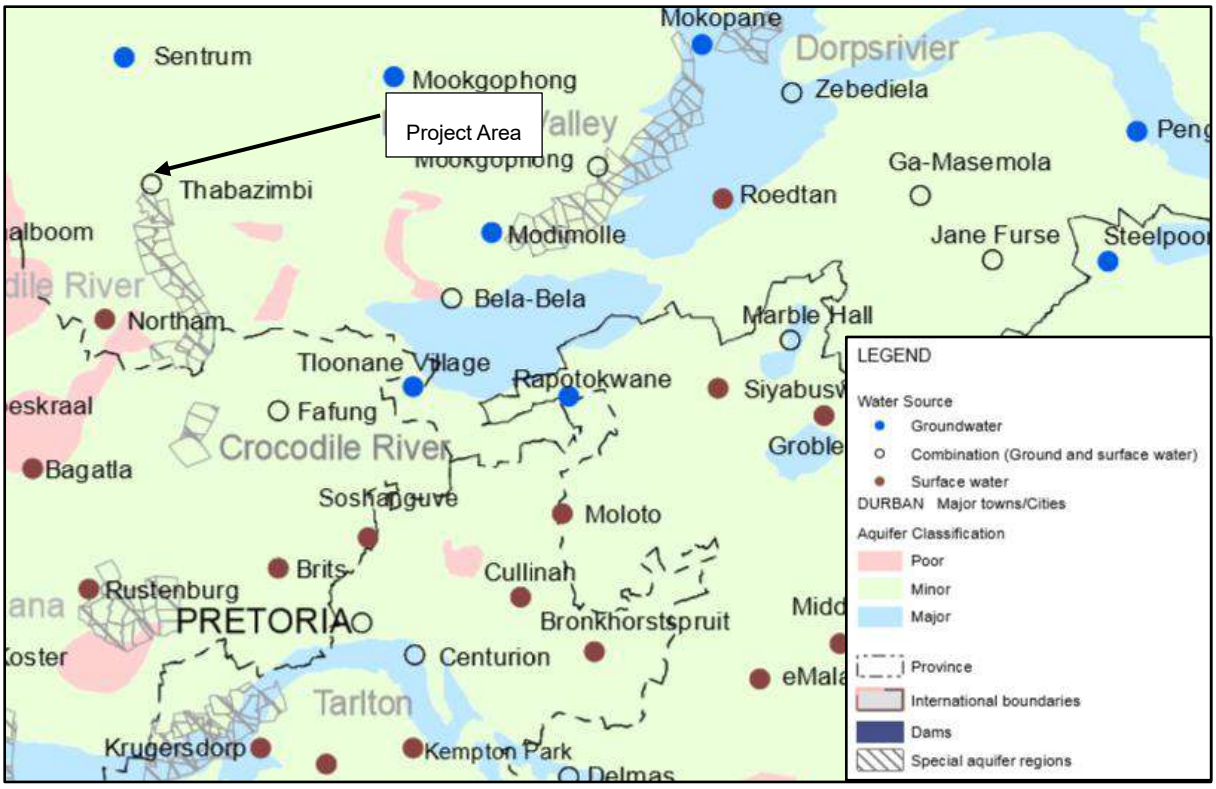

Figure 10-2: Aquifer Classification

Table 10-1: 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.

10.3. Hydraulic conductivity of the aquifer

Hydraulic conductivity reflects an aquifer's capacity to transmit water under a hydraulic gradient. It directly influences the rate at which groundwater and any dissolved contaminants move, meaning that higher hydraulic conductivity typically leads to increased vulnerability to contamination (Musekiwa & Majola, 2011). The water quality and electrical conductivity maps of the project area are shown on Figure 10-3 and Figure 10-4.

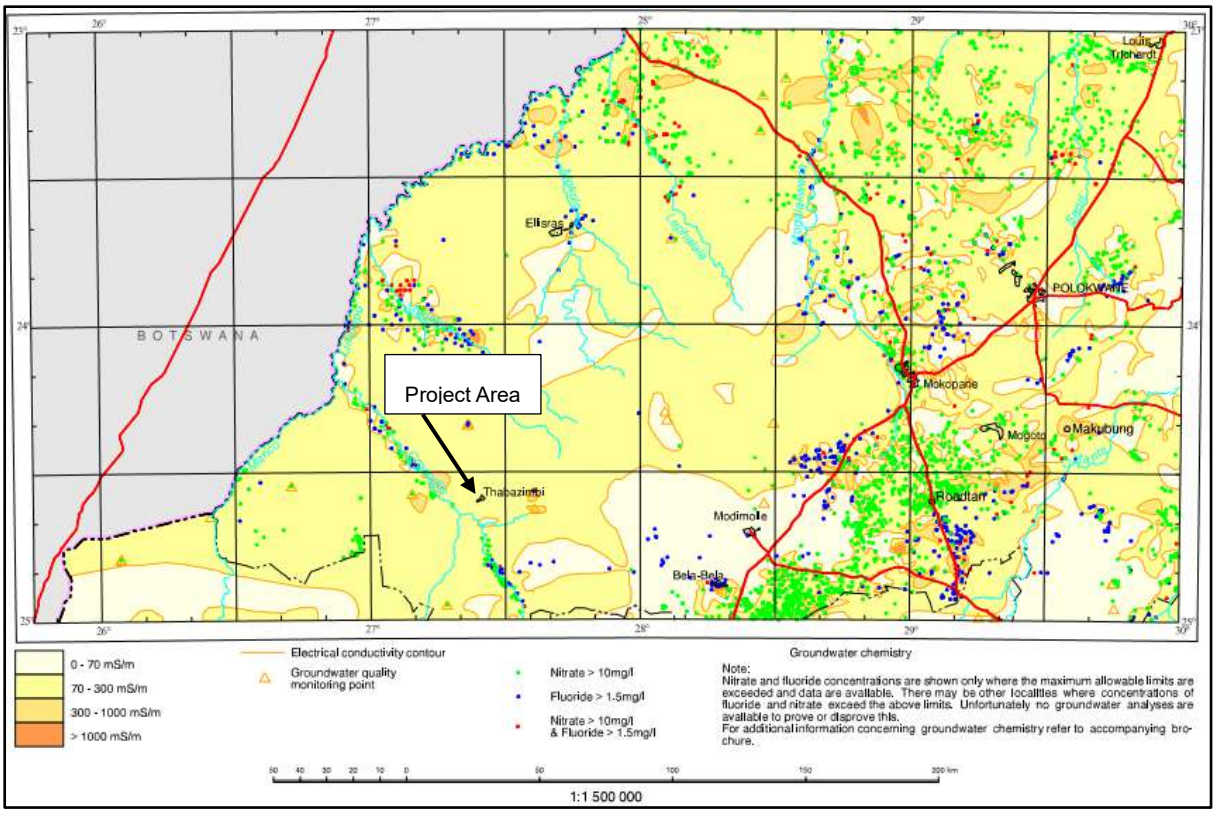

Figure 10-3: Groundwater quality Map

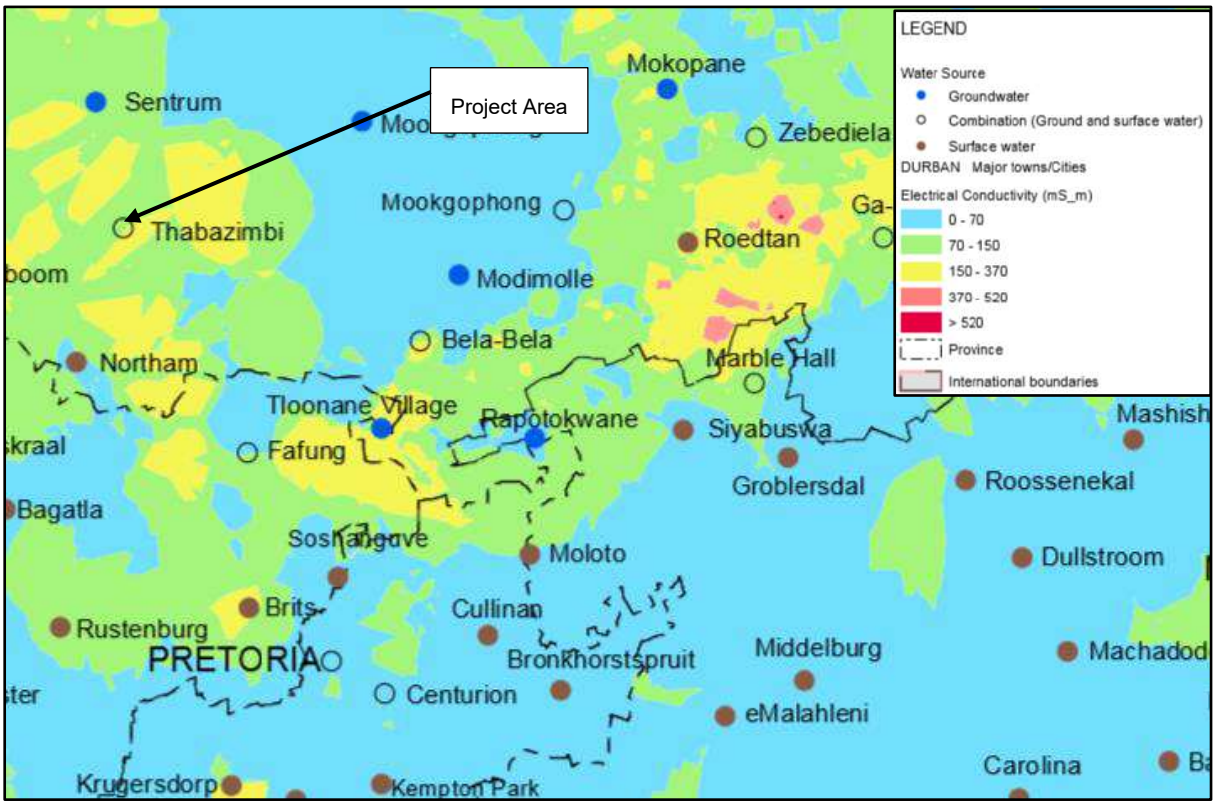

Figure 10-4: Electrical Conductivity (mS_m)

10.4. Aquifer Susceptibility

Aquifer susceptibility-means the simplicity with which contaminants can move from the land surface to the aquifer based exclusively on the types of surface and subsurface materials in the area. This usually defines the rate at which a contaminant will reach an aquifer unimpeded by chemical interactions with the vadose zone media. The method of aquifer susceptibility analysis has been used to objectively evaluate the spatial correlation between the high presence of pollutants in each aquifer and land use factors that can potentially influence the contamination. Moreover, the results allowed us to quantify on a large scale the effect that preferential flow paths, due to both thickness variation in the aquitard and the areal density of multi aquifer wells, have in reducing the protection of the underlying deep aquifer.

Table 10-2 and Figure 10-5 indicates the qualitative measure of the relative ease with which a groundwater body can be potentially contaminated by anthropogenic activities and includes both aquifer vulnerability and the relative importance of the aquifer in terms of its classification.

Table 10-2: Susceptibility Matrix

AQUIFER CLASSIFICATION				
VULNERABILITY		Poor	Minor	Major
	Least	Low 1	Low 2	Medium 3
	Moderate	Low 2	Medium 4	High 6
		Medium 3	High 6	High 9

Figure 10-5: Susceptibility Map

11. CONTAMINATION RISK ASSESSMENT

11.1. Parson's rating system

The "Parsons Rating System" is an aquifer classification system developed to implement a strategy for managing groundwater quality in South Africa. Classification, vulnerability and susceptibility are rated for a specific aquifer to be studied.

i. Aquifer Classification

The project area comprises of minor aquifers, with dominant water source being both groundwater and surface water (Vegter & Seymour, 2012). Minor aquifers are moderately yielding aquifers with acceptable quality or high yielding aquifer of poor-quality water. Regions occur in parts of the project area, associated with karst aquifers within the carbonate rocks of the Chuniespoort Group. These dolomitic formations exhibit moderate to high porosity due to dissolution features, allowing for the storage of significant groundwater volumes. As a result, these dolomitic areas are often linked to high-yielding aquifers.

ii. Aquifer vulnerability

A most and moderate tendency or likelihood does exist for contamination to reach a specific position in the groundwater system after introduction at some location above the uppermost aquifer.

iii. Aquifer susceptibility

The aquifer is rated to have a medium and high susceptibility. Susceptibility is a qualitative measure of the relative ease with which a groundwater body can be potentially contaminated by anthropogenic activities and includes both aquifer vulnerability and the relative importance of the aquifer in terms of its classification.

The Groundwater Quality Management Index (GQM index) of this option is rated at 6, and level of protection is shown in Table 11-1, to adhere to the Department of Water Affair's (DWA) water quality objectives.

Table 11-1: Appropriate Level of Groundwater Protection Required

GQM	Level of Protection
<1	Limited Protection
1-3	Low Level Protection
3-6	Medium Level Protection
6-10	High Level Protection
>10	Strictly non-degradation

11.2. Assessment of the vulnerability of the underground water resources

The vulnerability of the underground water sources is related to the distance that the contaminant must flow to reach the water table and the ease with which it can flow through the soil and rock layers above the water table. An assessment of the soil and rock types and the distance to the water table can be used to obtain a vulnerability class. (Groundwater Protocol document, Version 2, dated March 2003). Five broad classes of aquifer vulnerability are defined in Table 11-2 below.

Table 11-2: Vulnerability of groundwater Aquifer due to hydrological Conditions

Vulnerability Class	Measurements	Definition
Extreme (Usually highly fractured rock and/or high groundwater table)	High risk and short distance(<2m) to water table	Vulnerable to most pollutants with relatively rapid impact from most contamination disposed of at or close to the surface

Vulnerability Class	Measurements	Definition
High (usually gravely or fractured rock, and/or high water table)	High risk and medium distance(2-5m) to water table	Vulnerable to many pollutants except those highly absorbed, filtered and/or readily transformed
Medium (usually fine sand, deep loam soils with semi-solid rock and average water table > 10m)	Low risk and medium to long distance to water table	Vulnerable to inorganic pollutants but with negligible risk of organic or microbiological contaminants
Low (usually clay or loam soils with semi- solid rock and deep water table>20m)	Minimal and low risk and long to very long distance to water table	Only vulnerable to the most persistent pollutants in the very long term
Negligible (usually dense clay and/or solid impervious rock with deep water table)	Minimal risk with confining layers	Confined beds present with no significant infiltration from surface areas above aquifer.

In Table 11-2 above, according to the Groundwater Protocol document, Version 2, dated March 2003 in Table A, the vulnerability of the Groundwater Aquifer due to the Hydrogeological Conditions at the proposed Mining Right site can be rated as Extreme risk due to Karst dolomitic areas, as s they are highly susceptible to contamination with rapid pollutant transport from surface sources.

Table 11-3 below show that the surface material layer that is found on site have a medium capacity to absorb contaminants and a high capacity to create an effective barrier to contaminants. A high reduction of bacteria and viruses will be evident in the unsaturated aquifer if a sanitation leak does happen. Nitrates and phosphates will have some reduction and chloride will be minimally reduced. A minimal reduction of hydrocarbons is expected.

Table 11-3: Assessment of the reduction of contaminants in the unsaturated zone

Unsaturated Zone Conditions	Factor Effecting Reduction			Contamination Reduction			Comments
	Rate of flow in unsaturated zone	Capacity of the media to absorb contaminants	Capacity to create an effective barrier to contaminants	Bacteria and Viruses	Nitrates and Phosphates	Chlorides	
Clay	Very slow <10mm/d	High	High	Very high reduction	High Reduction	High Reduction	Very Good barrier to movement of contaminants. May have problems with water retention in pit

Unsaturated Zone Conditions	Factor Effecting Reduction			Contamination Reduction			Comments
	Rate of flow in unsaturated zone	Capacity of the media to absorb contaminants	Capacity to create an effective barrier to contaminants	Bacteria and Viruses	Nitrates and Phosphates	Chlorides	
Silt	Slow 10-100mm/d	Medium	High	High Reduction	Some Reduction	Minimal Reduction	Good barrier to movement of biological contaminants, but little reduction in chemical contaminants.
Sandy loam	Slow 10-100mm/d	Medium	High	High Reduction	Some Reduction	Minimal Reduction	Good barrier to movement of biological contaminants, but little reduction in chemical contaminants.
Fractured or weathered sandstone	Medium 0.1 - 10m/d	Medium	Medium	High Reduction	Minimal Reduction	Minimal Reduction	Fair barrier to movement of biological contaminants, but little reduction in chemical contaminants.
Fine sand	Medium 0.1 - 10m/d	Minimal	High	High Reduction	Minimal Reduction	Minimal Reduction	Good barrier to movement of biological contaminants, but little reduction in chemical contaminants.

11.3. Common Pathways

The proposed Project Area is underlain by a karst aquifer system within dolomitic formations, which is typically unconfined and characterised by fractures, joints, and solution cavities. Groundwater flow occurs rapidly through these preferential pathways. Water is the primary transport mechanism for contaminants. In karst systems, contaminants can move quickly with minimal natural attenuation due to the presence of interconnected conduits.

The following common pathways have been identified:

- Rapid infiltration through fractures, joints, and sinkholes;
- Direct recharge into the aquifer with limited filtration; and
- Fast groundwater flow through conduits, facilitating downstream migration of contaminants.

11.3.1. Potential Receptors

Receptors can be classified as points of discharge such as boreholes used for water drinking, rivers, or streams where animal (including humans) and plants come into contact or consume contaminated water(Figure 11-1).

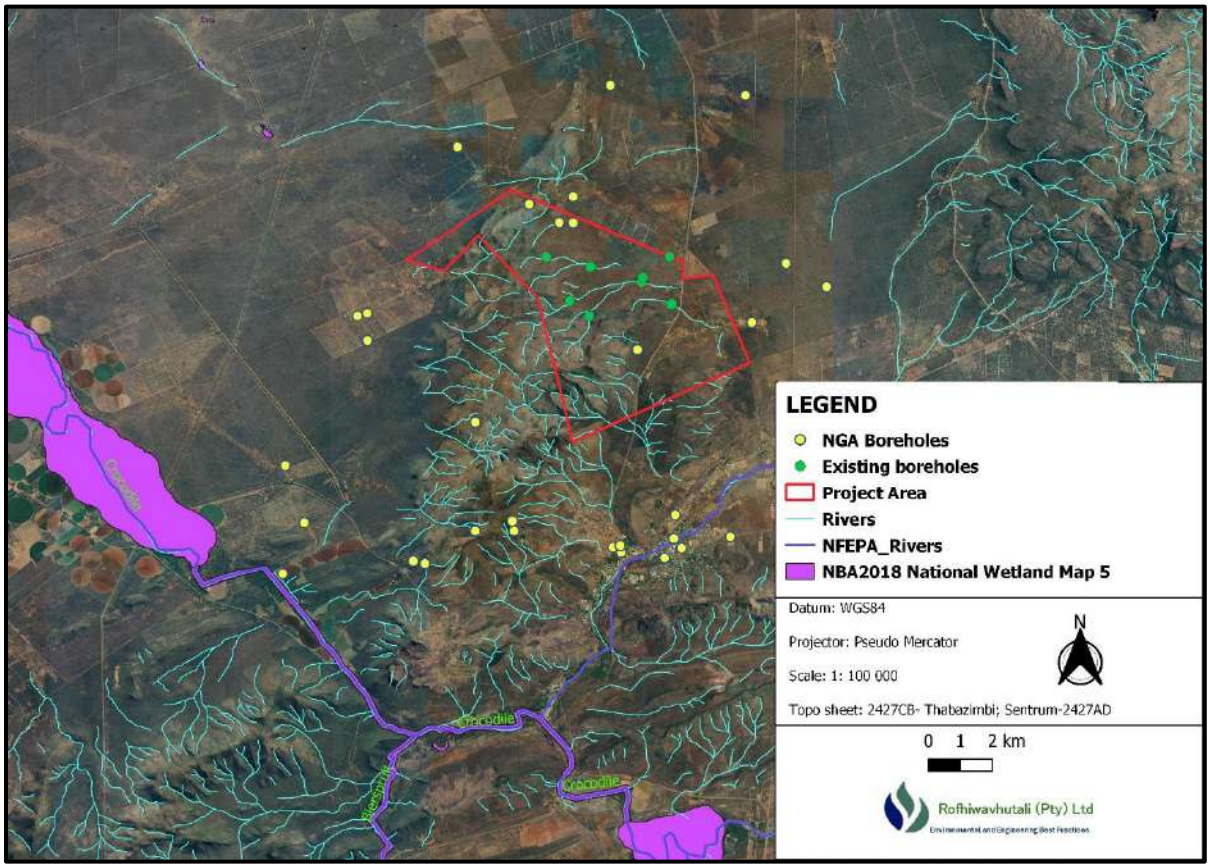

Figure 11-1: Waterbodies and Boreholes

12. GEOHYDROLOGICAL IMPACT ASSESSMENT

An Environmental Impact Assessment involves forecasting potential outcomes based on the interpretation and analysis of the data and information available at the time of its preparation. The methodology adopted for this assessment aligns with recognized international best practices. The evaluation specifically examined the possible effects of the proposed project activities on both groundwater and surface water resources.

Each identified impact is first described in terms of its nature and the sensitive receptors that may be influenced. This is followed by an assessment of the impact's significance before any mitigation is applied (initial risk rating), suggested mitigation strategies, and an evaluation of the residual impact expected after these measures are implemented. Table 12-1, Table 12-2 and Table 12-3 outlines the Risk Matrix used to evaluate impact severity by comparing the probability of occurrence with the potential magnitude.

The significance of identified impacts was determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the

potential significance of impacts, namely occurrence and severity, which are further sub-divided as follows:

Table 12-1: Impact Assessment Factors

Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Scale/extent of impact	Magnitude of impact

To assess these factors for each impact, the following four ranking scales are used:

Table 12-2: Impact Assessment Scoring Methodology

Magnitude	Duration
10- Very high/ unknown	5- Permanent (>10 years)
8- High	4- Long term (7-10 years, impact ceases after site closure has been obtained)
6- Moderate	3- Medium-term (3 months- 7 years, impact ceases after the operational life of the activity)
4- Low	2- Short-term (0-3 months, impact ceases after the construction phase)
2- Minor	1- Immediate
Scale	Probability
5- International	5- Definite/Unknown
4- National	4- Highly Probable
3- Regional	3- Medium Probability
2- Local	2- Low Probability
1- Site Only	1- Improbable
0- None	0- None

Significance Points= (Magnitude + Duration + Scale) x Probability

Table 12-3: Significance of impact based on point allocation

Points	Significance	Description
SP>60	High environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.

Magnitude	Duration	
SP 30-60	Moderate environmental significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated.
SP<30	Low environmental significance	Impacts with little real effect and which will not have an influence on or require modification of the project design.
+	Positive impact	An impact that is likely to result in positive consequences/effects.

12.1. Construction phase

The construction phase will involve preparatory works to ready the site for operational activities.

12.1.1. 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.
- An increase in subsurface permeability may lead to localised changes in groundwater flow dynamics and water levels within the shallow aquifer system.
- Dewatering of construction sites and resultant altering of the localised groundwater flow regime. Dewatering at excavations for construction purposes can cause localised altering of the flow and levels of the groundwater at the construction site.

12.1.2. Impacts on groundwater quality

In terms of groundwater quality, the potential risk is from accidental spills of hydrocarbons or other chemicals from construction vehicles. The operation of the fuel and lubricants storage facility has the potential for causing contamination of surface water due to infrastructure failure (emergency), leakage or spillages during normal operation. Included in normal operation is the potential for the incorrect disposal of spill absorbing material.

The operation of offices, ablutions and maintenance areas 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. These incidents are considered unlikely, and if they occur, are typically localized and reversible with proper containment and remediation. The severity of such impacts is rated as low during the relatively short construction period, especially when mitigation measures are applied. The impact assessment and risk ratings are detailed in Table 12-4. Key management objectives during construction include the development and implementation of a Standard Operating Procedure (SOP) for containing and cleaning up any accidental chemical or hydrocarbon spills. Measures include

the immediate containment of spills, excavation of contaminated soil where necessary, and proper disposal of waste material at certified facilities.

12.1.3. Groundwater management

- All spillages will need to be cleaned up as soon as practically possible.
- Report any significant spillage of chemicals, fuels etc. during the lifespan of the mining activities to the Department of Water and Sanitation and other relevant authorities.
- Park the machinery at the Project Area with drip trays placed underneath stationary vehicles.
- Site Manager to ensure day-to-day compliance with the guidelines as stipulated in the EMPR.
- Compliance to be monitored by the independent Environmental Control Officer during the annual environmental audit.
- Proper management of stormwater drainage infrastructure should be ensured.
- Vehicles and machinery will be maintained in good order to minimise leakages.
- Spill kits will be made available in areas of likely spillage.
- Sealing of monitoring boreholes to prevent contamination from surface pollutants.
- All hydrocarbon storage containers will be stored within a bunded areas which are watertight and able to contain 110% of the stored volume and
- All equipment utilising hydrocarbons will be stored on a hard standing surface.

Table 12-4: Impact Assessment on groundwater quality during construction

POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Significance without Mitigation	Magnitude	Duration	Scale	Probability	Significance	Significance with Mitigation	Detailed Mitigation Measures
Construction Phase													
Hydrocarbon spills contaminating groundwater	6	2	2	4	40	Moderate	4	2	2	2	16	Low	Bunded fuel storage; drip trays; lined refuelling area; spill kits; staff training; leak detection.
Inadequate sewage & wastewater management	6	2	1	4	36	Moderate	4	2	1	2	14	Low	Chemical toilets; weekly servicing; and no discharge to soil.
Hazardous material storage leakage	6	2	2	3	30	Moderate	4	2	1	2	14	Low	Bunded chemical storage; inspections; trained staff.
Alteration of groundwater flow from excavations	5	2	2	3	27	Low	4	2	1	2	14	Low	Maintain drainage paths; stabilise trenches; avoid recharge zones.
workshop, chemical stores, and plant storage areas	4	2	2	4	32	Moderate	4	2	1	3	21	Low	Hardstand storage. Spill kits on site. Remove impacted soils immediately.
Dust suppression activities	6	2	1	3	27	Low	4	1	1	4	24	Low	Avoid over-watering to prevent pooling and infiltration.

12.2. Operational phase

12.2.1. 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 removal of vegetation reduces the recharge of rainwater to aquifers due to increased run-off. The detailed impact assessment and associated risk rating for groundwater quantity during the operational phase are provided in Table 12-5**.**

12.2.2. Impacts on groundwater quality

Groundwater quality can be compromised through leachate of petroleum, chemical, harmful and hazardous substances. In particular, oil spills, diesel and grease from vehicles, trucks, equipment and drilling machinery and transportation vehicles utilised during the Mining operations may occur. Such spills may poison aquatic life (Stebbins 2006). The detailed impact assessment and associated risk rating for groundwater quality` during the operational phase are provided in Table 12-5.

12.2.3. Groundwater management

- All spillages will need to be cleaned up as soon as practically possible.
- Proper management of stormwater drainage infrastructure should be ensured.
- Site Manager to ensure day-to-day compliance with the guidelines as stipulated in the EMPR.
- Compliance to be monitored by the independent Environmental Control Officer during the annual environmental audit.
- 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.
- Portable ablution facilities with suitable containment systems should be on site for use during Mining operations. Waste should be properly contained to avoid any leakages be regularly be disposed off a suitable site.
- 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.

Table 12-5: Operational Phase Impact Assessment

POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Significance without Mitigation	Magnitude	Duration	Scale	Probability	Significance	Significance with Mitigation	Detailed Mitigation Measures
Operational Phase													
leakage from storage (fuel, chemicals, wastewater)	6	3	2	4	44	Moderate	4	3	2	2	18	Low	Impermeable flooring; leak-detection sensors; secondary containment; routine inspections.
Contamination from operational waste handling	6	3	2	3	33	Moderate	4	3	2	2	18	Low	Maintain equipment; use drip trays, bunded refuelling areas
Inadequate sewage & wastewater management	6	3	2	4	44	Moderate	4	3	2	2	18	Low	Chemical toilets; weekly servicing; and no discharge to soil.
Workshop and plant storage areas	6	3	2	3	33	Moderate	4	3	2	2	18	Low	Hardstand storage. Spill kits on site. Remove impacted soils immediately.
Dust suppression activities	6	3	2	3	33	Moderate	4	3	1	2	16	Low	Avoid over-watering to prevent pooling and infiltration.

12.3. Decommissioning phase

The decommissioning phase will begin once the activities for the Project have ended. This phase will continue until formal closure is achieved, after which the Post-Closure Phase will commence.

Groundwater and surface water contamination from activities identified on the operational phase is expected during this phase. Pumping of groundwater for dewatering activity is expected to cease at this phase allowing groundwater levels to recover. Groundwater levels in the surrounding area which were drawn-down due to the dewatering activity will subsequently return to close to the natural or pre-mining state. However, due to the low recharge influx it may take a long time before groundwater levels return to pre-mining conditions. Groundwater recovery time was not simulated during the model run. It was therefore recommended that this task be conducted during the model update to simulate the time it may take for groundwater levels to fully recover based on calibrated dewatering volumes. a rehabilitation plan must be implemented. This plan should align with the provisions of the National Water Act (Act No. 36 of 1998) to prevent or mitigate any potential environmental impacts. A zero-effluent discharge approach should be adopted. Measures such as water recycling, reuse, and/or treatment should be applied to support this objective.

12.4. post-mining phase

12.4.1. Groundwater quality

The corresponding impact assessment and risk rating for groundwater quality during the post-closure period are detailed in Table 12-6.

Table 12-6: Decommissioning Impact Assessment

POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Significance without Mitigation	Magnitude	Duration	Scale	Probability	Significance	Significance with Mitigation	Detailed Mitigation Measures
Decommissioning and Closure Phase													
Disturbance of soils leading to polluted runoff to groundwater	6	3	2	3	33	Moderate	4	2	1	3	21	Low	Stabilise soils; berms to prevent infiltration.
Potential future decommissioning activities will likely involve dismantling and removing the supporting infrastructure, as well as transferring waste materials to disposal, recycling, and/or treatment facilities, as applicable (where re-use is not possible).	6	2	2	3	30	Moderate	4	2	2	3	24	Low	The study area should be revegetated with indigenous vegetation to help with soil compaction, runoff, erosion and dust control as required.
Potential decommissioning activities will likely involve dismantling on-site, equipment, and facilities. During this period, there will be vehicular traffic, thus increasing the likelihood of soil contamination.	6	2	2	3	30	Moderate	4	1	2	3	21	Low	Any portions of the site with compacted soil should be decompacted.
Loss of aquifer recharge areas due to abandoned infrastructure	6	4	3	3	39	Moderate	4	2	2	3	24	Low	Full site rehabilitation; removal of impervious surfaces; restore natural infiltration.

12.5. Cumulative impacts

A cumulative impact is the impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (Nas Whidbey, 2018). 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.

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 area 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 project area management area.

13. GROUNDWATER MONITORING SYSTEM

13.1. Monitoring objectives

Monitoring, measuring, evaluating, and reporting are key components of the groundwater management programme. These actions are intended to identify and manage any unforeseen impacts on groundwater resources associated with exploration drilling activities. The key objectives of groundwater monitoring are to:

- To provide reliable groundwater data that can be used for management purposes.
- The early detection of changes in groundwater quality and quantity.
- Provide an on-going performance record on the efficiency of the Water Management Plan.
- Obtain information that can be used to redirect and refocus the Water Management Plan.
- Determine compliance with environmental laws, standards and the water use licence and other environmental authorizations.

This will ensure that management is timely warned of problems and unexpected impacts that might occur, and can be positioned to implement mitigation measures at an early stage.

13.2. Groundwater monitoring network

13.2.1. System response monitoring network

A comprehensive Water Management Plan is required to ensure that proposed activities do not result in unacceptable changes to groundwater quality or levels. This plan will also function as an early warning system, enabling the timely implementation of mitigation strategies to minimize potential impacts. To safeguard the groundwater environment, continuous

monitoring of both water quality and groundwater levels is necessary throughout the life of the project.

Monitoring is required for the following purposes:

- Timely detect actual impacts on groundwater quantity and quality.
- Address uncertainties identified in this report through field investigations that improve understanding of the aquifer system.

Monitoring should generally adopt a risk-based approach to identify and characterize the risks that mining activities and associated infrastructure may pose to the surrounding environment. Risk assessments involve understanding how a hazard is generated, the likelihood of its occurrence, and the potential consequences—capturing the full cause-and-effect cycle. A fundamental risk assessment framework includes three key components: the source of the risk (source term), the pathway it travels, and the receptor that is potentially affected. This method helps define the causal links between activities and environmental impacts.

The placement of monitoring boreholes should strategically cover:

- background conditions (upgradient of the source),
- conditions at the source,
- conditions downgradient from the source, and
- points along the pathway to the final receptor.

The primary aim of groundwater monitoring is to ensure minimal negative impacts on natural water resources. More broadly, it serves to verify that water management systems operate effectively, provide early detection of potential pollution, ensure regulatory compliance, and support environmental reporting. The preliminary monitoring program for the site plans for the proposed Mining right application are presented below. The recommended monitoring borehole/points are given below in Table 13-1 and Figure 13-1.

The management of the above potential impacts will include monitoring and recommending the following actions:

- The production boreholes should be installed with piezometer (dipper tube), flow meter and take off tap in the riser pipe for groundwater sampling.
- Groundwater levels can be measured within the well, and the pump programmed to shut off automatically if the water goes below the critical level.
- In-line meters: Specific conductivity can be monitored using an in-line conductivity meter installed in the discharge line, including features like an automated shut off if the electrical conductivity goes above 200-250 mS/m.
- The daily quantity of water taken from all production boreholes must be metered or gauged and the total recorded at the last day of each month.
- Water samples must be collected at both production boreholes on a quarterly basis and submitted to a SANAS accredited laboratory for analysis. The data, times, and monitoring point in respect of each sample taken shall be recorded together with the results of the analysis.

- Dedicated monitoring personnel need to ensure that all monitoring equipment are in working order and maintained to ensure the consistency of data collection which ultimately enables the efficient management of the groundwater resource.
- Record and track the water quality changes and water level data over time. It is recommended that a geohydrologist review the above information to ensure optimal groundwater abstraction and management control.
- Water metering is recommended to be installed to assists with detecting uncontrolled leaks.
- Should it become evident from the monitoring program that pollution of the groundwater or anomalous lowering in static water level occur, corrective and remedial actions should be implemented immediately.

Table 13-1: recommended monitoring points

SAMPLE ID	Latitude	Longitude
BH01	-24.518200°	27.384840°
BH02	-24.513683°	27.378774°
BH03	-24.503178°	27.385172°
BH04	-24.500135°	27.371524°
BH05	-24.506343°	27.401332°
BH06	-24.507790°	27.400861°
BH07	-24.500110°	27.409623°
BH08	-24.514518°	27.410315°
BH09	-24.514630°	27.409860°

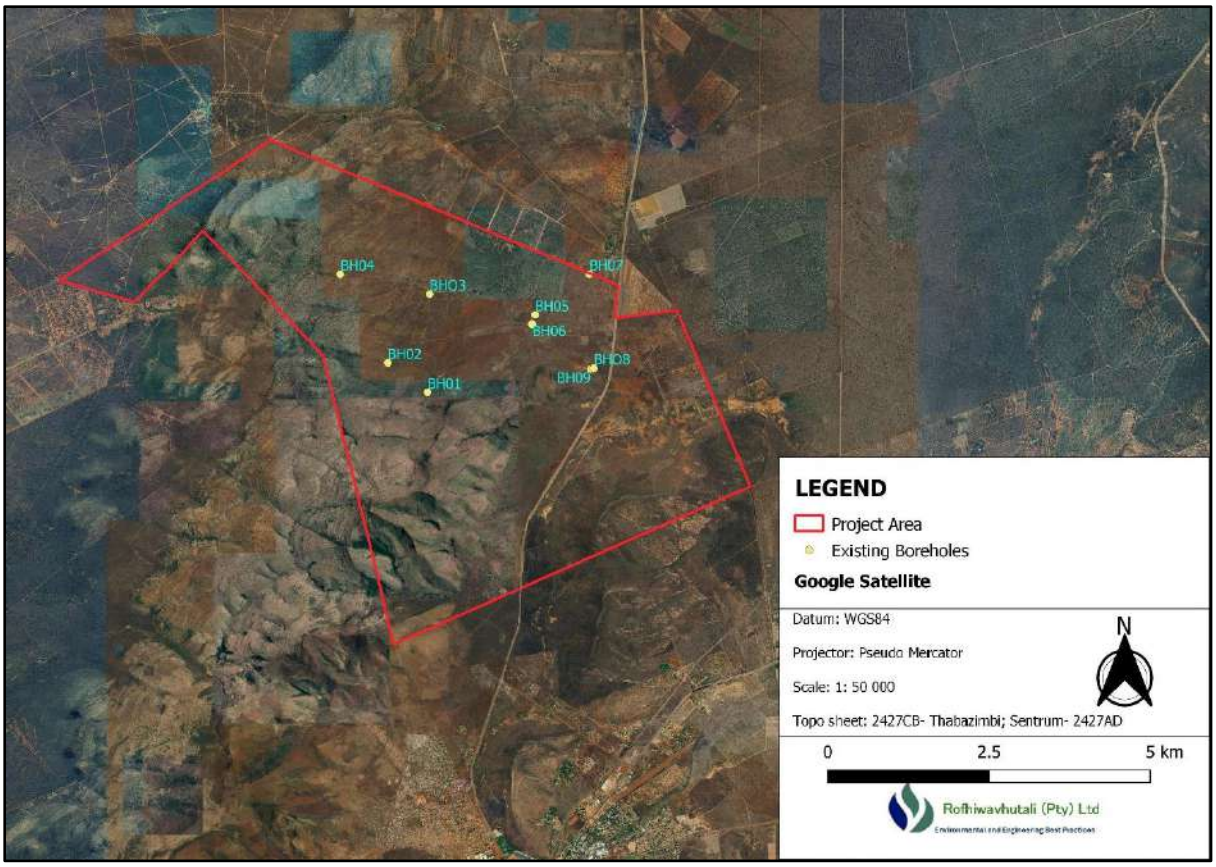

Figure 13-1: Existing Proposed Monitoring Boreholes

Groundwater level monitoring should be conducted monthly. This monitoring will serve as an early warning for groundwater level decline during the mining phase activities. The same water level may also serve as an early warning for rising groundwater levels after mine closure phase.

Water quality monitoring should be conducted quarterly for all boreholes. This data will serve as an early warning for groundwater pollution and other activities. Samples should be analysed for chemical and physical constituents normally associated with iron ore mining and processing.

13.2.2. Sampling Methods and Preservation

Required apparatus:

- Plastic bottles (1L)
- Glass bottles
- Dip meter
- Steel bailer
- Cooler box
- EC and Ph meter
- Marking pens

13.2.3. Methods and preservation

One litre plastic bottle with unlined plastic caps are 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 in order to maintain proper preservation thereof.

13.3. Monitoring parameters

The groundwater parameters should be monitored by a qualified Hydrogeological Specialist. As per minimum requirements the following variables should be monitored at minimum quarterly frequency:

- pH, EC
- TDS
- Total hardness
- Total alkalinity
- Turbidity
- Major cations including Ca, Mg, Na, K
- Major anions including Cl, SO4, T-Alk (HCO3-/CO3-)
- Minor cations/metals including Fe, Al, Mn, Ni, Cr, Cr6+, V, Si, F
- Nutrients including PO4-, NO3-, NH4+
- Groundwater levels

13.4. 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 in order to minimize groundwater contamination. Monitoring results may 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.

13.5. Reporting

Reporting on groundwater quality conditions will be included in the annual report. 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 right conditions. Laboratory results will be analysed against the target water quality guidelines for domestic use, the aquatic environment, livestock watering and irrigation (according to the South African National Standards for drinking water; SANS 241:2015). The strictest value between the target water quality objectives or objectives through a reserve determination will be used.

14. CONCLUSION AND RECOMMENDATIONS

- The Mining Right application area covers approximately 3 892 hectares and includes commodities such as diamonds (general), gold, platinum group metals, and associated minerals within the Thabazimbi Local Municipality, Limpopo Province.
- The project area is located within the Crocodile (West) and Marico Water Management Area, specifically within quaternary catchments A24H and A24J, which are characterised by moderate to low mean annual runoff and variable recharge conditions.
- From a hydrogeological perspective, the area is underlain by intergranular primary aquifers and fractured to karstified secondary aquifers associated with dolomitic formations of the Chuniespoort Group, which exhibit moderate to high groundwater storage and transmissivity.
- The aquifer system is classified as a minor aquifer with moderate yields (approximately 0.5–2.0 L/s), although localized high-yielding zones may occur within dolomitic karst formations.
- Groundwater quality within the study area is generally good, with physico-chemical parameters such as pH, electrical conductivity, total dissolved solids, and major ions falling within acceptable limits for domestic use, indicating minimal current anthropogenic impact.
- The vulnerability of the aquifer varies across the site, with localized areas classified as extreme vulnerability, particularly where shallow groundwater levels (<2 m) and highly fractured or karstified conditions occur, resulting in a high risk of rapid contaminant migration.
- Overall, the aquifer is considered to have a medium to high susceptibility to contamination due to the combined effects of aquifer vulnerability and the hydrogeological importance of the dolomitic units.
- The unsaturated zone, comprising fractured or weathered sandstone and overburden materials, exhibits a medium capacity to absorb contaminants and a medium capacity

to act as a barrier, with groundwater flow rates ranging between approximately 0.1 and 10 m/day.

- Bacteria and viruses are expected to undergo high reduction within the unsaturated zone, indicating relatively effective attenuation of biological contaminants.
- Nitrates, phosphates, and chlorides are expected to undergo minimal reduction, indicating a high potential for persistence and migration within the groundwater system.
- Hydrocarbons and other chemical contaminants are likely to experience minimal attenuation, highlighting the risk of subsurface mobility, particularly in areas with preferential flow paths.
- The unsaturated zone therefore acts as a fair barrier to biological contaminants, but provides limited protection against chemical contamination, particularly under conditions of rapid infiltration.
- The presence of fractures, joints, and solution cavities within the dolomitic aquifer creates preferential pathways that facilitate rapid groundwater flow and contaminant transport, reducing natural attenuation capacity.
- Potential groundwater impacts associated with the proposed mining activities include contamination from hydrocarbon spills, seepage from stockpiles and process areas, and infiltration of contaminated stormwater.
- With the implementation of appropriate mitigation measures, including strict hydrocarbon handling procedures, lined pollution-prone areas, and effective stormwater management systems, the risk of groundwater contamination can be significantly reduced.

RECOMMENDATIONS

To ensure continued protection of groundwater resources and compliance with geohydrological best practice, several measures are recommended.

- In terms of pollution prevention, all hydrocarbons such as diesel, oils, and lubricants must be stored in impermeable and watertight bunded areas capable of containing at least 110% of the stored volume.
- All machinery, generators, and refueling points should be positioned on hard standing surfaces to prevent spills from infiltrating the soil and aquifer.
- Report any significant spillage of chemicals, fuels etc. during the lifespan of the Mining activities to the Department of Water and Sanitation and other relevant authorities.
- Given the presence of dolomitic formations within the Chuniespoort Group and the associated karst features, it is recommended that a detailed dolomite stability investigation and geotechnical investigation be undertaken prior to mining infrastructure development to assess potential risks related to subsidence, sinkhole formation, and ground instability.
- Yield must be determined on all boreholes intended for operational use, and the results included in the WULA under Section 21(a) to quantify borehole capacity and determine appropriate abstraction rates.
- Spill kits must be available at all hydrocarbon storage and handling points, and any spillages must be cleaned immediately using suitable absorbent material and disposed of at licensed waste facilities.

- No sanitary convenience, fuel depots, reservoir, or depots for any substance which causes or is likely to cause pollution of a water resource may be located within the 1:50 year floodline of any watercourse.
- Effective stormwater management is essential, and the stormwater system must be maintained to prevent contaminated run-off from entering the soil profile or reaching nearby surface water bodies.
- No uncontrolled discharges resulting in pollution of the receiving environment and aquifer shall be permitted.
- Waste management must include strict segregation, secure storage, and regular removal of waste to prevent leachate generation. Hazardous waste, including oils, contaminated rags, and used filters, must be disposed of at licensed hazardous waste facilities, and all disposal certificates must be retained for audit purposes.
- Water seeping into filled levels on site must be prevented.
- Legal compliance must be maintained, and should any activity trigger a Section 21 water use under the National Water Act (Act 36 of 1998), a Water Use Licence (WUL) application must be submitted.
- Rehabilitation and closure planning should follow a progressive approach.
- Disturbed areas must be reshaped, re-soiled, stabilized, and vegetated to promote long-term land stability and reduce future infiltration or erosion risks.

15. REFERENCES

- Bosman, C., 2018. Groundwater Governance, s.l.: Carin Bosman Sustainable Solutions.
- Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, & South African National Biodiversity Institute. (2013). Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria.
- Department of Water Affairs and Forestry. (1999). South African Version 1.0 of Resource Directed Measures for Protection of Water Resources.
- Groundwater Management for Hygiene and Sanitation, 2011; IWSD, Physical and Quality Groundwater monitoring information for effective management, Harare June 2011.
- Lynch, S.D., Reynders, A.G. and Schulze, R.E., 1994: A DRASTIC approach to groundwater vulnerability mapping in South Africa. SA Jour. Sci., Vol. 93, pp 56 - 60.
- South African National Standards, 241: 2015 Drinking Water Standards.
- Vegter JR., 2003. hydrogeology of groundwater region 19 Lowveld., WRC Report No. TT 208/03
- Vearncombe, J.R., Barton, J.M. and Walsh, K.L., 1987. The Rooiwater Complex and associated rocks, Murchison granitoid-greenstone terrane, Kaapvaal Craton. South African Journal of Geology, 90, 361–377.
- Vearncombe, J.R., Barton, J.M., Cheshire, P.E., De Beer, J.H., Stettler, E.H., Brandl, G. (1992) Geology, geophysics and mineralization of Murchison Schist Belt, Rooiwater Complex and surrounding granitoids. Mem. Geol. Surv. S.Afr.18,139 pp
- Vegter, J., & Seymour, A. (2012). Aquifer Classification of South Africa. Hydrological Services.
- Vegter, JR; Seymour , AJ. (2013). Aquifer Vulnerability of South Africa. Hydrological Services.

Appendix: A

Data obtained from hydro census (NGA)

Latitude	Longitude	Elevation	Depth To Bottom	Discharge Rate	Electrical Conductivity	Ph Value	Water Level	Depth ToTop	Lithology	Formation
-24.5971	27.29024	900	999.99	N/A	64.2	N/A	N/A	N/A	N/A	N/A
-24.596	27.47306	1040	91.74	N/A	N/A	8.3	39.01	51.21	SOIL	N/A
-24.596	27.47305	1040	118.26	N/A	N/A	N/A	44.5	94.49	Sandstone	Sedimentary
-24.596	27.47304	1040	57.3	N/A	N/A	N/A	35.36	65.53	Boulders	Sedimentary
-24.596	27.47303	1040	122.22	N/A	N/A	N/A		53.04	Sandstone	Sedimentary
-24.596	27.47302	1040	65.53	N/A	N/A	N/A	45.72	36.58	SOIL	N/A
-24.594	27.33413	1080	999.99	N/A	N/A	N/A		122.22	Boulders	Sedimentary
-24.5932	27.33053	1020	999.99	N/A	69.9	N/A		54.86	Sandstone	Sedimentary
-24.5924	27.40802	980	19.62	N/A	N/A	8	8.97	48.77	Sandstone	Sedimentary
-24.5924	27.40802	980	19.15	N/A	80.4	N/A	8.96		Sandstone	Sedimentary
-24.5923	27.40802	980	22.98	N/A	N/A	8.1	8.97		N/A	N/A
-24.5923	27.40803	980	22.65	N/A	N/A	N/A	9.24		N/A	N/A
-24.5923	27.40804	980	22.3	N/A	N/A	N/A	9.27		N/A	N/A
-24.5923	27.40805	980	19.94	N/A	N/A	N/A	9.6		N/A	N/A
-24.5906	27.39462	970	28	N/A	N/A	N/A	9.62		N/A	N/A
-24.5892	27.4133	850	N/A	N/A	N/A	N/A	8.53		N/A	N/A
-24.589	27.39215	995	29	N/A	N/A	N/A	8.72		N/A	N/A

Latitude	Longitude	Elevation	Depth To Bottom	Discharge Rate	Electrical Conductivity	Ph Value	Water Level	Depth ToTop	Lithology	Formation
-24.5885	27.39439	970	81	N/A	N/A	N/A	8.73	23	N/A	N/A
-24.5864	27.41092	790	31	N/A	N/A	N/A	7.51		N/A	N/A
-24.5858	27.42836	990	28.1	N/A	N/A	N/A	7.51	44	N/A	N/A
-24.584	27.36163	1440	N/A	N/A	N/A	N/A	7.54	25	N/A	N/A
-24.584	27.3497	1340	48	N/A	N/A	N/A	7.64		N/A	N/A
-24.584	27.34969	1340	67	N/A	N/A	N/A	7.64	45	N/A	N/A
-24.5815	27.29691	960	67	N/A	N/A	N/A	7.67	100.58	N/A	N/A
-24.581	27.36108	1620	142.65	0.750 l/s	N/A	N/A	7.86	103.63	Dolomite	Sedimentary
-24.581	27.36108	1620	103.63	0.750 l/s	N/A	N/A	7.86	92.96	Quartzite	Metamorphic
-24.5791	27.41136	890	140.21	N/A	N/A	N/A	7.99		Diabase	Igneous
-24.564	27.29108	960	999.99	N/A	N/A	N/A	8.25	90	Boulders	Sedimentary
-24.5508	27.44979	1000	123	N/A	N/A	N/A	8.28	161	Shale	Sedimentary
-24.5508	27.44978	1000	7	N/A	N/A	N/A	8.34		Diabase	Igneous
-24.5508	27.44977	1000	12	N/A	116	N/A	8.31		Diabase	Igneous
-24.5508	27.44976	1000	161	0.010 l/s	N/A	7.6	8.4	38.1	N/A	N/A
-24.5507	27.44975	1000	N/A	N/A	N/A	N/A	8.44	25.6	SOIL	N/A
-24.5507	27.34974	1260	999.99	N/A	N/A	N/A	8.43	33.53	Dolomite	Sedimentary
-24.5507	27.44974	1000	102.11	N/A	N/A	N/A	8.46	27.43	SOIL	N/A
-24.5507	27.34973	1260	37.19	N/A	N/A	N/A	8.52		Dolomite	Sedimentary

Latitude	Longitude	Elevation	Depth To Bottom	Discharge Rate	Electrical Conductivity	Ph Value	Water Level	Depth ToTop	Lithology	Formation
-24.5507	27.44973	1000	49.38	N/A	N/A	N/A	8.47	36.58	N/A	N/A
-24.5507	27.34972	1260	42.98	N/A	N/A	N/A	8.47	36.58	N/A	N/A
-24.5507	27.44972	1000	42.98	N/A	N/A	N/A	8.4	34.44	Boulders	Sedimentary
-24.5507	27.34971	1260	47.4	N/A	N/A	N/A	8.23	30.48	Sandstone	Sedimentary
-24.5507	27.44971	1000	44.5	N/A	N/A	N/A	8.13	57.91	Boulders	Sedimentary
-24.5507	27.3497	1260	118.41	N/A	N/A	N/A	8.29	33.53	Sandstone	Sedimentary
-24.5507	27.4497	1000	33.53	N/A	N/A	N/A	8.31	77.72	Dolerite	Igneous
-24.5507	27.34969	1260	77.72	N/A	N/A	N/A	8.32	33.83	Sandstone	Sedimentary
-24.5507	27.44969	1000	48.16	6.400 l/s	N/A	N/A	8.43	91.74	Sandstone	Sedimentary
-24.5285	27.39969	1140	91.74	6.400 l/s	N/A	N/A	8.43	32	Boulders	Sedimentary
-24.5285	27.3997	1140	35.05	N/A	N/A	N/A	8.45	68	Shale	Sedimentary
-24.5257	27.31636	1000	75	N/A	N/A	N/A	8.5	26.82	Quartzite	Metamorphic
-24.5257	27.31637	1000	26.82	N/A	N/A	N/A	8.63	41	Norite	Igneous
-24.5257	27.31641	1000	42	N/A	N/A	N/A	8.63	100	SOIL	N/A
-24.5257	27.31642	1000	5.5	1.210 l/s	N/A	N/A	8.64	41.15	Sandstone	Sedimentary
-24.5202	27.43501	1040	120	N/A	N/A	N/A	8.72	55.78	Boulders	Sedimentary
-24.5202	27.435	1040	130	N/A	N/A	N/A	8.55	89.31	Shale	Sedimentary
-24.5182	27.3133	990	47.85	N/A	N/A	N/A	8.22		Norite	Igneous
-24.5174	27.3164	1000	58.22	N/A	N/A	N/A	8.07	91	Quartzite	Metamorphic

Latitude	Longitude	Elevation	Depth To Bottom	Discharge Rate	Electrical Conductivity	Ph Value	Water Level	Depth ToTop	Lithology	Formation
-24.5174	27.31639	1000	89.31	1.500 l/s	N/A	N/A	8.07	91	SOIL	N/A
-24.5174	27.31638	1000	9999.99	1.500 l/s	N/A	N/A	8.01	55.78	Shale	Sedimentary
-24.5174	27.31637	1000	91	N/A	N/A	N/A	8.07	55.78	Gravel	Sedimentary
-24.5174	27.31636	1000	91	N/A	N/A	N/A	8.15	120	Shale	Sedimentary
-24.5093	27.45808	1020	60.96	N/A	N/A	N/A	8.92	101	Sandstone	Sedimentary
-24.5093	27.45807	1020	55.78	N/A	N/A	N/A	8.93	106	Boulders	Sedimentary
-24.5093	27.45806	1020	140	N/A	N/A	N/A	8.93	147	Dolomite	Sedimentary
-24.5093	27.45805	1020	36	N/A	N/A	N/A	9.04	82	SOIL	
-24.5093	27.45804	1020	101	N/A	N/A	N/A	9.22	117	Sandstone	Sedimentary
-24.5093	27.45802	1020	106	N/A	N/A	N/A	9.42	92.05	Sandstone	Sedimentary
-24.5093	27.45803	1020	147	N/A	N/A	N/A	9.68	56.08	Clay	Sedimentary
-24.5022	27.4456	1040	82	N/A	N/A	N/A	9.65	49.38	Sandstone	Sedimentary
-24.5021	27.44559	1040	117	N/A	N/A	N/A	10.12	47.85	Boulders	Sedimentary
-24.5021	27.44558	1040	92.05	N/A	N/A	N/A	10.32	26.82	Dolomite	Sedimentary
-24.5021	27.44557	1040	65.53	N/A	N/A	N/A	10.38	38.4	Sandstone	Sedimentary
-24.5021	27.44556	1040	47.85	N/A	N/A	N/A	10.39	70.1	Sandstone	Sedimentary
-24.5021	27.44555	1040	26.82	N/A	N/A	N/A	10.56	61.57	Chalk	Sedimentary
-24.5021	27.44554	1040	46.02	N/A	N/A	N/A	10.82	92.05	Sandstone	Sedimentary
-24.5021	27.44553	1040	85.65	N/A	N/A	N/A	10.91	27.74	Sandstone	Sedimentary

Latitude	Longitude	Elevation	Depth To Bottom	Discharge Rate	Electrical Conductivity	Ph Value	Water Level	Depth ToTop	Lithology	Formation
-24.5021	27.44552	1040	61.57	6.400 l/s	N/A	N/A	11.17	36.58	Dolomite	Sedimentary
-24.5021	27.44553	1040	92.05	6.400 l/s	N/A	N/A	11.13	45.72	Dolomite	Sedimentary
-24.4898	27.37986	1140	27.74	N/A	N/A	N/A	11.28	54.86	SOIL	N/A
-24.4898	27.37985	1140	52.43	12.800 l/s	N/A	N/A	11.31	83	Granite	Igneous
-24.4898	27.37987	1140	62.48	12.800 l/s	N/A	N/A	11.16	56	Granite	Igneous
-24.4898	27.37988	1140	63.4	N/A	N/A	N/A	11.19	89	Granite	Igneous
-24.4898	27.37987	1140	30.2	N/A	N/A	N/A	10.62	109	Sandstone	Sedimentary
-24.4898	27.37987	1140	96	N/A	N/A	N/A	9.91	91	Sandstone	Sedimentary
-24.4898	27.37988	1140	145	N/A	N/A	N/A	9.25	51.82	SOIL	N/A
-24.4898	27.37988	1140	30	N/A	N/A	N/A	9.95	67.06	Sandstone	Sedimentary
-24.4897	27.37985	1140	24	N/A	N/A	N/A	10.05	45.72	Sandstone	Sedimentary
-24.4897	27.37986	1140	97	N/A	N/A	N/A	10.22	150	SOIL	N/A
-24.4897	27.37987	1140	109	N/A	N/A	N/A	10.41	10.36	Quartzite	Metamorphic
-24.4897	27.37985	1140	91	N/A	N/A	N/A	10.61	42.67	Quartzite	Metamorphic
-24.4897	27.37985	1140	76.96	N/A	N/A	N/A	10.8	67.06	Quartzite	Metamorphic
-24.4897	27.37986	1140	114.3	N/A	N/A	N/A	10.97	62.48	N/A	N/A
-24.4897	27.37986	1140	45.72	N/A	N/A	N/A	11.08	54.86	Dolomite	Sedimentary
-24.4897	27.37986	1140	150	N/A	N/A	N/A	11.24	76.5	Dolomite	Sedimentary
-24.4896	27.37552	1160	10.36	N/A	N/A	N/A	11.32	80.47	SOIL	N/A

Latitude	Longitude	Elevation	Depth To Bottom	Discharge Rate	Electrical Conductivity	Ph Value	Water Level	Depth ToTop	Lithology	Formation
-24.484	27.36639	1260	83.82	N/A	N/A	N/A	11.1	106.98	Dolomite	Sedimentary
-24.484	27.36637	1260	100.89	N/A	N/A	N/A	10.49	76.5	Sandstone	Sedimentary
-24.484	27.36637	1260	72.39	N/A	N/A	N/A	9.86	110	Diabase	Igneous
-24.484	27.36636	1260	76.5	N/A	N/A	N/A	9.49	45.72	Diabase	Igneous
-24.4817	27.37985	1180	80.47	N/A	N/A	N/A	9.22	61.26	SOIL	
-24.4666	27.34424	1040	106.98	N/A	N/A	N/A	9.09	115	Gravel	Sedimentary
-24.4666	27.34423	1040	76.5	N/A	N/A	N/A	9.06	36.58	Diabase	Igneous
-24.4666	27.34422	1040	110	N/A	N/A	N/A	8.93	130	SOIL	
-24.4666	27.34421	1040	106.98	N/A	N/A	N/A	8.71	110	Sandstone	Sedimentary
-24.4666	27.3442	1040	61.26	N/A	N/A	N/A	9.1	62.48	SOIL	
-24.4666	27.34419	1040	115	N/A	N/A	N/A	9.16	36.58	Diabase	Igneous
-24.4666	27.34418	1040	51.82	N/A	N/A	N/A	8.79	130	Sandstone	Sedimentary
-24.4666	27.34417	1040	130	N/A	N/A	N/A	8.81	57.91	Sandstone	Sedimentary
-24.4665	27.34416	1040	110	N/A	N/A	N/A	9.08	62.79	SOIL	
-24.4665	27.34415	1040	62.48	N/A	N/A	N/A	8.82	44.2	Sandstone	Sedimentary
-24.4665	27.34414	1040	71.63	N/A	N/A	N/A	9	93.27	Diabase	Igneous
-24.4665	27.34413	1040	130	N/A	N/A	N/A	9.27	35.36	SOIL	
-24.4508	27.43318	1080	70.26	N/A	N/A	N/A	9.14	82.3	Sandstone	Sedimentary
-24.4508	27.43317	1080	72.54	N/A	N/A	N/A	9.46	76.2	Sandstone	Sedimentary

Latitude	Longitude	Elevation	Depth To Bottom	Discharge Rate	Electrical Conductivity	Ph Value	Water Level	Depth ToTop	Lithology	Formation
-24.4508	27.43316	1080	58.52	N/A	N/A	N/A	9.59	86.56	SOIL	
-24.4508	27.43315	1080	93.27	N/A	N/A	N/A	9.82	83.82	Sandstone	Sedimentary
-24.4508	27.43314	1080	35.36	N/A	N/A	N/A	9.94	50.29	Sandstone	Sedimentary
-24.4508	27.43313	1080	103.33	N/A	N/A	N/A	9.94	86.87	SOIL	N/A
-24.4508	27.43312	1080	86.56	N/A	N/A	N/A	10.13	55.78	Diabase	Igneous
-24.4508	27.43311	1080	83.82	N/A	N/A	N/A	10.29	120	SOIL	N/A
-24.4508	27.4331	1080	76.66	N/A	N/A	N/A	10.41	53.64	Sandstone	Sedimentary
-24.4508	27.43309	1080	95.25	N/A	N/A	N/A	10.52	49.99	Diabase	Igneous
-24.4507	27.43308	1080	92.66	N/A	N/A	N/A	10.73	94	Diabase	Igneous
-24.4507	27.43307	1080	120	N/A	N/A	N/A	10.9	65	Limestone	Sedimentary
-24.4507	27.43306	1080	66.75	N/A	N/A	N/A	10.97	68	Diabase	Igneous
-24.4507	27.43305	1080	94	N/A	N/A	N/A	11.08	62	Diabase	Igneous
-24.4507	27.43305	1080	109	N/A	N/A	N/A	11.2	97	Quartzite	Metamorphic
-24.4507	27.43304	1080	89	N/A	N/A	N/A	11.23	15.09	Dolomite	Sedimentary
-24.4507	27.43304	1080	62	N/A	N/A	N/A	11.09	96.32	Chalk	Sedimentary
-24.4507	27.43303	1080	97	N/A	N/A	N/A	11.35	51.82	Sandstone	Sedimentary
-24.4507	27.43303	1080	15.09	N/A	N/A	N/A	11.66	54.68	Chalk	Sedimentary
-24.4507	27.43302	1080	96.32	N/A	N/A	N/A	11.54	85.34	Sandstone	Sedimentary
-24.4507	27.43302	1080	64.62	N/A	N/A	N/A	11.63	76.2	SOIL	N/A

Latitude	Longitude	Elevation	Depth To Bottom	Discharge Rate	Electrical Conductivity	Ph Value	Water Level	Depth ToTop	Lithology	Formation
-24.4476	27.39135	1140	54.86	N/A	N/A	N/A	10.96	39.62	Diabase	Igneous
-24.4476	27.39136	1140	92.96	N/A	N/A	N/A	10.15	44.2	SOIL	N/A
-24.4174	27.38302	1080	48.16	N/A	N/A	N/A	9.59	49.38	Sandstone	Sedimentary
-24.4174	27.38303	1080	49.38	N/A	N/A	N/A	9.31	101	Diabase	Igneous
-24.4115	27.44415	1060	104	N/A	N/A	N/A	9.09	44.2	Sandstone	Sedimentary
-24.4115	27.44414	1060	84.2	N/A	N/A	N/A	9.13	26.52	Diabase	Igneous
-24.4115	27.44413	1060	38.4	N/A	N/A	N/A	9.16	21.95	SOIL	

Appendix: B

WATERLAB (Pty) Ltd
Reg. No.: 1983/009165/07 V.A.T. No.: 4130107891
23B De Havilland Crescent
Persequor Techno Park
Meiring Naudé Drive
Pretoria
P.O. Box 283, Persequor Park, 0020
Tel: +2712 - 349 - 1066
Fax: +2786 - 654 - 2570
e-mail: admin@waterlab.co.za
T0391

CERTIFICATE OF ANALYSES

GENERAL WATER QUALITY PARAMETERS

Date received: 2026-03-16 **Date completed:** 2026-03-24
Project number: 1000 **Report number:** 153689 **Order number:**

Client name: Rofhiwavhutali Pty Ltd **Contact person:** Mr. M. Guduvheni
Address: P.O Box 6035, Thohoyandou, 0960 **e-mail:** info@rofhiwavhutali.co.za; mutali@rofh
Telephone: 076 176 0655 **Facsimile:** **Mobile:** 076 176 0655

Analyses in mg/ℓ (Unless specified otherwise)		UOM %	Method ID	Risk	SANS 241 : 2015 Limits	Sample Identification	
						BH01	BH06
Sample Number						26-01819	26-01820
Date/Time Sampled						N/A	N/A
pH - Value @ 25 °C	A	7.7	WLAB065	Operational	≥5 to ≤ 9.7	8.1	8.7
Electrical Conductivity in mS/m @ 25°C	A	7.0	WLAB065	Aesthetic	≤170	65.1	70.0
Total Dissolved Solids @ 180°C	A	5.6	WLAB003	Aesthetic	≤1200	414	424
Colour in PtCo Units	A	---	WLAB006	Aesthetic	≤15	13	7
Turbidity in N.T.U	A	7.6	WLAB005	Operational/Aest	≤1 / ≤5	2.0↓	3.3↓
Total Alkalinity as $CaCO_3$	A	10	WLAB007	---	---	356	388
Langelier Index at 25°C	A	---	WLAB053	---	---	0.2	1.0
Chloride as Cl	A	8.0	WLAB046	Aesthetic	≤300	16	18
Sulphate as SO_4	A	8.4	WLAB046	Acute health/Aest	≤500 / ≤250	16	27
Fluoride as F	A	6.7	WLAB014	Chronic health	≤1.5	0.2	0.4
Nitrate as N	A	4.8	WLAB046	Acute health	≤11	<0.1	<0.1
Nitrite as N	A	3.0	WLAB046	Acute health	≤0.9	<0.05	<0.05
Combined Nitrate & Nitrite	A	---	WLAB046	Acute health	≤1	<0.1	<0.1
Silica as SiO_2	N	---	WLAB046	---	---	19.9	34
Total Organic Carbon as C	A	---	WLAB060	Chronic health	≤10	23↓	13↓
E. coli (MPN/100 ml)	A	5.0	WLAB021	Acute health	Not detected	14↓	<1
Free and Saline Ammonia as N	A	10	WLAB046	Aesthetic	≤1.5	0.8	0.1
Sodium as Na	A	8.3	WLAB015	Aesthetic	≤200	10	13
Potassium as K	A	7.9	WLAB015	---	---	4.0	4.7
Calcium as Ca	A	9.5	WLAB015	---	---	13	19
Magnesium as Mg	A	9.5	WLAB015	---	---	78	80
Aluminium as Al (µg/ℓ)	A	8.1	WLAB015	Operational	≤300	<100	<100
Antimony as Sb (µg/ℓ)	A	9.4	WLAB050	Chronic health	≤20	<1	<1
Arsenic as As (µg/ℓ)	A	9.6	WLAB050	Chronic health	≤10	<1	8
Barium as Ba (µg/ℓ)	A	9.4	WLAB015	Chronic health	≤700	<25	28
Boron as B (µg/ℓ)	A	9.7	WLAB015	Chronic health	≤2400	<25	<25
Cadmium as Cd (µg/ℓ)	A	8.5	WLAB050	Chronic health	≤3	<1	<1

J. Ngobeza - Chemical Technical Signatory

M. Nkambule - Microbiological Technical Signatory

Start date of analysis: 2026/03/16 Date of Issue: 2026/03/24

A = Accredited N = Not Accredited S = Subcontracted UoM=Uncertainty Of Measurement ↑ = Lower Limit exceeded ↓ = Upper Limit exceeded
Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Scope of Accreditation for this Laboratory.
Results marked "Subcontracted Test" in this report are not included in the SANAS Scope of Accreditation for this Laboratory.

Sample condition acceptable unless specified on the report.
Microbiological standards dictate that zero cannot be reported in cases where no growth is observed. The requirement is to then report as <1cfu/g or ml. A result of <1 implies the absence of the specific test organism and is the lowest reportable result where no growth was detected.

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Bact. analyses analysed on: 2026-03-16 Sampled by: Client Page 1 of 2

WATERLAB (Pty) Ltd
Reg. No.: 1983/009165/07 V.A.T. No.: 4130107891
23B De Havilland Crescent
Persequor Techno Park
Meiring Naudé Drive
Pretoria
P.O. Box 283, Persequor Park, 0020
Tel: +2712 - 349 - 1066
Fax: +2786 - 654 - 2570
e-mail: admin@waterlab.co.za

T0391

CERTIFICATE OF ANALYSES

GENERAL WATER QUALITY PARAMETERS

Date received: 2026-03-16 **Date completed:** 2026-03-24
Project number: 1000 **Report number:** 153689 **Order number:**

Client name: Rofhiwavhutali Pty Ltd **Contact person:** Mr. M. Guduvheni
Address: P.O Box 6035, Thohoyandou, 0960 **e-mail:** info@rofhiwavhutali.co.za; mutali@rofh
Telephone: 076 176 0655 **Facsimile:** **Mobile:** 076 176 0655

Analyses in mg/ℓ (Unless specified otherwise)		UOM %	Method ID	Risk	SANS 241 : 2015 Limits	Sample Identification	
						BH01	BH06
Sample Number						26-01819	26-01820
Date/Time Sampled						N/A	N/A
Total Chromium as Cr (µg/ℓ)	A	7.8	WLAB015	Chronic health	≤50	<25	<25
Copper as Cu (µg/ℓ)	A	7.7	WLAB015	Chronic health	≤2000	<10	<10
Iron as Fe (µg/ℓ)	A	8.1	WLAB015	Chronic health/Aest	≤ 2000 / ≤300	<25	27
Lead as Pb (µg/ℓ)	A	9.7	WLAB050	Chronic health	≤10	<1	<1
Manganese as Mn (µg/ℓ)	A	8.3	WLAB015	Chronic health/Aest	≤ 400 / ≤100	28	64
Mercury as Hg (µg/ℓ)	A	16	WLAB050	Chronic health	≤6	<1	<1
Nickel as Ni (µg/ℓ)	A	7.7	WLAB015	Chronic health	≤70	<25	<25
Selenium as Se (µg/ℓ)	A	9.4	WLAB050	Chronic health	≤40	1	<1
Uranium as U (µg/ℓ)	A	8.5	WLAB050	Chronic health	≤ 30	<1	1
Zinc as Zn	A	8.0	WLAB015	Aesthetic	≤5	<0.025	<0.025
% Anion-Cation Balance	N	---	---	---	---	98.4	98.4

J. Ngobeza - Chemical Technical Signatory

M. Nkambule - Microbiological Technical Signatory

Start date of analysis: 2026/03/16 Date of Issue: 2026/03/24

A = Accredited N = Not Accredited S = Subcontracted UoM=Uncertainty Of Measurement ↑ = Lower Limit exceeded ↓ = Upper Limit exceeded
Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Scope of Accreditation for this Laboratory.
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Sample condition acceptable unless specified on the report.
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Bact. analyses analysed on: 2026-03-16 Sampled by: Client

Page 2 of 2

PALAEONTOLOGICAL IMPACT ASSESSMENT

PREPARED BY:

Rofhiwavhutali (Pty) Ltd
Environmental and Engineering Best Practices

Contact Person: Mutali Guduvheni
Contact Number: 076 176 0655
Email: admin@rofhiwavhutali.co.za
Website: www.rofhiwavhutali.co.za

PREPARED FOR:

ARENGO 297
WE BUILD TO GIVE BACK

DMRE Ref No: LP 30/5/1/2/3/2/1 10287 MR

NAME OF THE APPLICANT: ARENGO 297 (PTY) LTD

MINING RIGHT APPLICATION FOR DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE, IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE., IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.

2026

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DOCUMENT TRACKING

Project Name	Palaeontological Impact Assessment for the application of the mining right application for diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore, in respect of portions RE/2/313, RE3/313, and RE/4/313 of the Farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province.	
DMRE Ref No	LP 30/5/1/2/3/2/1 10287 MR	
Client Details	ARENGO 297 (PTY) LTD	
		Signature
Primary author	Dr. Nonhlanhla Vilakazi	
VERSION	V1	
CONTACT	admin@rofhiwavhutali.co.za	+27 76 176 0655
Date	23 March 2026	

DECLARATION INDEPENDENCE

I, **Dr Nonhlanhla Vilakazi,** declare that –

- I act as the independent specialist in this matter;
- I do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014 (as amended in 2017);
- I performed the work relating to the application in an objective manner, even if it results in views and findings that are not favourable to the applicant;
- I declare that there were no circumstances that compromised my objectivity in performing such work;
- I have expertise in conducting the specialist assessment relevant to this application, including knowledge of the National Environmental Management Act (Act 107 of 1998) (NEMA), regulations and any guidelines that have relevance to the proposed activity;
- I comply with the NEMA Act, regulations and all other applicable legislation; and
- I disclosed to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct.
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B (1) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature:

Expertise of Specialist

The Palaeontologist Consultant: Dr Nonhlanhla Nonny Vilakazi Qualifications: PhD (Wits University) 2015

Experience: 10 years of research and lecturing in Palaeontology

16 years PIA studies.

Executive Summary

A Palaeontological Impact Assessment was requested for the mining right application in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, Limpopo Province. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a Phase 1 Palaeontological Impact Assessment (PIA) was completed for the proposed development.

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Requirements of Appendix 6 – Government Notice (GN) R326 EIA Regulations of 7 April 2017	**Relevant section in report**	**Comment where not applicable.**
1.(1) (a) (i) Details of the specialist who prepared the report	Section 2 of Report – Contact details	-
(ii) The expertise of that person to compile a specialist report including a curriculum vitae	Section 2 appendix B	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Section 1	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 7 – Methods and Terms of Reference	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 8 – Geological and Palaeontological history	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 9	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Not Applicable	-
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Sections 7, 8 and 9 Approach and Methodology	-
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Sections 9 and 10	-
Requirements of Appendix 6 – Government Notice (GN) R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
(g) An identification of any areas to be avoided, including buffers	Not Applicable	-

Requirements of Appendix 6 – Government Notice (GN) R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 8 – Geological and Palaeontological history	-
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Not Applicable	-
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Sections 10,11, 12	-
(k) Any mitigation measures for inclusion in the EMPr	Not applicable	-
(l) Any conditions for inclusion in the environmental authorisation	Not applicable	
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Not applicable	-
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 and 13	-
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		-
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be Authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 3 and 12	-

1. BACKGROUND

Rofhiwavhutali (Pty) Ltd was appointed by Vahlengwe Mining Advisory and Consulting to revise a Phase 1 Palaeontological Impact Assessment (PIA) to assess the potential palaeontological impacts of mining for diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore, in respect of portions RE/2/313, RE3/313, and RE/4/313 of the Farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province.

The survey was conducted in accordance with the SAHRA Minimum Standards for the Archaeology and Paleontology Study. The minimum standards clearly specify the required contents of the report of this nature. The study aimed to identify and document any palaeontological resources that may be affected by the proposed development, these will in turn assist the developer in ensuring proper conservation measures in line with the National Heritage Resource Act, 1999 (Act 25 of 1999).

2. SITE DESCRIPTION

2.1. Site Locality

Arengo 297 (Pty) Ltd intends to conduct mining operations involving portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ, as well as the remaining extent of portions 2, 5, 8, 9, 10, and 11 of Koedoevlei 128 KQ, situated within the Thabazimbi Local Municipality of the Waterberg District Municipality. This area encompasses 3,892.0 hectares. The project involves the application for mining rights for the extraction of diamonds (general), gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore.

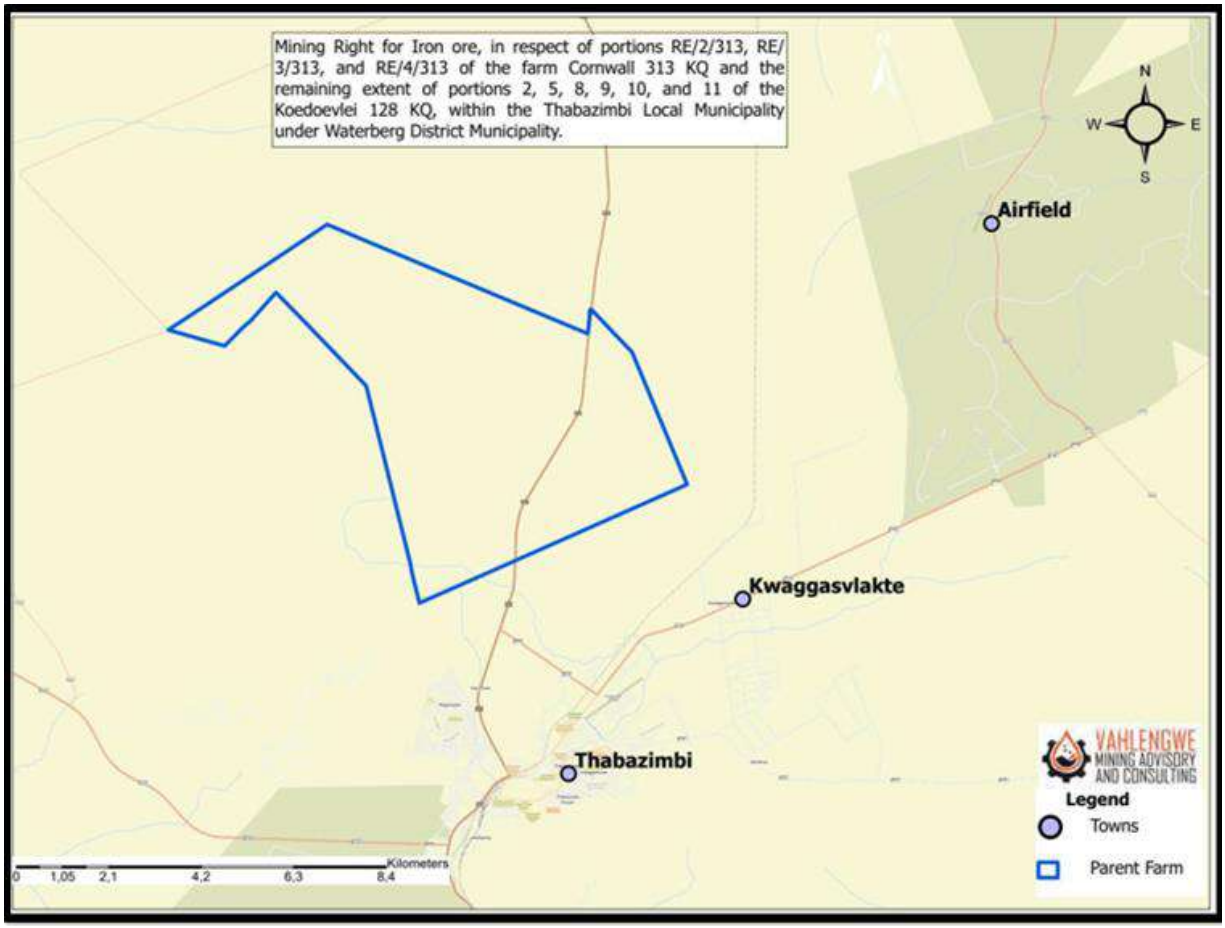

Figure 2-1: Locality map for the proposed mining right area.

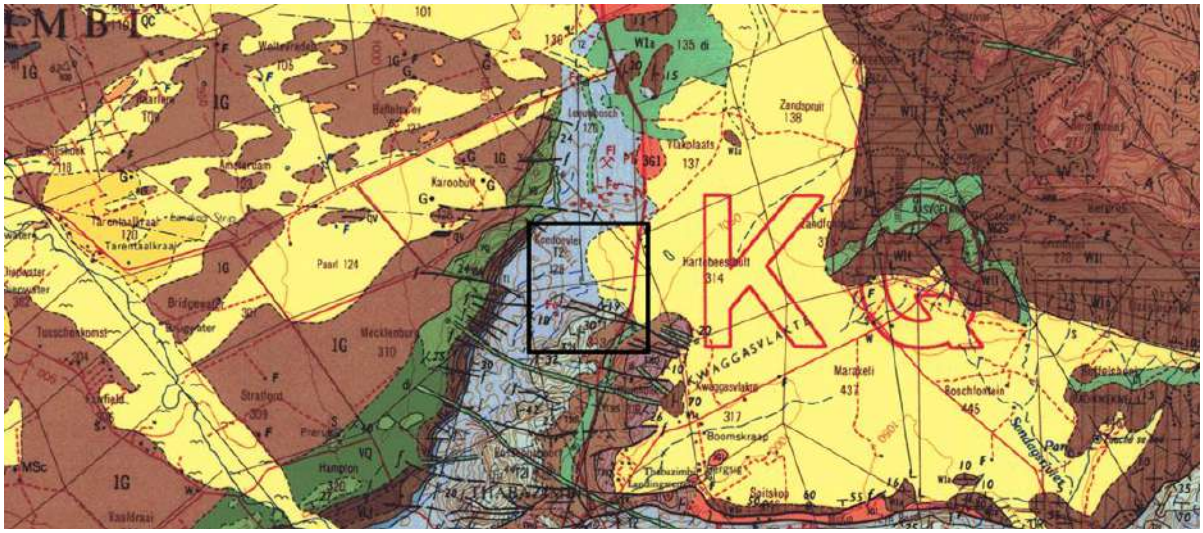

Figure 2-2: Geological map of the Arengo 297 (Pty) Ltd's proposed mine indicated by a black rectangle. Map enlarged from the Thabazimbi 2426 Geological Survey 1: 250 000 1974oogle earth view of the site proposed for the development.

3. Legislative Framework

a. Constitution of the Republic of South Africa, Act 108 of 1996

Section (24) establishes the right of everyone to an environment not harmful to their health or well-being and to a protected environment for the benefit of present and future generations.

b. National Environmental Management Act No. 107 of 1998

Everyone has the right to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that—

i. prevent pollution and ecological degradation;
ii. promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development

c. National Heritage Resources Act, No. 25 Of 1999

This Act provides for the preservation of heritage resources that are places or objects of cultural importance according to the law, including places or objects of aesthetic, architectural, geographical, scientific, social, spiritual, linguistic and technological value. Permits are required for the disturbance, demolition or destruction of any heritage site, archaeological site or paleontological site, burial site, grave or public monument or memorial that may be found during the construction process. The Act sets out what is defined as a cultural heritage resource, the criteria for determining its importance, and lists specific activities that may require specialist study of cultural heritage. In this context, the categories of developments listed in Section 38 (1) of the NHR Act are:

- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site;
- Exceeding 5000 m² in extent;
- Involving three or more existing erven or subdivisions thereof;
- Involving three or more subdivisions thereof which have been consolidated within the past five years;

Costs of which will exceed a sum set in terms of regulations by the South African Heritage Resources Agency (SAHRA).

- The rezoning of a site exceeding 10 000 m²
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

All excavation related activities are to be stopped if any objects exposed during this activity, in addition, the archaeologist must be called to the site for inspection and potential rescue. Under no conditions will any item be damaged or removed without the permission of the South African Heritage Resources Agency.

4. Assessment Methodology (In compliance with the NHRA ACT NO. 25 OF 1999) AND SAHRA GUIDELINES

- Identify, map & provide background to heritage finds/localities within the vicinity of the affected area via desktop assessment.
- Provide an assessment, with Field Rating criteria, of the significance of heritage resources in the region via desktop assessment.
- Identify and map all possible heritage finds/localities within the affected area / footprint via pedestrian survey.
- Provide an assessment with Field Rating criteria, of the potential impact by the development on heritage resources within the affected area.
- Provide appropriate mitigation measures and recommendations for heritage resources identified within the area of impact, including providing of identification training workshop to ECO's, chance find protocols and monitoring procedures.

5. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.

The methods employed to address the ToR included:

a. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources included records housed at the University of Cape Town and SAHRA database;
b. Where necessary, site visits by a qualified paleontologist to locate any fossils and assess their importance.
c. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (not applicable to this assessment); and
d. Determination of fossils' representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (not applicable to this assessment).

6. Geology and Palaeontology

6.1. Geological context

The stratigraphic framework of the Thabazimbi region comprises Neoarchaean to Mesoproterozoic supracrustal rocks, including the 2.58 to 2.06 Ga Transvaal Supergroup (TSG) of the Transvaal basin (Eriksson et al., 1995; Altermann and Nelson, 1998), the 2.061 Ga Bushveld Igneous Province (Walraven et al., 1990; Zeh et al., 2016), and the 2.054 to 1.87 Ga Waterberg Group (Du Plessis and Clendenin, 1988; Netshiozwi, 2002; Dorland et al., 2006). The stratigraphic sequence of the Transvaal Supergroup in the Thabazimbi region

includes the Black Reef Formation, dated at 2642.2 ± 2.3 Ma (U-Pb zircon ages; Walraven and Martini, 1995), the Chuniespoort Group at 2587 ± 49 Ma, and the Pretoria Group, ranging from 2.35 to 2.06 Ga (Walraven and Martini, 1995; Eriksson and Reczko, 1995; Zeh et al., 2016). The Pretoria Group is altered by the igneous rocks of the Bushveld Igneous Province, with an estimated age of 2.061 billion years (Dorland et al., 2006). The 2.054 – 1.87 Ga (U – Pb dating on zircons from the porphyritic lava of the Rust de Winter and Lower Swaershoek Formation, Waterberg unconformity-bounded sequence (WUBS I): Dorland et al., 2006) Waterberg Group sedimentary rocks are deposited unconformably atop the Transvaal strata, the Bushveld igneous rocks, and the 3.0 to 2.8 Ga Archaean gneisses and granites of the Kaapvaal craton (Zeh et al., 2016). The deposition of the Waterberg Group signifies a crucial phase in Earth's evolution, during which free atmospheric oxygen became accessible, facilitating the formation of extensive terrestrial red beds for the first time in Earth's history (Bumby, 2000; Barker et al., 2006). The region under concern is part of the Chuniespoort Group, which will be succinctly addressed below.

6.1.1. The Chuniespoort Group

The 2587 ± 49 Ma chemical facies of the Chuniespoort Group conformably overlie the Black Reef Formation (Walraven and Martini, 1995; Martin et al., 1998; Altermann and Nelson, 1998). The assemblage comprises carbonate rocks from the Malmani Subgroup, the 2480 ± 6 Ma Banded Iron Formation (BIFs) of the Penge Formation (Walraven and Martini, 1995), and the siliciclastic rocks of the Duitschland Formation (Eriksson et al., 2001; Bumby et al., 2012; Möller et al., 2014). The Malmani Subgroup is distinguished by stromatolitic carbonates that exhibit elevated chert concentration in certain areas. The Malmani Subgroup is categorized into five formations: Oaktree Formation, Monte Christo Formation, Lyttelton Formation, Eccles Formation, and Frisco Formation, based on chert concentration and stromatolite morphology (Eriksson and Altermann, 1998). The carbonate facies of the Malmani Subgroup are seen as a component of a more extensive carbonate platform retained inside the Transvaal structural basin of the Kaapvaal craton. The Penge iron formation, which has a conformable gradational contact, overlies the Malmani Subgroup and is locally faulted (Eriksson et al., 2001; Frauenstein et al., 2009). The Banded Iron Formation (BIF) of the Penge Formation consists of rhythmically stratified iron oxides (hematite, magnetite, goethite), iron silicates such as stilpnomelane, minnesotaite, and siderite, all embedded within a chert matrix, interspersed with shale layers in varying amounts (Möller et al., 2014). This particular region is located inside the Penge Formation (to be elaborated upon subsequently).

6.1.2. Penge Formation

The Penge Iron Formation is located inside the contact metamorphic aureole of the Bushveld Complex. The Penge Iron Formation has significant variation in thickness because to bending and erosion that occurred prior to the deposition of the Pretoria Group (Schwellnus et al., 1962; Button, 1973). Cilliers (1964) documented a thickness of 74 m for this succession at Kromellenboog and 178 m at Penge, omitting diabase sills. Beukes (1983) asserts that the Penge Iron Formation is stratigraphically analogous to the crocidolite-bearing Asbesheuwels Subgroup, which includes the Kuruman and Griquatown Iron Formations in Griqualand West. The Asbesheuwel Subgroup is approximately 2450 million years old (Trendall et al., 1990). The diagenetic to extremely low-grade mineral assemblages of the Asbesheuwels Subgroup

are well-documented (Beukes, 1983; Miyano & Beukes, 1984) and may serve as a basis for comparison with the thermally metamorphosed Penge Iron Formation. The black shales of the Penge Iron Formation mostly consist of biotite, chlorite, and kerogen, with significant quantities of sulphides (predominantly pyrrhotite) and manganese-rich garnet in specific areas. Biotite–grunerite hornfels is characterized by either a black, carbonaceous hue or a green coloration, and it is locally extremely magnetic. Banded hornfels have notable chert mesobands. Significant mineable amosite reefs are present in certain carbonaceous biotite grunerite hornfelses (Beukes & Dreyer, 1986).

6.2. Palaeontological context

Fossils in the Chuniespoort Group are infrequent owing to their Precambrian age; however, certain rocks exhibit features such as stromatolites, which are stratified sedimentary formations produced by cyanobacteria. These provide as proof of primordial existence in shallow marine ecosystems. Additional formations have produced certain fossilized flora (Wilkins et al., 1987).

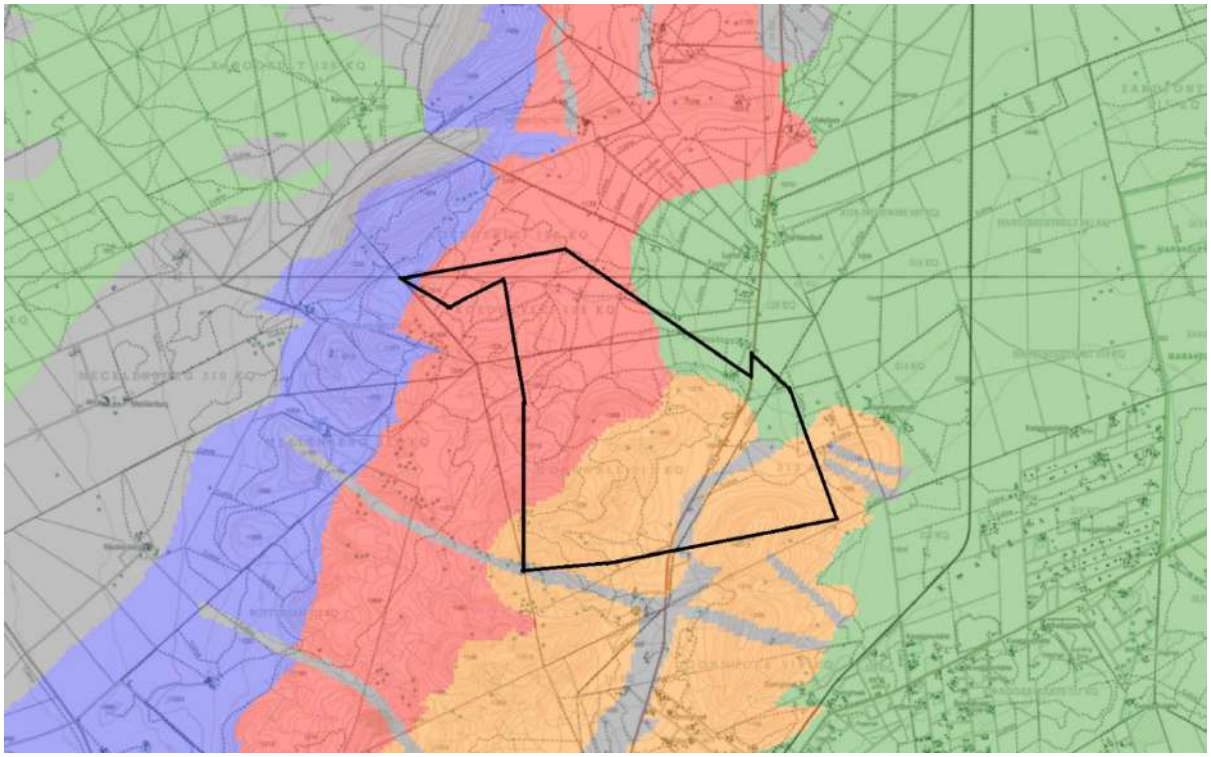

Figure 6-1: A Palaeo-Sensitivity Map of proposed mine. The area is on the red and yellow portions, signifying its sensitivity as very high (where the proposed area of mining is marked by the black polygon).

7. Impact assessment

An assessment of the potential impacts on possible palaeontological resources considers the criteria encapsulated in Table 7-1:

Table 7-1 (a): Criteria for assessing Impacts

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	**H**	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

Table 7-2 (b): Impact Assessment

PART B: Assessment		
SEVERITY/	**H**	-
	M	-
	L	Soils do not preserve fossils; however, these might be exposed during excavation. This will result in medium impact.
	L+	-

NATURE	**M+**	-
	H+	-
DURATION	**L**	-
	M	-
	H	Where manifest, the impact will be permanent.
PART B: Assessment		
SPATIAL SCALE	**L**	Since the only possible fossils within the area would be fossil fauna and flora in the Chuniespoort Group, the spatial scale will be localized within the site boundary.
	M	-
	H	-
PROBABILITY	**H**	-
	M	It is extremely unlikely that any fossils would be found in the loose soils and sands that cover the area or in the overlying sandstones. There is a chance that the sediments from the Chuniespoort Group might have fossil fauna but, a Fossil Chance Find Protocol should be added to the eventual EMPr.
	L	

8. Site Overview

Figure 8-1 to Figure 8-6: Photos showing the site in question. Red sediment is visible in some of the photos as the area is highly vegetated. It should be noted that no fossils were found in the area during the site visit.

Figure 8-1: Photo showing the general overview of the area. it is highly vegetated

Figure 8-2: Photo Showing the vegetation and red mudstone. This is typical of the area.

Figure 8-3: Photo showing the area earmarked for mining. it is covered with vegetation.

Figure 8-4: Mining Activities are said to span over to the mountain shown in the photo above.

Figure 8-5: Photo showing a mix of dolomite with some shale just outside the farm

Figure 8-6: Photo showing pockets of bare land.

9. Assumptions and uncertainties

It is assumed that the fossil potential of a formation within the study area will mirror that of the region and, in particular, correspond to what has been previously documented in the study area. This unit is anticipated to contain intermittent fossil relics, including stromatolites and fossilized flora. The Penge Iron Formation typically lacks associated fossils; however, adjacent formations contain some. The material is anticipated to be infrequently distributed among different layers, and the success of recovery is primarily contingent upon the identification of this material as it emerges during excavation or drilling, necessitating careful supervision of the digging process. A constraint on predictive capability arises from the difficulty to ascertain the exact fossil content of a site or formation beyond broad generalizations. Specific processes or agents can generate substantial concentrations of fossil bones; however, the potential existence of these particular buried palaeoenvironments may only be disclosed upon the exposure of the formation during excavations.

10. Recommendation

The impact of mining is considered minimal. The mitigation actions outlined in the Paleontological Impact Assessment are considered sufficient, encompassing the collecting of coarse-fraction fossiliferous material for research and the establishment of a Chance Find Protocol for potential fossil finds. Fossils may be discovered during vegetation clearance and excavations; thus, it is essential for the ECO and all workers to get familiar with the Chance Find Protocol.

11. Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations/ drilling activities begin.

a. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
b. When excavation begins, the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, or bone) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
c. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
d. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
e. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
f. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA/LHRA permit must be obtained. Annual reports must be submitted to SAHRA/LHRA as required by the relevant permits.
g. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA/LHRA once the project has been completed and only if there are fossils.
h. If no fossils are found and the excavations have finished, then no further monitoring is required.

12. References

Altermann, W., Nelson, D.R., 1998. Sedimentation rates, basin analysis and regional correlations of three Neoarchaean and Palaeoproterozoic sub-basins of the Kaapvaal craton as inferred from precise U-Pb zircon age from volcaniclastic sediments. Sedimentary Geology 120, 225-256.

Barker, O.B, Brandl, G., Callaghan, C.C., Eriksson, P.G., Neut (van der), M., 2006. The Soutpansberg and Waterberg Groups and the Blouberg Formation. In Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (Eds). The Geology of South Africa. Geological Society of South Africa, Council for Geoscience, Pretoria, 301-318.

Beukes, N.J. 1983. Palaeoenvironmental setting of iron-formations in the depositional basin of the Transvaal Supergroup, South Africa, 131-209. In: Trendall, A.F. & Morris, R.e., Eds., Iron-formation: Facts and Problems. Elsevier, Amsterdam, 558pp.

Beukes, N.J. & Dreyer, C.J.B. (1986). Amosite asbestos deposits of the Penge area, 901-910. In: Anhaeusser, C.R. and Maske, S., Eds., Mineral Deposits of Southern Africa. I. Geol. Soc. S. Afr., Johannesburg, 1020pp.

Bumby, A.J., 2000. The geology of the Blouberg Formation, Waterberg and Soutpansberg Group in the area of Blouberg mountains, Northern Province, South Africa. PhD. Thesis, University of Pretoria, pg 1-295.

Bumby, A.J., Eriksson, P.G., Catuneanu, O., Nelson, D.R., Rigby, M.J., 2012. Meso-Archaean and Palaeo-Proterozoic sedimentary sequence stratigraphy of the Kaapvaal Craton. Marine and Petroleum Geology 33, 92-116.

Button, A. 1973. A regional study of the stratigraphy and development of the Transvaal Basin in the eastern and northeastern Transvaal. Ph.D. thesis (unpubl.). University of Witwatersrand, Johannesburg, 351 pp.

Cilliers, J. J. le R., 1964. Amosite at the Penge asbestos mine. In: Haughton, S.H. (ed.) The Geology of some Ore Deposits of Southern Africa. Johannesburg: Geological Society of South Arica, pp. 579-591.

Dorland, H.C., Beukes, N.J., Gutzmer, J. 2006. Precise SHRIMP U-Pb zircon age contraints on the lower Waterberg and Soutpansberg Groups, South Africa. South African Journal of Geology 109, 139 156.

Du Plessis, C.P., Clendenin, C.W., 1988. The Bobbejaanwater Fault System south Thabazimbi, western Transvaal. South African Journal of Geology 91, 97-105.

Eriksson, P.G., Reczko, B.F.F., 1995. The sedimentary and tectonic setting of the Transvaal Supergroup floor rocks to the Bushveld Complex: tectonic setting derived from basin-fill geometry, inferred volcanic processes and sedimentation systems. J. Afr. Earth Sci. 21, 487–504.

Eriksson, P.G., Hatting, P.J., Altermann, W., 1995. An overview of the geology of the Transvaal Sequence and Bushveld Complex, South Africa. Mineral Deposita 30, 98-111.

Eriksson, P.G., Altermann, W., 1998. An overview of the geology of the Transvaal Supergroup dolomites (South Africa). Environmental Geology 36, 176-188.

Eriksson, P.G., Altermann, W., Catuneanu, O., Van der Merwe, R., Bumby, A. J., 2001. Major influences on the evolution of the 2.67-2.1 Ga Transvaal basin, Kaapvaal craton. Sedimentary Geology 142, 205-231.

Frauenstein, F., Veizer, J., Beukes, N., Van Niekerk, H.S., Coetzee, L.L., 2009. Transvaal Supergroup carbonates: implications for Paleoproteroic δ18O and δ13C records. Precambrian Research 175, 149-160.

Martin, D.McB., Clendenin, C.W., Krapez, B., McNaughton N.J., 1998. Tectonic and geochronological constraints on late Archaean and Paleoproterozoic stratigraphic correlation within and between the Kaapvaal and Pilbara Cratons. Journal of the Geological Society, London 155, 311-322.

Miyano, T. & Beukes, N. J., 1984. Phase relations of stilpnomelane, ferri-annite, and riebeckite in very low-grade metamorphosed iron formations. Transactions of the Geological Society of South Africa 87, 111–124

Möller, V., Klemd, R., Jachimski, M., Barton Jr, J.M., 2014. Hydrothermal controls on iron and lead mineralization on the farms Leeuwbosch and Cornwall, Thabazimbi District, South Africa. Ore Geology 63, 40-63.

Netshiozwi, S.T., 2002. Origin of high-grade hematite ores at Thabazimbi Mine, Limpopo Province, South Africa. Unpublished Magister Scientae Dissertation, University of Johannesburg, 109 pp.

Schwellnus, J. S. I., Engelbrecht, L. N. J., Coertze, F. J., Russell, H. D., Malherbe, S. J., van Rooyen, D. P. & Cooke, R., 1962. The Geology of the Olifants River Area, Transvaal. [Explanation of Sheets 2429B (Chuniespoort) and 2430A (Wolkberg).], Pretoria: Geological Survey of South Africa, 85 pp.

Trendall, A. F., Compston, W., Williams, I. S., Armstrong, R. A., Arndt, N. T., McNaughton, N. J., Nelson, D. R., Barley, M. E., Beukes, N. J., de Laeter, J. R., Retief, E. A. & Torne, A. M., 1990. Precise zircon U–Pb chronological comparison of the volcano sedimentary sequences of the Kaapvaal and Pilbara Cratons between about 3·1 and 2·4 Ga. Abstracts Volume, Third International Archaean Symposium, Perth, 1990, Perth: Geoconferences Ltd., pp. 81–83.

Walraven, F., Armstrong, R. A. & Kruger, F. J., 1990. A chrono stratigraphic framework for the north–central Kaapvaal craton, the Bushveld Complex and the Vredefort structure. Tectonophysics 171, 23–48.

Walraven, F. & Martini, J., 1995. Zircon Pb-evaporation age determination of the Oak Tree Formation, Chuniespoort Group, Transvaal Sequence: implications for Transvaal-Griqualand West basin correlation. South African Journal of Geology 98, 58-67.

Wilkins, C.B., Eriksson, P.G. & van Schalkwyk, A. 1987. Two generations of karst-fill sedimentary rocks within Chuniespoort Group of dolomites south of Pretoria. South African Journal of Geology, 90(2), 155-167.

Zeh, A., Wilson, A.H., Ovtcharova, M., 2016. Source and age of upper Transvaal Supergroup, South Africa: Age-Hf isotope record of zircons in Magaliesberg quartzite and Dullstroom lava, and Implications for Paleoproterozoic (2.5-2.0 Ga) continent reconstruction. Precambrian research 278, 1-21.

Soil, Land Use and Land Capability Assessment

PREPARED BY:

Rofhiwavhutali (Pty) Ltd
Environmental and Engineering Best Practices

Contact Person: Mutali Guduvheni
Contact No: 076 176 0655
Email: info@rofhiwavhutali.co.za
Website: www.rofhiwavhutali.co.za

PREPARED FOR:

VAHLENGWE MINING ADVISORY AND CONSULTING

DMRE Ref No: LP 30/5/1/2/3/2/1 10287 MR

NAME OF THE APPLICANT: ARENGO 297 (PTY) LTD

MINING RIGHT APPLICATION FOR DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE, IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE., IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.

2026

Report Credentials.

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DOCUMENT TRACKING

Project Name	Soil, land Use and land Capability and agricultural potential verification assessment for Mining Right application for Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore, in Respect of Portions Re/2/313, Re/3/313, and Re /4/313 of the Farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province	
DMRE Ref No	LP 30/5/1/2/3/2/1 10287 MR	
Client Details	Vahlengwe Mining Advisory and Consulting	
		Signature
Prepared by	Mutali Guduvheni (Principal Consultant) South African Council for Natural Scientific Professions (Pr. Sci. Nat); Geological Society of South Africa (GSSA) Environmental Assessment Practitioners Association of South Africa (EAPASA) International Association for Impact Assessment South Africa (IAIASA)- Professional Member.	
VERSION	V1	
CONTACT	mutali@rofhiwavhutali.co.za	+27 76 176 0655
Date	20 March 2026	

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1. INTRODUCTION

Arengo 297 (Pty) Ltd, hereafter referred to as 'the applicant' or Arengo', has applied for a Mining right application for Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore, in Respect of Portions Re/2/313, Re/3/313, and Re /4/313 of the Farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province covering an area extent of 3 892.0 ha.

Vahlengwe Mining Advisory and Consulting, as the Arengo' appointed lead consultant, appointed Rofhiwavhutali (Pty) Ltd to compile a Soil, Land Use and Land Capability Assessment as part of Specialist Studies required for the Project.

This specialist study has been compiled in terms of Appendix 6 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) EIA Regulations, 2014, (as amended in 2017) in terms of the Scoping and EIA process, which is being followed in applying for Environmental Authorisation.

1.1. Aims and Objectives of the Study

The objective of the Soil, Land Use and Land Capability is to fulfill the requirements of the most recent South African Environmental Legislation with reference to the Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983). This act aims to promote the conservation of soil, water sources, vegetation, and the control of weeds and invader plants through the management of natural agricultural resources.

The proposed study thus aims to determine the possible impacts that the proposed development could have on the soils, land use, land capability and agricultural potential and to also identify areas of high sensitivity regarding the proposed project. This is done by taking into consideration factors such as soil quality, drainage, topography, climate and water availability. Therefore, provide sufficient information that can help to ensure that land is used in a sustainable and responsible way.

The study objective will be achieved through determining:

- The soil forms occurring within the study area;
- The associated land capability and potential of the soils occurring within the study area;
- Discussion of the agricultural potential in terms of the soils, water availability, surrounding development and current status of land; and
- Discussion of potential and actual impacts as a result of the proposed development.

1.2. Suitability of soils for agricultural cultivation

The assessment of soils suitability for agricultural cultivation rests primarily on the identification of soils that are suited to crop production. In order to classify soils as being of suitable for crop cultivation they must have the following properties:

- Adequate depth (greater than 60 cm) to accommodate root development for majority of cultivated crops;
- Good structure as in water stable aggregates which allows for root penetration and water retention;
- Sufficient clay and organic matter to provide nutrients for growing crops;
- Sufficient distribution of high quality and potential soils within the study area to constitute a viable economic management unit;
- Adequate clay content and deep enough water table to allow for water storage; and
- Good climatic conditions such as sufficient rainfall and sunlight to increase crop choice variety.

1.3. Legal And Regulatory Requirements

The most recent South African Environmental Legislation that needs to be considered for any new or expanding development with reference to assessment and management of soil and land use includes:

- Soils and land capability are protected under the National Environmental Management Act 107 of 1998, the Minerals Act 28 of 2002 and the Conservation of Agricultural Resources Act 43 of 1983.
- The National Environmental Management Act 107 of 1998 requires that pollution and degradation of the environment be avoided, or, where it cannot be avoided, be minimised and remedied.
- The Conservation of Agricultural Resources (Act 43 of 1983) states that the degradation of the agricultural potential of soil is illegal.
- The Conservation of Agriculture Resources Act 43 of 1983 requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.
- Government Notice R983 of 4 December 2014, Activity 21. The purpose of this notice is to identify activities that would require environmental authorisation prior to commencement of that activity.

1.4. Terms of Reference

The terms of reference applicable to the Soils, Land Capability and Land Use Study include the following:

- A review of available desktop information about the study area site and compile various maps illustrating the desktop data;
- Discussion of the relevant desktop literature;
- Conduct a soil classification survey covering the study area according to the South African Soil Classification System: A Natural and Anthropogenic System for South Africa (Soil Classification Working Group, 2018);
- Determination of the current (baseline) soil physical, climatic conditions and land uses, as well as the current land capabilities and soil potential associated with the identified soil forms present in the study area;
- Compile soil, land use and land capability and impact statement report under current on-site conditions based on the field finding data to be compared to the screening tool.

1.5. Assumptions, Assumptions uncertainties, limitations and gaps

The following assumptions, uncertainties, limitations and gaps were applicable for the soil, land use and land capability assessment:

- The information gathered during the desktop assessment must be considered with caution, as inaccuracies and data capturing errors are often present within these databases;
- The soil delineations as well as the associated land capability and agricultural potential was done at a high level due the low quantum of risk presented by the proposed development and therefore should not be used for any other purpose than it is intended for. Should the quantum of risk of the project change for any reason, then a detailed soil investigation, delineation and classification would have to be undertaken in fulfilment of the applicable legislation;
- The soil survey was confined to the study area outline with consideration of various land uses outside the study area considered;
- The land capability assessment covered all accessible areas within the defined focus area and proposed footprint. Where access was not possible, soil characteristics were interpreted using available historical soil information, aerial imagery, and recognised land use databases. The surrounding context was also considered to support accurate interpretation of site conditions;
- Soil profiles were observed using a 1.5m hand-held soil auger and thus a description of the soil characteristics deeper than 1.5m cannot be given; and
- Soils exist in a continuum; it is often difficult to classify any particular soil type. As a consequence, the soil classifications presented in this report are based on the "best fit" to the soil classification system of South Africa.

2. SITE DESCRIPTION

2.1. Site Locality

The proposed mining right is located in the northern part of Thabazimbi and approximately 6.02 km, in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality Figure 2-1 and Figure 2-2.

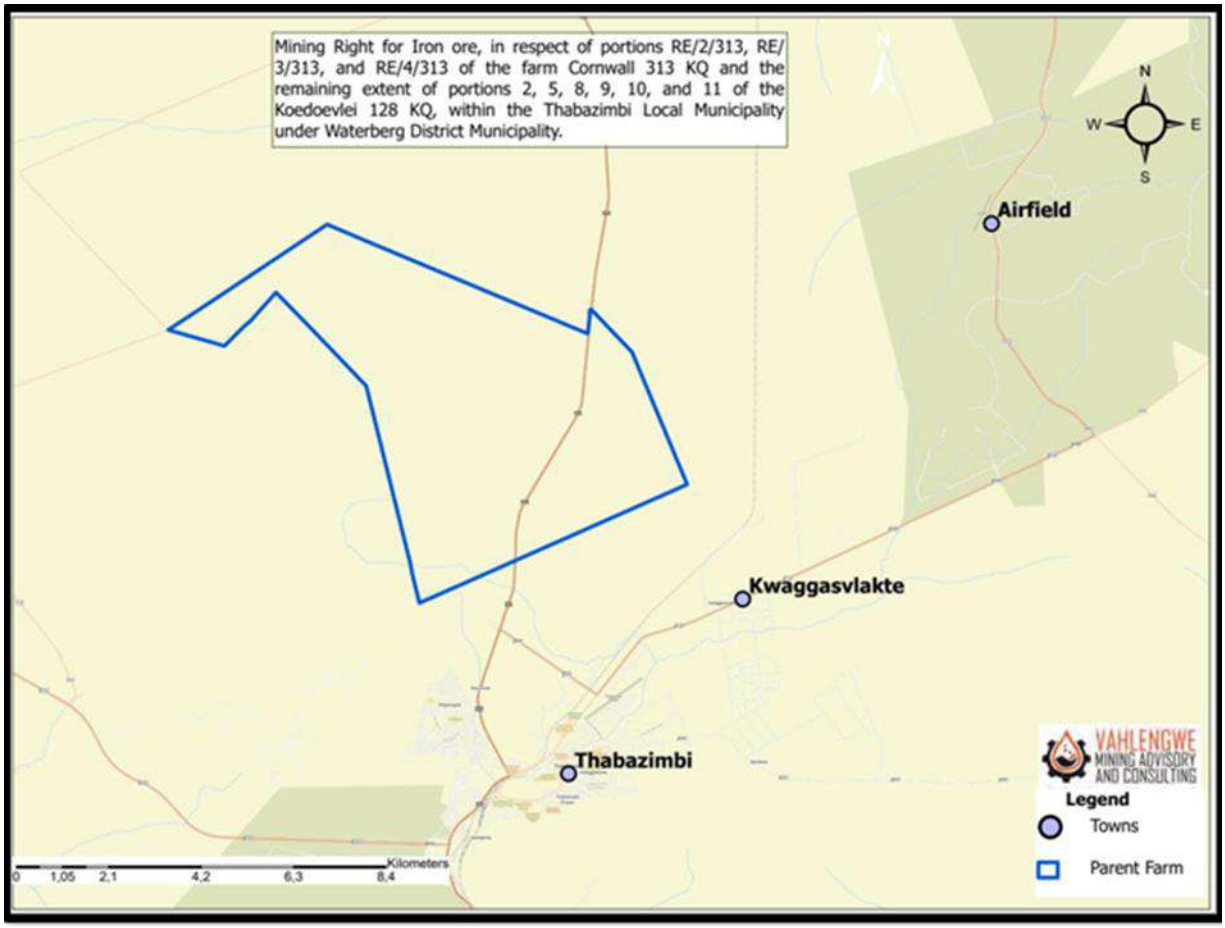

Figure 2-1: Locality Map

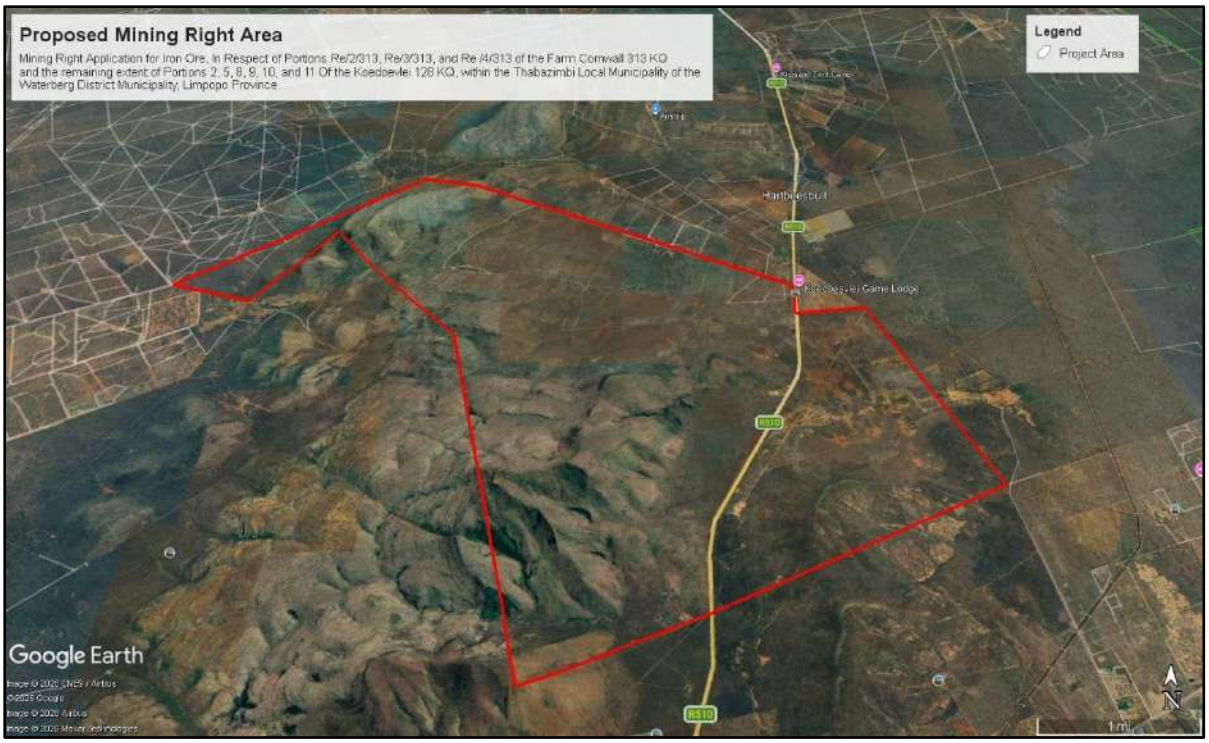

Figure 2-2: Google earth View of the site proposed for the development

3. STUDY METHODOLOGY:

The assessment of agricultural potential of the study area was based on a combination of desktop studies to amass general information and then through site visit for status quo assessment, soil classification and characterisation, and the validation of generated information from the desktop studies.

3.1. Desktop Study and Literature Review

A literature review and background study were carried out prior to beginning the field assessment to gather predetermined soil, land use, and land capability data in the study area. In order to validate the predetermined soil results obtained at the desktop level, a field investigation was conducted.

3.2. Site Survey

The field survey was conducted in March 2026 in which soils were classified into soil forms according to the Soil Classification System: A Natural and Anthropogenic System for South Africa Soil Classification System (2018).

3.3. Land Capability Classification

A land capability class is an interpretive grouping of land units with similar potential and containing limitations or hazards for long term intensive use of land for rainfed farming determined by the interaction of climate, soil and terrain. It is a more general term than land suitability and is more conservation oriented (See Table 3-1 below). It involves consideration of (i) the risks of land damage from erosion and other causes and (ii) the difficulties in land

use owing to physical land characteristics, including climate. Eight land capability classes were employed with potential decreasing and limitations and hazards increasing from class 1 to class 8. Classes 1 to 4 can be considered as arable, whereas Class 5 to 7 may be classified as wetland or watercourses, grazing, forestry or wildlife. The climate capability of an area as indicated in Table 3-2 below influences the land potential of an area. As part of the mitigation measures, the expected impacts of the proposed land use on soil and land capability were assessed.

Table 3-1: Land Capability Classification (Smith, 2006)

Land Capability Group	Land Capability Class						Intensity of Land Use				
		wildlife	Forestry	Light grazing	Moderate grazing	Intensive grazing	Light cultivation	Moderate cultivation	Intensive cultivation	Very intensive cultivation	Limitations
Arable	I										No or few limitations. Very high arable potential. Very low erosion hazard
	II										Slight limitations. High arable potential. Low erosion hazard
	III										Moderate limitations. Some erosion hazards
	IV										Severe limitations. Low arable potential. High erosion hazard.
Grazing	V										Water course and land with wetness limitations
	VI										Limitations preclude cultivation. Suitable for perennial vegetation
	VII										Very severe limitations. Suitable only for natural vegetation
Wildlife	VIII										Extremely severe limitations. Not suitable for grazing or afforestation.

Table 3-2: Climate Capability Classification (Scotney et al.al 1987)

Climate Capability Class	Limitation Rating	Description
C1	None to slight	Local climate is favourable for good yield for a wide range of adapted crops throughout the year.
C2	Slight	Local climate is favourable for good yield for a wide range of adapted crops and a year-round growing season. Moisture stress and lower temperatures increase risk and decrease yields relative to C1.
C3	Slight to moderate	Slightly restricted growing season due to the occurrence of low temperatures and frost. Good yield potential for a moderate range of adapted crops.
C4	Moderate	Moderately restricted growing season due to low temperatures and severe frost. Good yield potential for a moderate range of adapted crops but planting date options more limited than C3.
C5	Moderate to severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops may be grown at risk of some yield loss.
C6	Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Limited suitable crops for which frequently experience yield loss.
C7	Severe to very severe	Severely restricted choice of crops due to heat, cold and/or moisture stress.
C8	Very severe	Very severely restricted choice of crops due to heat and moisture stress. Suitable crops at high risk of yield loss.

Climatic criteria, within the growing season, incorporate rainfall, evaporation, minimum and maximum temperatures as well as limitations linked to frost, wind and hail hazards. When assessing climatic factors, the system provides a dual approach, whereby permanent terrain and soil factors can be used to define soil capability, while with the addition of climatic factors can then be used to determine land potential (Scotney et al., 1991). However, the authors recommend the use of the overarching land capability classification in rainfed production environments, while soil capability can be used to comparatively rate soil capability of different areas. Table 3-3 below presents the land capability classes, whilst Table 3-4 presents a description thereof, according to Guy and Smith (1998).

Table 3-3: Land Potential Classes (Smith, 2006)

Soil Capability Class	Climate Capability Class							
	C1	C2	C3	C4	C5	C6	C7	C8
I	L1	L1	L2	L2	L3	L3	L4	L4
II	L1	L2	L2	L3	L3	L4	L4	L5
III	L2	L2	L3	L3	L4	L4	L5	L6
IV	L2	L3	L3	L4	L4	L5	L5	L6
V	(L3) Wetbased	(L3) Wetbased	(L4) Wetbased	(L4) Wetbased	(L5) Wetbased	(L5) Wetbased	(L6) Wetbased	(L6) Wetbased
VI	L4	L4	L5	L5	L5	L6	L6	L7
VII	L5	L5	L6	L6	L7	L7	L7	L8
VIII	L6	L6	L7	L7	L8	L8	L8	L8

Table 3-4: The Land Capability Classes description (Adapted from guy and smith, 1998)

Land Capability	Description of Land Capability Class
L1	**Very high Capability:** No limitations. Appropriate contour protection must be implemented and inspected.
L2	**High Capability:** Very infrequent and/or minor limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L3	**Good Capability:** Infrequent and/or moderate limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L4	**Moderate Capability:** Moderately regular and/or severe to moderate limitations due to soil, slope, temperature or rainfall. Appropriate permission is required before ploughing virgin land.
L5	**Restricted Capability:** Regular and/or moderate to severe limitations due to soil, slope, temperature or rainfall.
L6	**Very restricted Capability:** Regular and/or severe limitations due to soil, slope, temperature or rainfall. Non-arable.
L7	**Low Capability:** Severe limitations due to soil, slope, temperature or rainfall. Non-arable.
L8	**Very low Capability:** Very severe limitations due to soil, slope, temperature or rainfall. Non-arable.

Land capability refers to the highest level of sustainable land use for rainfed agriculture, based on the combined influence of climate, soil, and terrain conditions (Table 3-1).

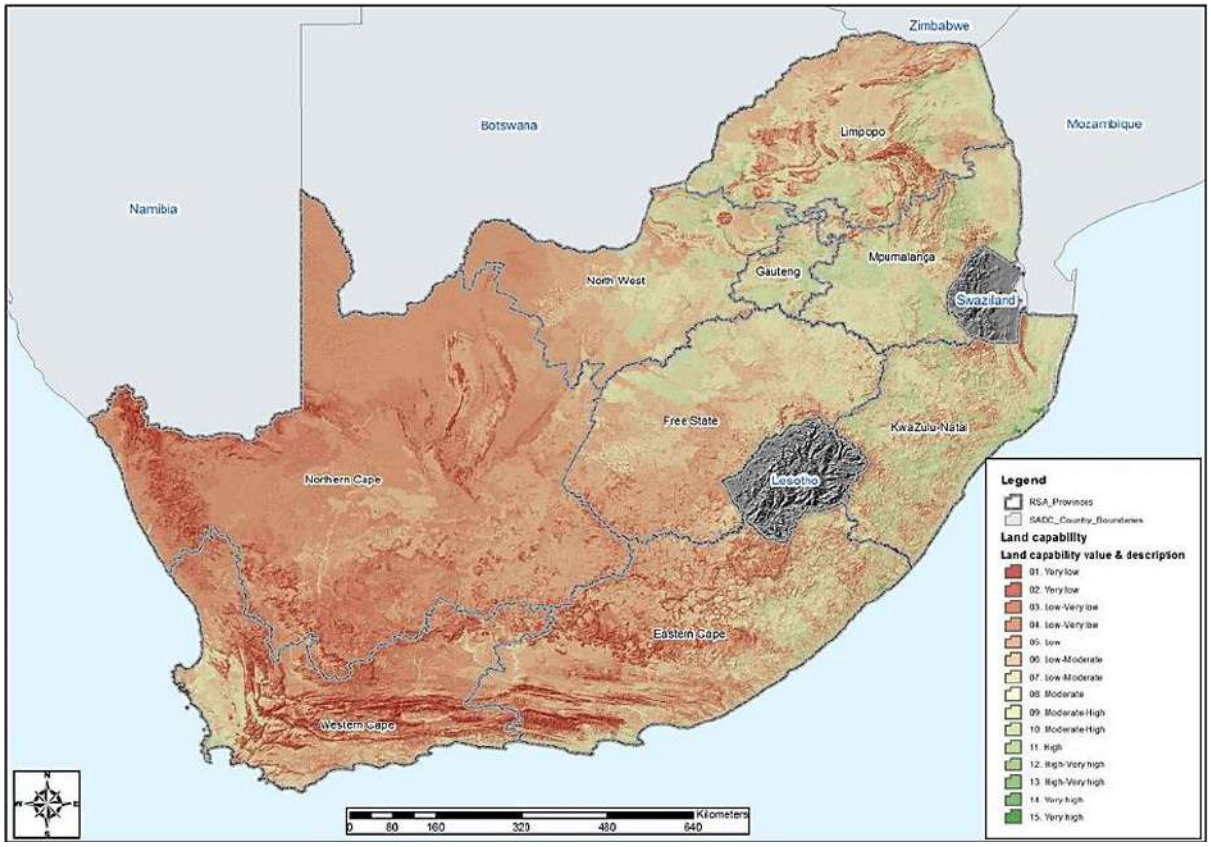

Figure 3-1: Land capability values and description

3.4. DAFF Screening Tool

The main purpose of the Agricultural Agro-Ecosystem Assessment is to ensure that the sensitivity of the site to the proposed land use change (from potential agricultural land to the proposed development) is sufficiently considered. The information provided in this report aims to enable the Competent Authority to come to a sound conclusion on the impact of the proposed development on the food production potential of the site.

To meet this objective, site sensitivity verification must be conducted of which the results must meet the following objectives:

- It must confirm or dispute the current land use and the environmental sensitivity as was indicated by the National Environmental Screening Tool;
- It must contain proof (e.g., photographs) of the current land use and environmental sensitivity pertaining to the study area;
- All data and conclusions are submitted together with the main report for the proposed development;
- It must indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources; and
- The report is prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The report is thus compiled in a manner that meets the minimum report content requirements for impacts on agricultural resources by the proposed development.

4. RESULTS AND DISCUSSIONS

4.1. Desktop Assessment Results

4.2. Climate

Climate is the state of the atmosphere over long periods, such as over years, decades, centuries, or greater, and the weather is defined as the atmospheric conditions of an area over a short period (Naomi, 2004).

4.2.1. Average temperature and precipitation

Average temperature and precipitation are shown Figure 4-1 and Figure 4-2. Figure 4-1 shows the temperature variations throughout the year are shown in where the solid red line represents the mean daily maximum temperature and the solid blue line indicates the mean daily minimum; the dashed red and blue lines reflect the historical extremes, highlighting the hottest days and coldest nights recorded over the past 30 years. To further illustrate temperature trends.

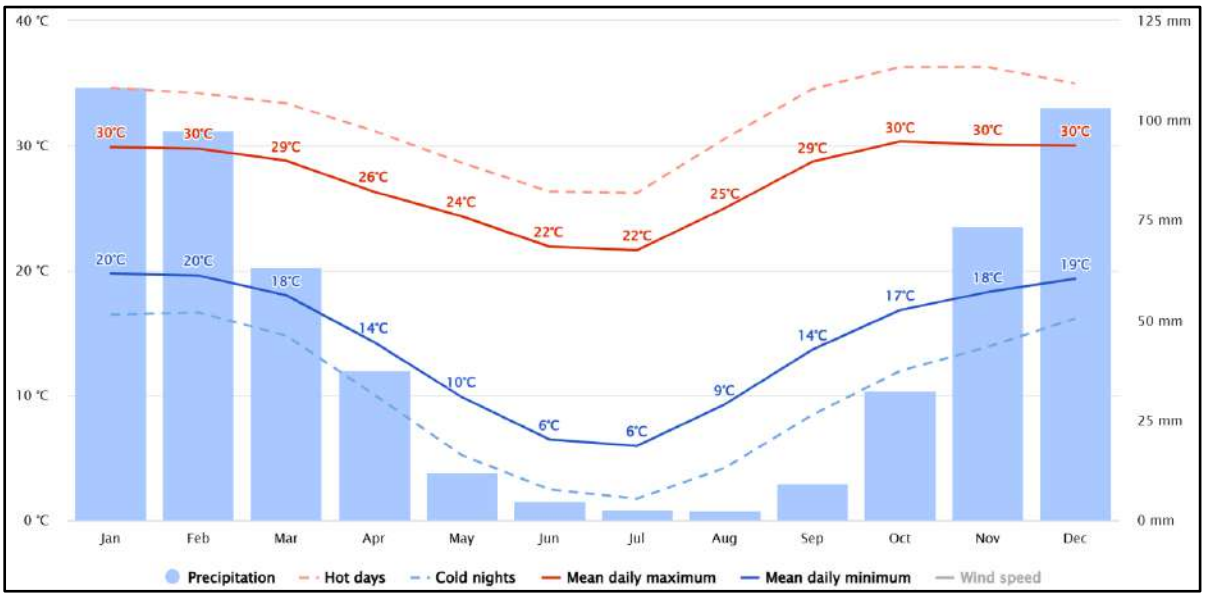

Figure 4-1: Average temperatures and Precipitation (meteoblue.com)

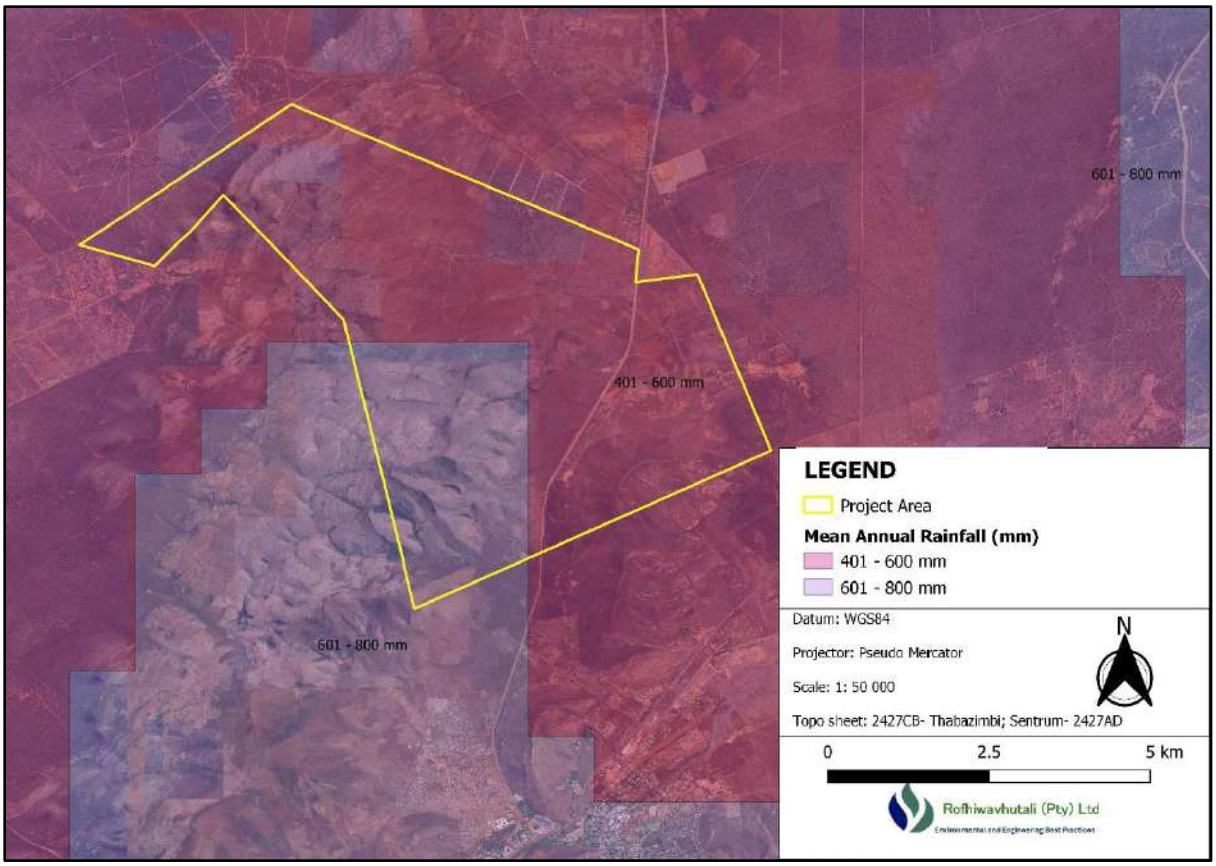

Figure 4-2: Mean Annual Precipitation

4.2.2. Geology and lithology of project Area

The project area is situated within the Kaapvaal Craton and is underlain by the Transvaal Supergroup, a major Neoarchaean to Palaeoproterozoic stratigraphic unit extending across northern South Africa and southern Botswana. The Transvaal Supergroup is dated to approximately 2.58–2.06 Ga and is bounded by the older Witwatersrand Basin (~2.7 Ga) and the younger Bushveld Igneous Complex (~2.05 Ga) (Eriksson et al., 1995; Altermann and Nelson, 1998; Walraven et al., 1990; Zeh et al., 2016).

Regionally, the geology of the Thabazimbi area comprises supracrustal sequences including the Transvaal Supergroup (2.58–2.06 Ga), the Bushveld Igneous Complex (~2.06 Ga), and the overlying Waterberg Group (2.05–1.87 Ga) (Du Plessis and Clendenin, 1988; Netshiozwi, 2002; Dorland et al., 2006). The Transvaal Supergroup is subdivided into the Black Reef Formation (2642.2 ± 2.3 Ma), the Chuniespoort Group (2587 ± 49 Ma), and the Pretoria Group (2.35–2.06 Ga) (Walraven and Martini, 1995; Eriksson and Reczko, 1995; Zeh et al., 2016). Sedimentation within the Transvaal Basin commenced with clastic rocks of the Black Reef Formation, followed by carbonate rocks and banded iron formations (BIFs) of the Chuniespoort Group. These BIFs consist of alternating layers of iron oxides and chert and are characteristic of Precambrian depositional environments associated with early oceanic oxygenation. The Chuniespoort Group includes the Malmani Subgroup, composed predominantly of dolomite, stromatolitic chert, minor carbonaceous shale, limestone, and quartzite (de Beer, 2019). The Penge Iron Formation occurs within the contact metamorphic aureole of the Bushveld Complex and exhibits variable thickness due to deformation and

erosion prior to Pretoria Group deposition (Schwellnus et al., 1962; Button, 1973). Thickness variations have been documented by Cilliers (1964), ranging from approximately 74 m at Kromellenboog to 178 m at Penge.

Locally, the study area is predominantly mantled by Quaternary deposits comprising unconsolidated materials such as alluvium, colluvium, eluvium, gravel, sand, soil, and debris (de Beer, 2019). These deposits overlie a complex assemblage of bedrock units derived from the 1:250 000 Geological Map Sheet 2426 (Thabazimbi), as illustrated Figure 4-3 and Figure 4-4. The underlying geology is characterised by a variety of sedimentary and metamorphic lithologies, including dolomite, chert and shale with interbedded quartzite (T2), quartzite, arkose and conglomerate (VQ), as well as T3TQ quartzite and T3TS ferruginous shale and hornfels. Banded ironstone (T2i), locally associated with dolomitic and shaly units, is also present. Intrusive rocks such as granite and granite gneiss (1G), together with sandstone, grit, conglomerate and breccia (W), further contribute to the geological complexity of the area.

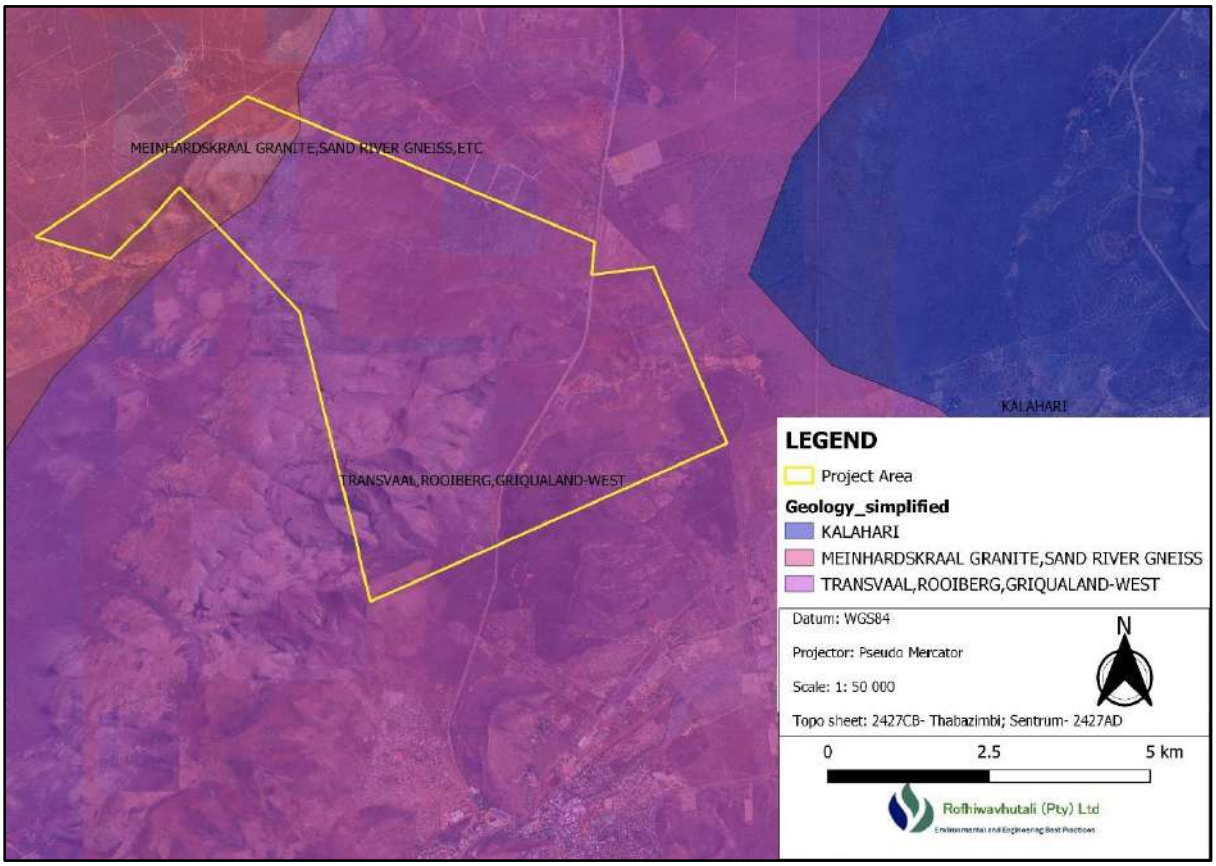

Figure 4-3: Geology Associated with the Project Area

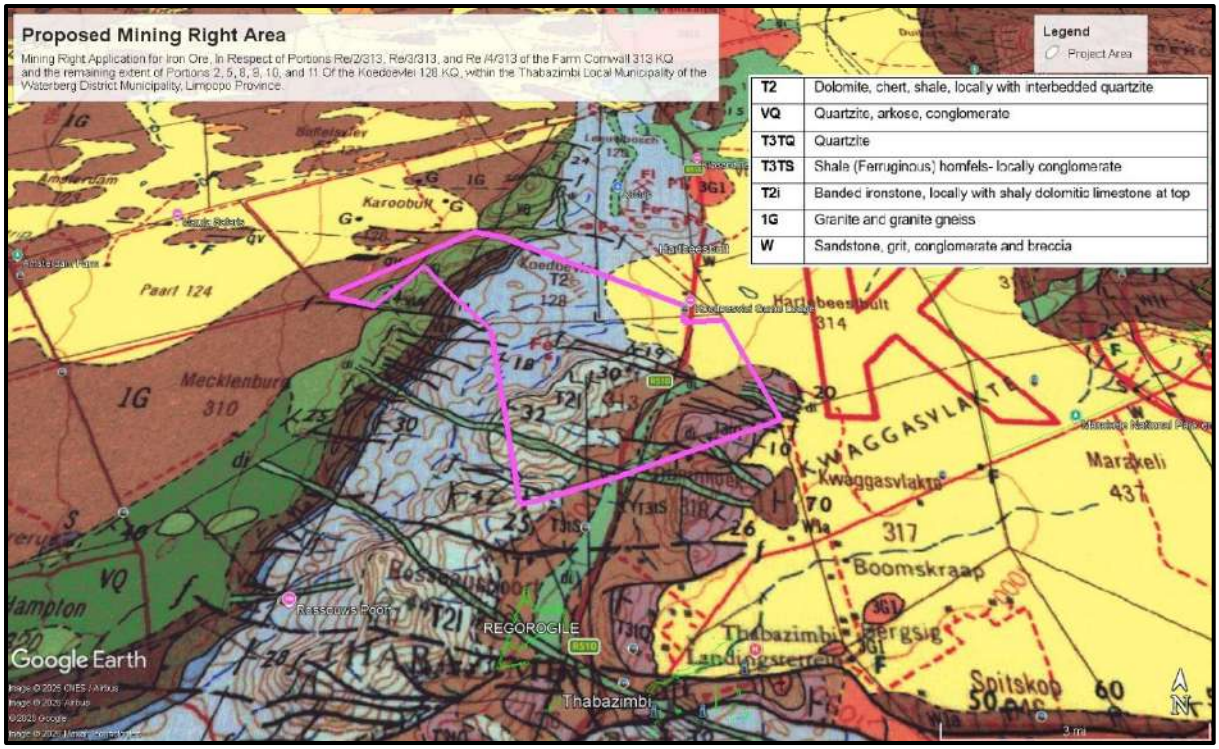

Figure 4-4: localised Geology Map

4.2.3. Soil pH and Predicted Soil loss

The soil pH in the study area ranges from 6.5 to 7.4, indicating neutral to slightly alkaline conditions. This pH range is generally considered highly suitable for most cultivated crops, as it supports optimal availability of essential plant nutrients and promotes favourable soil biochemical processes. Figure 4-5 below illustrates the spatial distribution of soil pH within the study area.

The predicted soil loss across the study area is predominantly classified as very low, with only a small portion reflecting low soil loss. This indicates that the prevailing soil characteristics, topography, vegetation cover, and current land use practices collectively contribute to a stable landscape with minimal erosion risk. The generally gentle slopes, adequate ground cover, and inherent soil stability reduce soil particle detachment and limit surface runoff, thereby minimizing the potential for soil degradation (Figure 4-6).

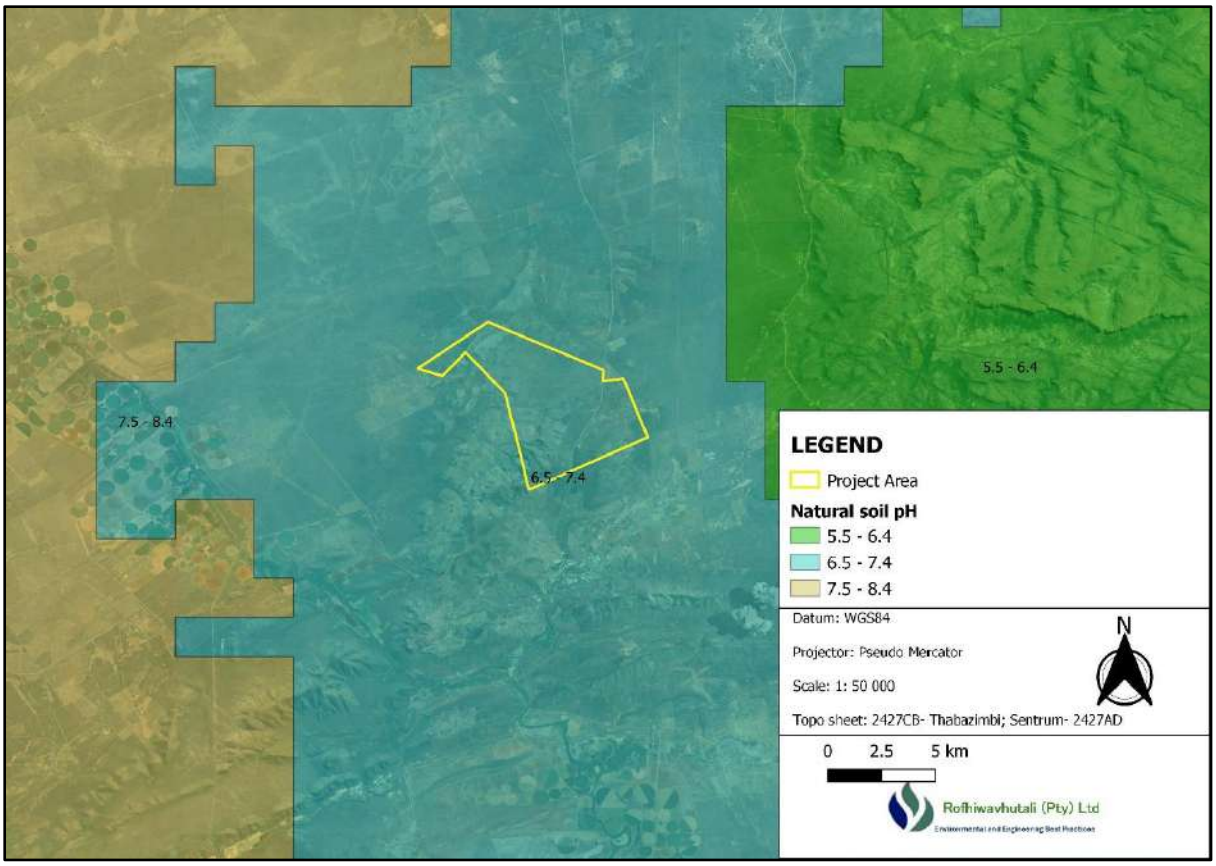

Figure 4-5: Soil pH associated with the Project Area

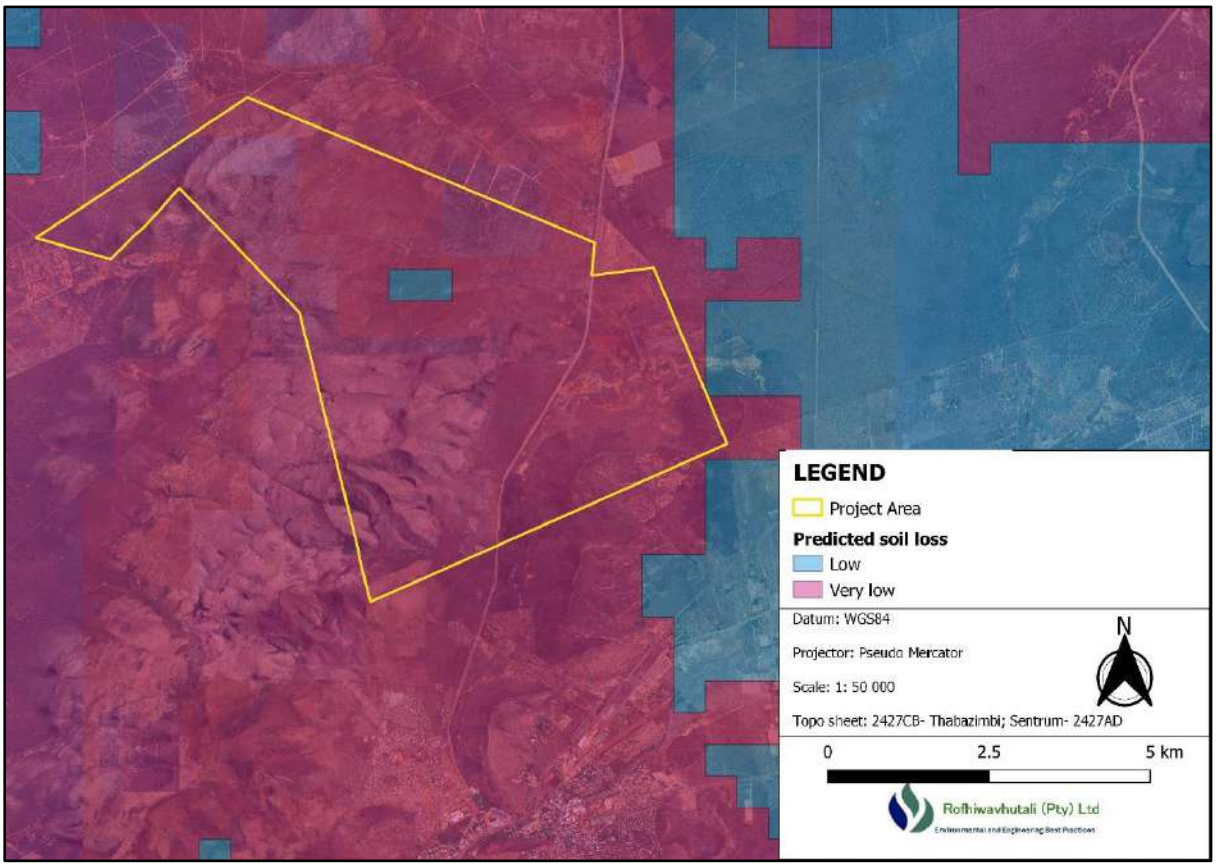

Figure 4-6: Predicted Soil loss

4.2.4. Landtype Data

According to the land type database (Land Type Survey Staff, 1972 - 2006) the development falls within the Ib308, Fa291, Ae239 and Ae234 land type classes (Figure 4-7, Table 4-1 and Figure 4-8). These land types are defined by variations in topography, soil forms, and climatic conditions, which play a significant role in determining land use patterns and agricultural potential. The subsoils in the project area are predominantly comprised of horizons that include Pedocutanic, soft plinthic, Red apedal (thick), neocutanic (thick), Lithic soils (shallow soils over hard rock), Hard rocks, soils with typically well-drained with moderate to high clay content and strong structure.

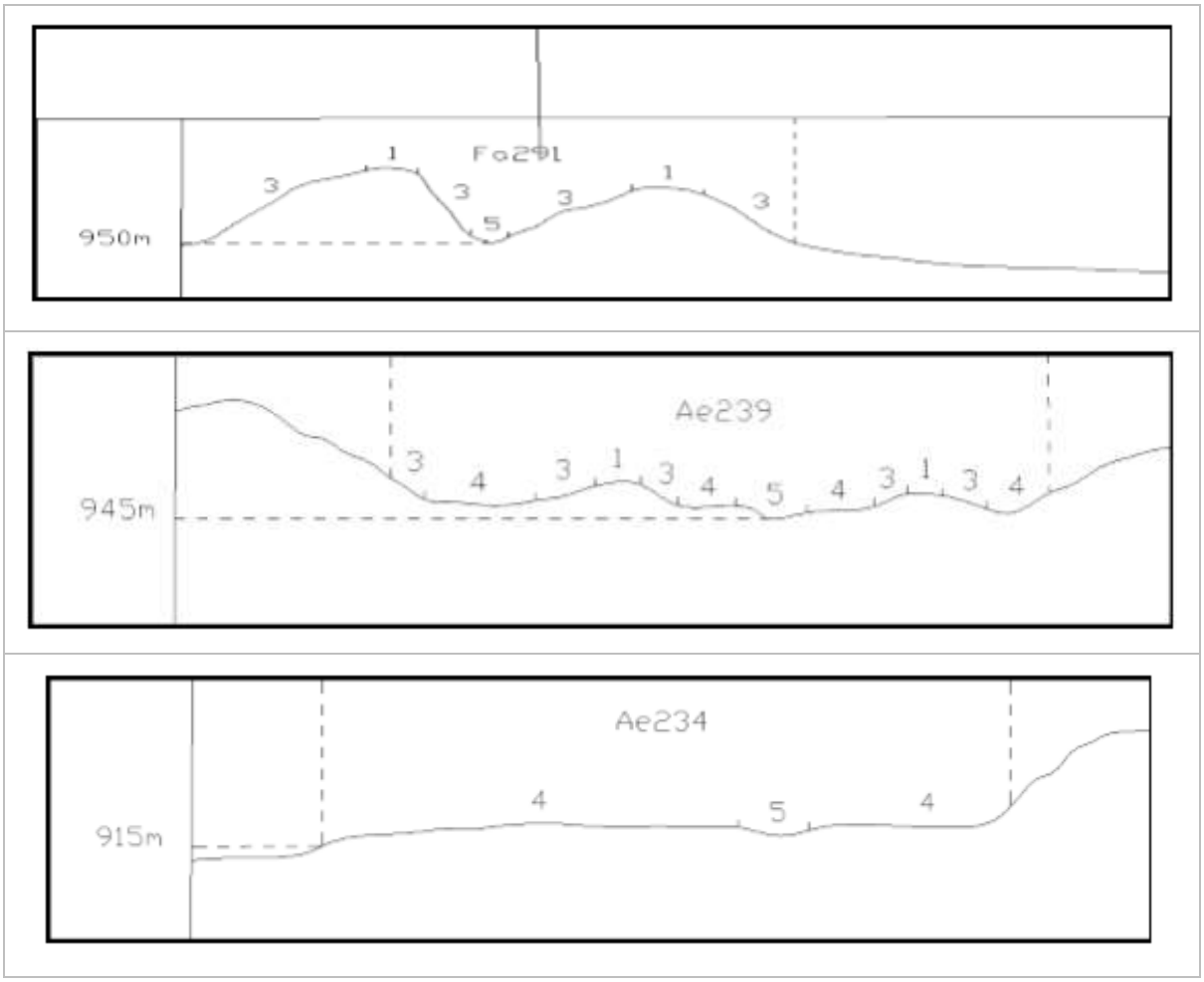

Figure 4-7: Typical terrain and terrain units of the land types

Table 4-1: Land types and Soil forms associated with the project Area

Land Type	Soil Form	
Ib308	• Glenrosa (Gs) • Mispah (Ms)	• Dundee (Du) • Hutton (Hu)
Fa291	• Glenrosa (Gs) • Mispah (Ms)	• Oakleaf (0a)
Ae239	• Hutton (Hu) • Mispah (Ms) • Shortlands (Sd)	• Dundee (Du) • Oakleaf (0a) • Bonheim (Bo)
Ae234	• Hutton (Hu) • Shortlands (Sd) • Avalon (Av)	• Bainsvlei (Bv) • Longlands (Lo)

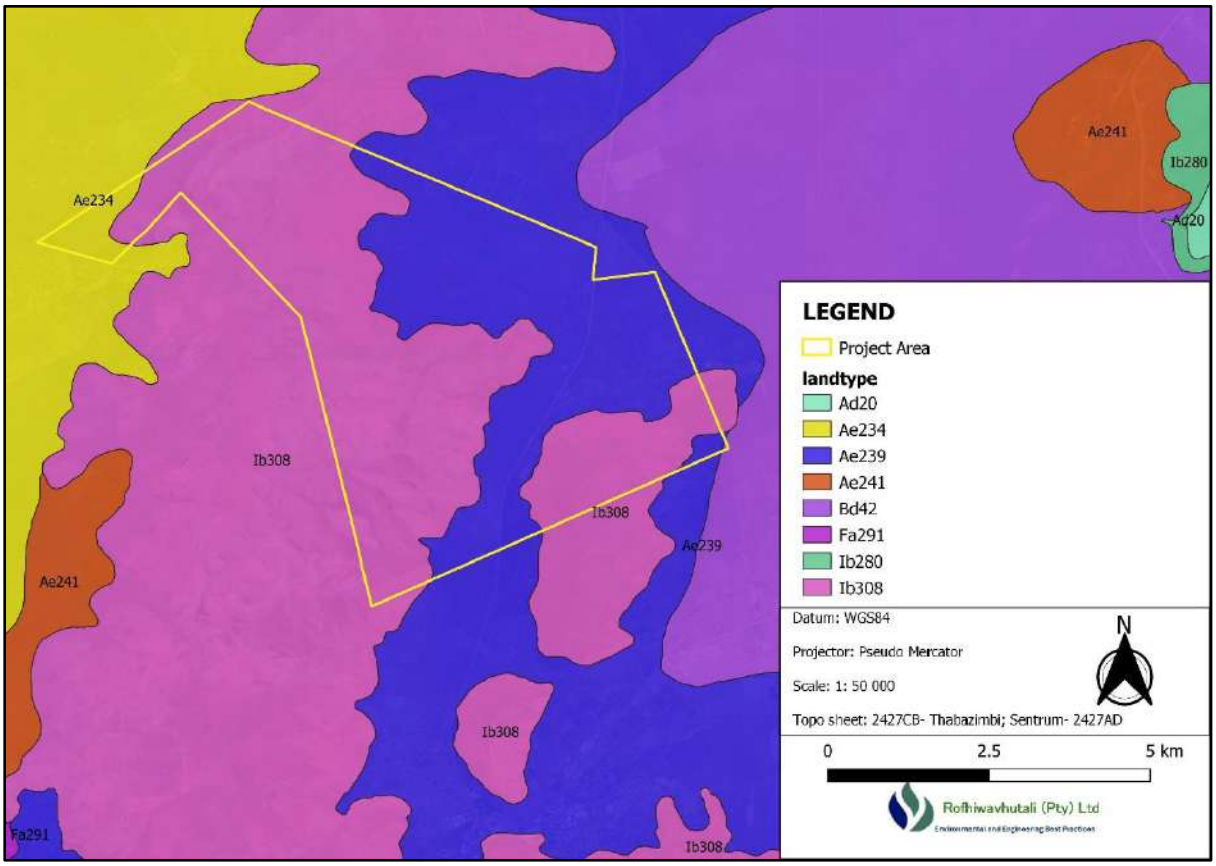

Figure 4-8: Land types associated with the study Area

4.2.5. Soil Classes

The project area is characterised by a Non soil land use, Red apedal or yellow structureless soils with plinthic horizon, freely drained structureless soils, Association of classes 13 and 16: undifferentiated shallow soils and land classes (Figure 4-9). Freely drained structureless soils are soils that allow water to move through them quickly due to both their drainage properties and their lack of stable aggregates. They are typically coarse-textured—often sandy or loamy sand—meaning the spaces between soil particles are large, allowing rainwater to infiltrate and percolate with minimal resistance. Because they are freely drained, these soils rarely become

waterlogged, making them well-aerated and favourable for root respiration. However, their structureless nature means that soil particles are either loose and single-grained, like beach sand, or form a massive, unaggregated mass with few pores. This can lead to challenges: in the loose form, they often have low water- and nutrient-holding capacity, which can cause drought stress and require more frequent fertilisation; in the massive form, compaction can limit root penetration. These soils are commonly found in elevated or sloping landscapes, river terraces, and coastal plains, and they are best suited for vegetation adapted to low moisture retention or for uses where rapid drainage is desirable.

Non-soil land classes refer to areas where the land surface does not contain soil capable of supporting vegetation in the usual sense. This includes exposed rock, gravel outcrops, paved or built-up areas, active river channels, and other surfaces where soil is absent or extremely shallow. Such areas are either naturally devoid of soil—like cliffs or rocky ridges—or have had their soil removed or sealed due to human activities, such as mining or urban development. These classes are important in land classification systems because they represent areas with little to no potential for conventional plant growth or agricultural use.

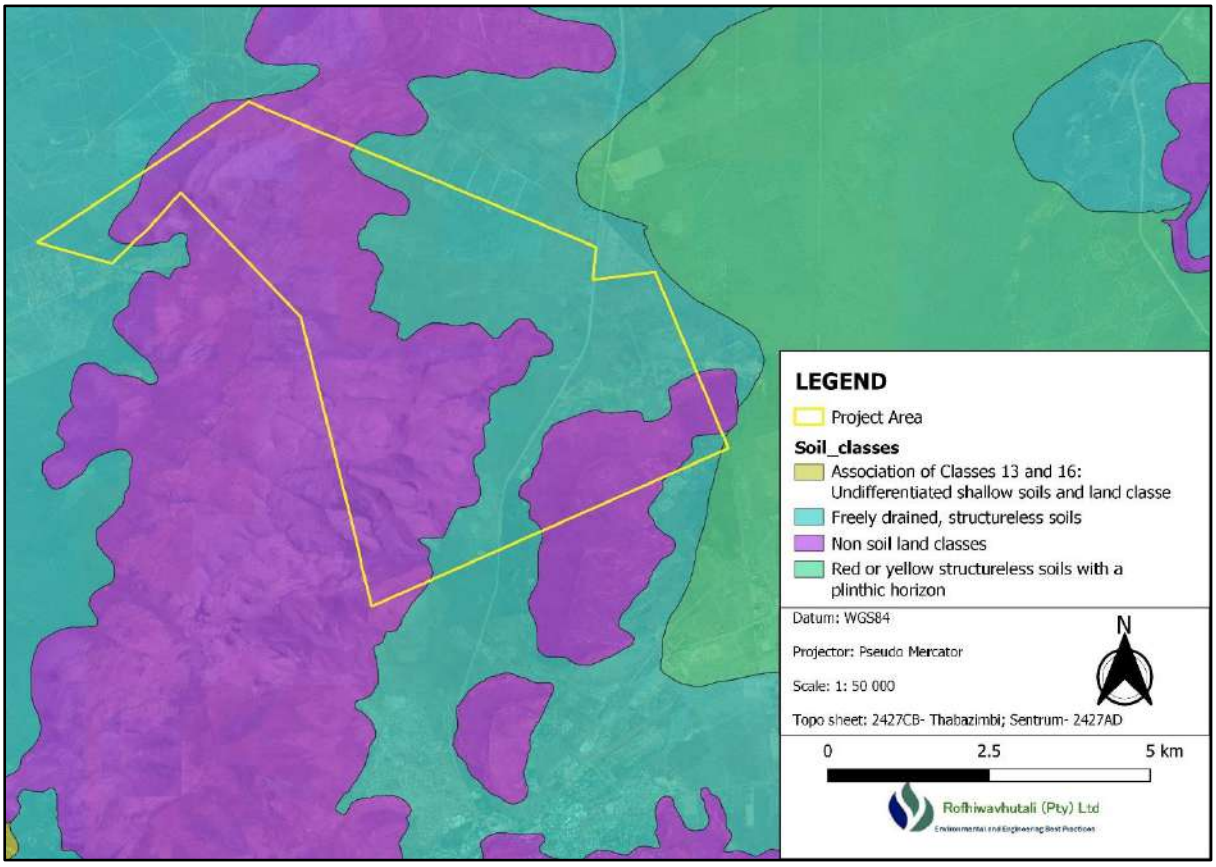

Figure 4-9: Soil Classes Map

4.2.6. Soil and Terrain (SOTER) Dominant Soils

The Soil and Terrain (SOTER) (Figure 4-10) indicates that the study area is predominantly underlain by Lithic Leptosols, which represent the most extensive soil group across the site. Lithic Leptosols are typically shallow soils that occur over hard rock or weathered bedrock and are often associated with rocky or undulating terrain. Due to their shallow depth, limited water-holding capacity, and the presence of underlying rock close to the surface, these soils

generally have low agricultural potential and are more commonly associated with natural vegetation or extensive grazing systems. The second dominant soil group within the study area is Ferric Lixisols, which occur mainly in the south-eastern portion of the site. Lixisols are characterised by subsurface clay accumulation and relatively low-activity clays, often with moderate to low natural fertility. The presence of iron-rich (ferric) components typically gives these soils a reddish coloration. While Ferric Lixisols may support certain agricultural activities under appropriate soil management and fertilisation practices, their productivity can be constrained by nutrient limitations and, in some cases, moderate erosion susceptibility.

A smaller portion in the north-western section of the study area is associated with Ferric Luvisols. These soils generally contain a well-developed clay-enriched subsoil horizon and often exhibit better natural fertility compared to Lixisols. As a result, Luvisols may have relatively higher agricultural potential where other limiting factors such as slope, drainage, or soil depth are favourable. Overall, the SOTER suggests that the study area is largely characterised by shallow, rock-associated soils with limited agricultural capability, with more developed clay-rich soils occurring locally within the south-eastern and north-western portions of the site.

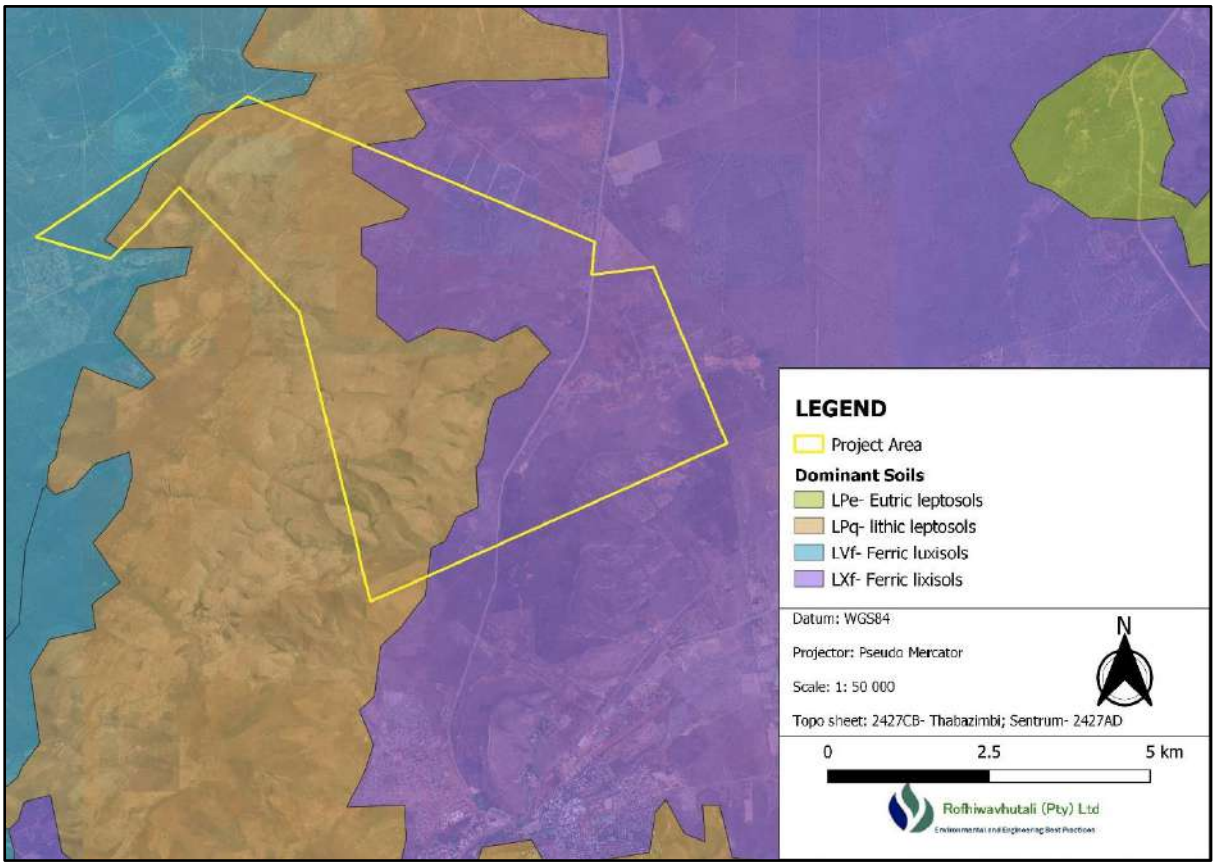

Figure 4-10: SORTER dominant Soils associated with the study area.

4.2.7. Desktop Soil Potential

The soil potential within the study area is predominantly classified as wilderness, moderately potential arable land, and marginal potential arable land covering most of the site. Figure 4-11 below depicts the desktop soil potential associated with the study area. These classifications are based on regional soil and land capability datasets that consider factors such as soil depth,

texture, drainage characteristics, terrain, and climatic conditions. Areas classified as wilderness generally represent land with very limited or no agricultural potential due to inherent soil and terrain limitations, including shallow soil depth, rocky outcrops, steep slopes, or conservation value. Such areas are typically more suitable for grazing rather than cultivation.

The moderate potential arable land within the study area indicates soils that may support crop production under suitable management practices. These areas generally possess moderately deep soils with acceptable drainage and structure, although limitations such as moderate fertility, seasonal moisture constraints, or slope conditions may restrict intensive cultivation. marginal potential arable land refers to areas where soil and terrain limitations significantly constrain agricultural productivity. These limitations may include shallow soils, lower fertility, imperfect drainage.

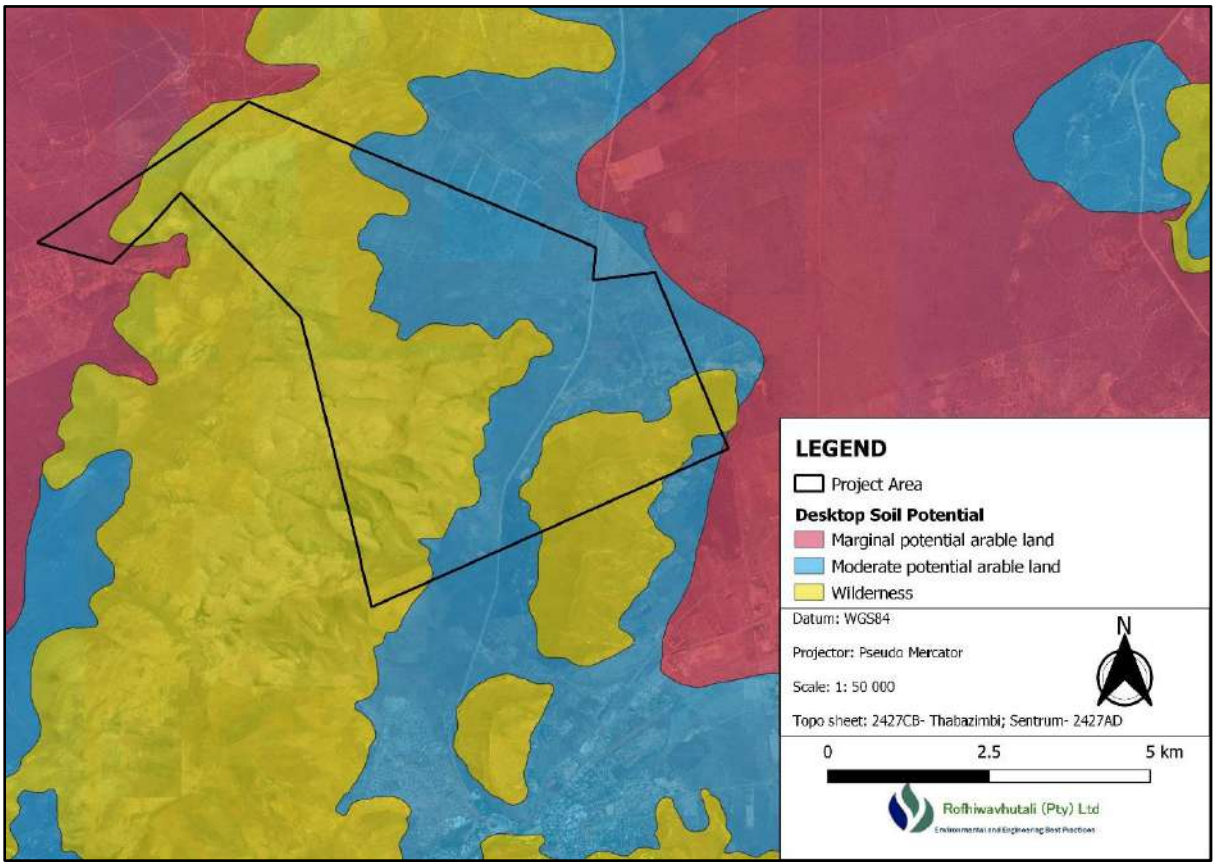

Figure 4-11: Soil Potential Associated with the Study Area

4.2.8. DAFF Screening Tool

The project area is characterised by a very high sensitivity to agriculture (Figure 4-12).

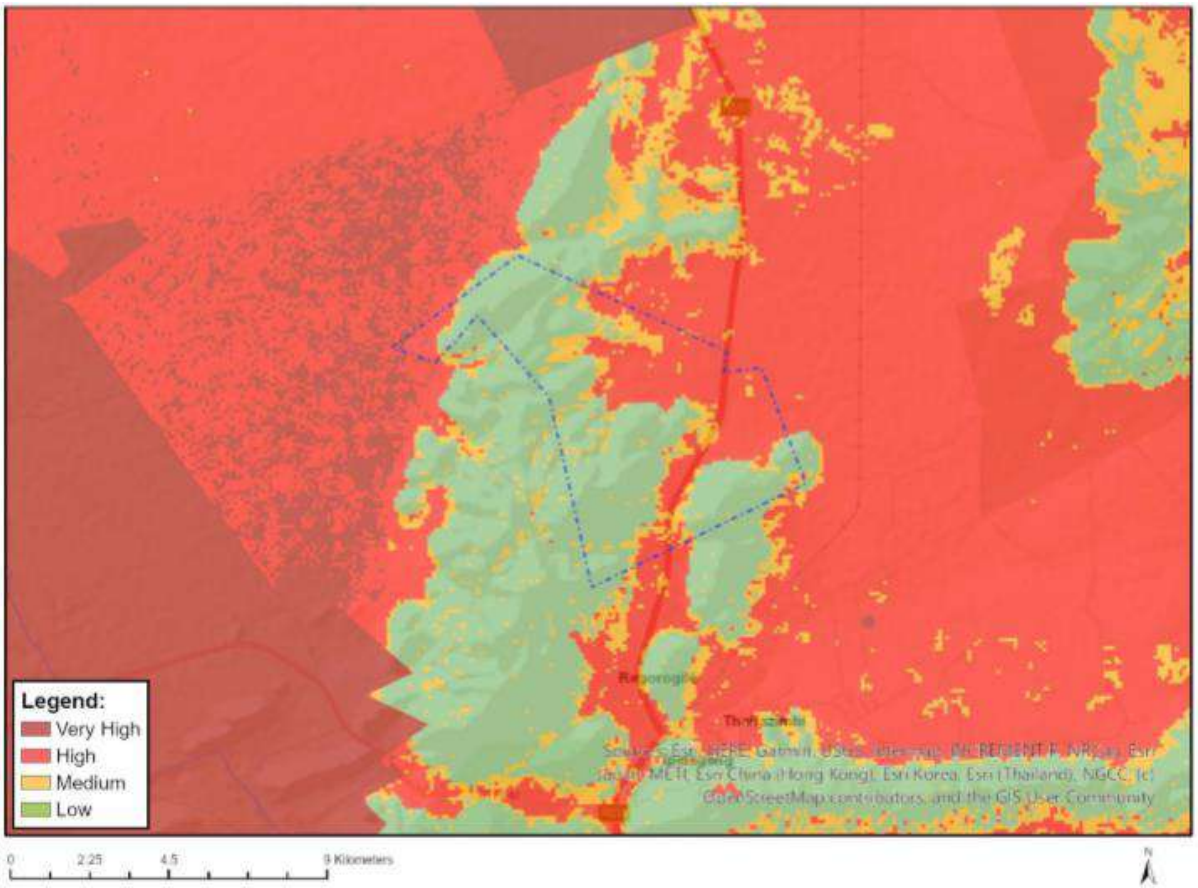

Figure 4-12: Screening tool Sensitivity

4.3. Identified Land Uses within the Study Area

The identified land uses within and around the study area include Farming, Cultivation and game reserve and grazing land. Table 4-2 below illustrates the various land uses identified within the study area.

Table 4-2: Site Pictures showing activities onsite

4.4. Soil Form in the Study Area

Based on field observations conducted during the site assessment, the dominant soil forms within the study area include Glenrosa, Mispah, Dundee, Hutton, Oakleaf, Shortlands, Bonheim, Avalon, Bainsvlei and Longlands. These soil forms vary significantly in terms of depth, structure, fertility, and drainage, all of which influence land use capability, vegetation type, and agricultural potential (Figure 4-13).

- Bonheim soils are typically moderately deep to deep soils characterized by a structured B horizon with relatively high clay content. They often occur on gentle to moderate slopes and are generally associated with moderate base status. Bonheim soils have moderate to good agricultural potential where drainage is adequate; however, their clayey subsoil may restrict internal drainage and root penetration if compacted. With proper management, they can support cultivated crops and pasture.
- Dundee soils are deep, sandy to sandy loam soils commonly found along river terraces and alluvial plains. They are generally well-drained and easy to cultivate due to their lighter texture. However, their lower clay content means they may have reduced nutrient- and water-holding capacity compared to more clay-rich soils. Under irrigation or with adequate rainfall and fertilisation, Dundee soils can support crop production, but they are more vulnerable to drought stress.
- Oakleaf soils are generally deep, well-drained soils with a relatively uniform texture profile and limited horizon differentiation. They often occur on stable landscape positions and may have moderate agricultural potential. While their structure is usually favourable for root development, productivity depends on nutrient availability and moisture conditions. In some cases, they may require soil amendments to optimise crop yields.
- Glenrosa soils are shallow, stony soils typically found over hard rock, often associated with undulating to steep terrain. These soils have limited effective rooting depth and water-holding capacity, making them marginally suitable for agriculture, especially in dryland conditions.
- Mispah soils are also shallow and lithic, formed over hard rock, and often lack a well-developed horizon sequence. These soils are found in rocky outcrops and shallow soil landscapes, with very low arable potential, and are typically used for extensive livestock grazing or conserved as natural vegetation.
- Shortlands soils are moderately deep and generally well-structured, often associated with moderate to high base status and good fertility. These soils can support a range of agricultural uses, including pasture, grazing, and limited crop cultivation, particularly under managed conditions.
- Hutton soils are deep, red, apedal soils that are generally well-drained and widely regarded as having good agricultural potential. Their depth and favourable physical properties allow for good root penetration and moisture storage. Where nutrient levels are adequate, Hutton soils are often suitable for a wide range of cultivated crops and grazing.

- Avalon soils are typically deep, yellow-brown to reddish soils that are moderately to well-drained, although they may show signs of periodic wetness in some landscape positions. They generally have moderate agricultural potential, with suitability depending on drainage conditions, texture, and landscape setting. In some areas, wetness limitations may reduce their cropping potential.
- Bainsvlei soils are usually deep, weakly structured to structureless soils, often occurring on gentle slopes and plains. They are commonly associated with moderate drainage and may be suitable for cultivation where climate and fertility are favourable. However, their productivity may be limited by lower natural fertility and susceptibility to compaction or crusting under poor management.
- Longlands soils are generally associated with imperfectly drained conditions and often occur in lower-lying landscape positions. These soils may have moderate to high clay content and are commonly affected by seasonal water saturation, which can restrict cultivation and root development. Their agricultural use is therefore often more suited to pasture or carefully managed cropping systems where drainage limitations can be addressed.

Figure 4-13: Pictures Dominant Soils forms within the study area outline.

4.5. Agricultural Potential and Sensitivity

Agricultural sensitivity in South Africa is generally restricted by climatic conditions, with specific mention to water availability (rainfall). Even within similar climatic zones, different soil types typically have different land use capabilities and agricultural sensitivities attributed to their inherent characteristics.

Highly sensitive agricultural land is defined as having the soil and terrain quality, growing season and adequate available moisture supply needed to produce sustained economically high crop yields when treated and managed according to best possible farming practices (Scotney *et al*., 1987).

For this assessment, agricultural sensitivity was inferred in consideration of observed limitations to land use due to physical soil properties and prevailing climatic conditions. Figure 4-14 below depict the land capability of the soils identified within the study area.

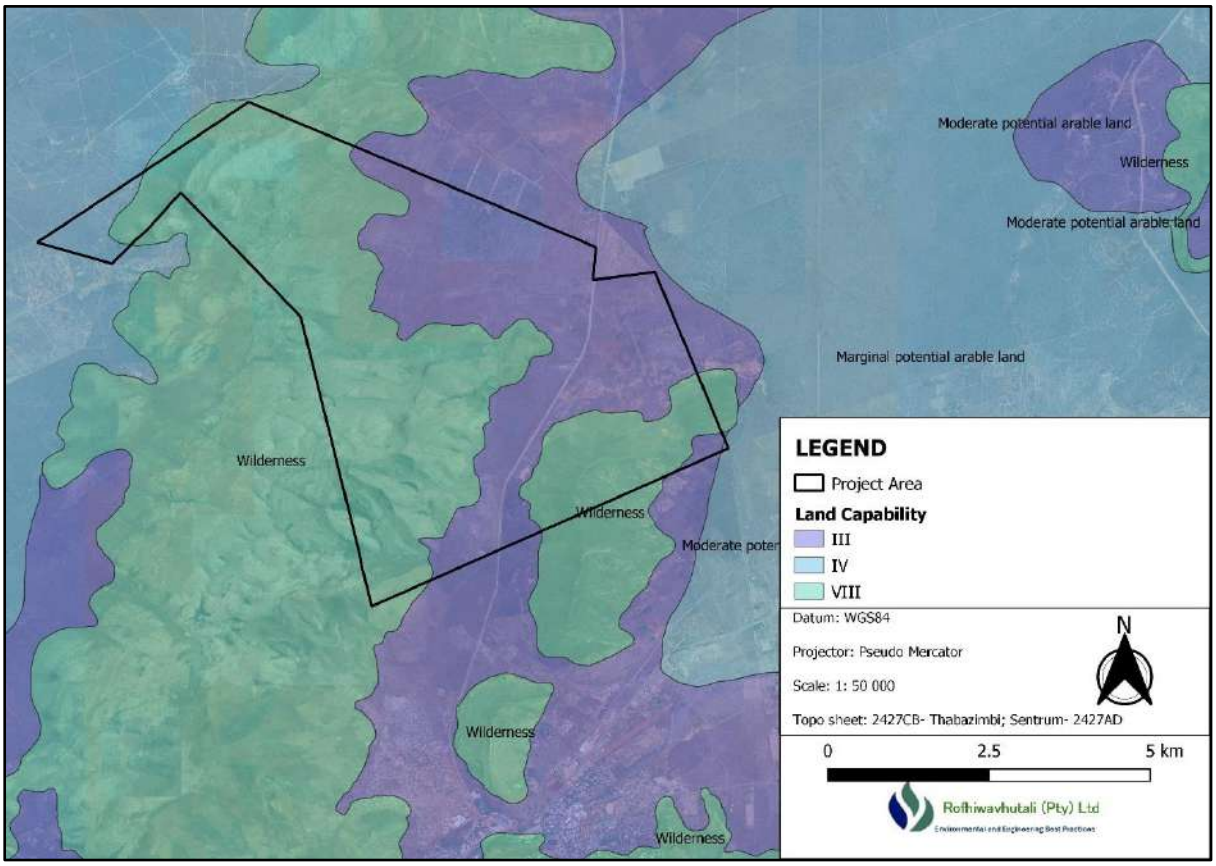

Figure 4-14: Map depicting the land capability of soils occurring within the study area.

5. IMPACT ASSESSMENT METHODOLOGY

5.1. Impact Assessment Methodology

The significance of each identified impact was determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity, which are further sub-divided as follows:

Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Scale/extent of impact	Magnitude (severity) of impact

To assess each of these factors for each impact, the following four ranking scales are used:

Magnitude	Duration
(10) Very high / Unknown	(5) Permanent (post closure)
(8) High	(4) Long-term (impact ceases after site closure has been obtained)
(6) Moderate	(3) Medium-term (impact ceases after operational life of the activity)
(4) Low	(2) Short-term (impact ceases after the construction phase)
(2) Minor	(1) Immediate
Scale	**Probability**
(5) International	(5) Definite / Unknown
(4) National	(4) Highly Probable
(3) Regional	(3) Medium Probability
(2) Local	(2) Low Probability
(1) Site only	(1) Improbable
(0) None	(0) None

Once these factors are ranked for each impact, the significance of the aspects, occurrence and severity, is assessed using the following formula:

SP (significance points) = (Magnitude + Duration + Scale) x Probability

The maximum value is 100 significance points (SP). The impact significance will then be rated as follows:

SP >60	Indicates high environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 – 60	Indicates moderate environmental significance	An impact or benefit which is sufficiently important to require management, and which could have an influence on the decision unless it is mitigated.
SP <30	Indicates low environmental significance	Impacts with little real effect and which should not have an influence on or require modification of the project design.
+	Positive impact	An impact that is likely to result in positive consequences / effects.

For the methodology outlined above, the following definitions were used:

i. ***Magnitude*** is a measure of the degree of change in a measurement or analysis (e.g., the severity of an impact on human health, well-being, and the environment), and is classified as none/negligible, low, moderate, high, or very high/unknown.

ii. ***Scale/Geographic*** extent refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international.

iii. ***Duration*** refers to the length of time over which an environmental impact may occur i.e. immediate/transient, short-term, medium term, long-term, or permanent.

iv. ***Probability*** of occurrence is a description of the probability of the impact occurring as improbable (less than 5% chance), low probability (5% to 40% chance), medium probability (40% to 60% chance), highly probable (most likely, 60% to 90% chance) or definite (impact will definite occur).

5.2. Impact Assessment Per Project Phase

5.2.1. Soil Erosion

Soil erosion is largely dependent on land use and soil management and is generally accelerated by anthropogenic activities. In the absence of detailed South African guidelines on erosion classification, the erosion potential and interpretation are based on field observations as well as observed soil profile characteristics. In general, soils with high clay content have a high-water retention capacity, thus less prone to erosion in comparison to sandy textured soils, which in contrast are more susceptible to erosion.

The soils of Mispah Form occurring within the Project Area are susceptible to soil erosion due to their sandy nature and shallow depth. Soils which were vegetated prior to the proposed activities will be more susceptible to erosion during the construction phase if left bare or if not vegetated when in stockpile areas before the rainy season; thus, exposed to wind and storm water. Soil erosion is likely to have some negative impacts on soil and this will most likely lead to:

- Removal of organic matter and important soil nutrients essential for vegetation growth and thus reduced yield potential;
- Possible pollution and sedimentation of nearby water sources consequently affecting the water quality for livestock and
- Limited water availability essential for vegetation growth

Soil erosion will be attributed to the following activities throughout the life of the project.

- Construction Phase:
    - Site clearing, removal and associated disturbances to soils, leading to, increased runoff, erosion and consequent loss of land capability in cleared areas. And Potential frequent movement of digging machinery within lose and exposed soils, leading to excessive erosion.
    - Exposure of soils resulting from vegetation clearing as part of ground preparation for establishment of infrastructure and opencast pit
- Operational and Decommissioning Phase:
    - Constant disturbances of soils, resulting in risk of erosion.
    - Ongoing disturbances to soils, resulting in increased sedimentation and risk of erosion, arising from mining activities.
    - Frequent movement of operation and earth moving equipment within lose and exposed soils, potentially leading to excessive erosion
    - Soil handling during backfilling and capping leading to erosion

5.2.2. Soil Compaction

Heavy equipment traffic during construction and activities is anticipated to cause soil compaction. The Project Area is more prone to compaction as there will be a significant increase in the use of vehicle and heavy machinery during the construction phase and if work is done when the soil is wet this may increase the soils susceptibility to compaction. Soil compaction may potentially lead to:

- Increased bulk density and soil strength, reduced aeration and lower infiltration rate;
- Consequently, it lowers crop performance via stunted aboveground growth coupled with reduced root growth;
- Destroyed soil structure, causing it to become more massive with fewer natural voids with a high possibility of soil crusting. This situation can lead to stunted, drought-stressed plants as a result of restricted water and nutrient uptake, which results in reduced crop yields;
- Soil biodiversity is also influenced by reduced soil aeration. Severe soil compaction may cause reduced microbial biomass. Soil compaction may not influence the quantity, but the distribution of macro fauna that is vital for soil structure including earthworms due to reduction in large pores.

Soil Compaction will be attributed to the following activities throughout the life of the Project.

- Construction Phase:
    - Site clearing and associated disturbances to soils, leading to, increased runoff, soil compaction and consequent loss of land capability in cleared areas.
    - Potential frequent movement of digging machinery and construction vehicles within lose and exposed soils, leading to excessive soil compaction.
- Operational and Decommissioning Phase:
    - Constant disturbances of soils, resulting in risk of compaction.
    - Movement of vehicles along the designated roads, this leads to soil compaction as well
    - Compaction and dust contamination due to vehicle movement while rehabilitating the shaft site and conveyer servitude
    - Erosion management/reduction due to slope stabilization and revegetation of disturbed

5.2.3. Potential Soil Contamination

Contamination sources are mostly unpredictable and often occur as incidental spills or leaks during the construction, operational phase and Decommissioning phase. Thus, the identified soils are considered equally predisposed to potential contamination. Therefore, strict waste management protocols as well as product management and activity specific Environmental Management Programme (EMPr) and monitoring guidelines should be adhered to during the construction, operational activities and Decommissioning phase. If the management protocols are not well managed this will more likely lead to:

- Contaminants leaching into the soil and thus potentially rendering the soil sterile. reducing the yield potential of soils.
- Potential reduction of water quality used for irrigation and for livestock use

Potential soil contamination is attributed to the following activities

- Construction Phase:
    - Spillage of petroleum hydrocarbons during construction of associated infrastructure
    - Disposal of hazardous and non-hazardous waste, including waste material spills and refuse deposits into the soil.
- Operational and Decommissioning Phase:
    - Leaching of hydrocarbons chemicals into the soils, leading to alteration of the soil chemical status as well as contamination of ground water.
    - Disposal of hazardous and non-hazardous waste, including waste material spills and refuse deposits into the soil.

5.2.4. Loss of Agricultural Land Capability

The loss of land capability is anticipated, as the land capability class for the study area is suitable for Arable, Wildlife, Forestry and Light Grazing. Large portions of soils will be removed and stockpiled and thus further potentially reducing the fertility status (sterilisation) of the soils and being prone to erosion. The proposed activities will lead to a permanent change of land use if not properly mitigated. Consequently, the loss of soils and the permanent change in land use will be localized to within the Project Area.

Loss of Grazing land Capability is attributed to the following activities.

- Construction phase:
    - Site clearing, the removal of natural vegetation, and associated disturbances to soils, leading to increased nutrient leaching, runoff
    - Potential indiscriminate disposal of hazardous and non-hazardous waste, including waste material spills and refuse deposits into the soil.
- Operational Phase:
    - Ongoing disturbances to soils, resulting in increased leaching of soil nutrients and risk of erosion, attributed to mining activities
    - Potential increase in concentrations of contaminant concentration in the soil.
    - Ongoing disturbance as a result of maintenance activities, leading to altered vegetation community structures, and consequently altering the quality and nutrient status of the soil

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.

6.2. Location of stockpiles

- Ensure stockpiles are placed on a free draining location to limit erosion loss
- Stockpiles should be located on flat terrain, this will be to reduce erosion.

6.2.1. Topsoil stripping

- Soils should 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.

6.2.2. 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.

6.2.3. Demarcation of topsoil stockpiles

- Berms should be placed around stockpiled soil to prevent soil loss due to erosion.
- The stockpiles area should be demarcated.

6.2.4. 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.

6.2.5. 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.

- Flat terrain should be ensured, as steep slopes will promote erosion.

6.2.6. 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.

6.2.7. 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.
- Burying of any waste including rubble, domestic waste, empty containers on the site should be strictly prohibited and all construction rubble waste must be removed to an approved disposal site

6.3. Soil Erosion and Dust Emission Management

- The boundaries of the proposed development and construction zones must be clearly defined to ensure that vegetation clearing is limited strictly to the designated infrastructure footprint as far as reasonably possible.
- Exposed soils along access roads should be periodically moistened to reduce dust generation during construction, particularly under forecasted windy conditions.
- Disturbed areas surrounding the development footprint should, where required, be rehabilitated using a mix of indigenous grass species to restore ground cover and reduce the risk of erosion and dust dispersion.
- Interim erosion control measures should be implemented during construction to stabilise disturbed soils until sufficient vegetation cover has been re-established.

6.4. Soil management during the operational and decommissioning phase

6.4.1. Managing potential soil contamination during the operational and decommissioning phase

- Prevent any spills from occurring.

- If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities.
- An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent contamination;
- All storage areas (for fuels and lubricants) will be compacted and have bunded containers to prevent soil pollution and appropriate oil separators installed.
- A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the construction works;
- 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.

Table 6-1: Environmental impact Assessment Table

POTENTIAL IMPACT	PHASE In which impact is anticipated	Magnitude	Duration	Scale	Probability	Significance	Significance without Mitigation	Magnitude	Duration	Scale	Probability	Significance	Significance with Mitigation	Detailed Mitigation Measures
Construction Phase														
Soil compaction and erosion due to vegetation clearance and access roads	Construction	6	3	2	4	44	Moderate	4	2	2	3	24	Low	Minimise clearing; use existing roads; avoid steep slopes; apply erosion controls
Topsoil loss and fertility reduction	Construction	6	3	2	4	44	Moderate	4	4	2	2	20	Low	Avoid subsoil mixing
Altered drainage patterns from trenching and roads	Construction	6	3	2	3	33	Moderate	4	2	2	2	16	Low	Align infrastructure with contours; restore drainage after use
Site clearing, removal and associated disturbances to soils, leading to, increased runoff, erosion and consequent loss of land capability in cleared areas.	Construction	5	3	2	4	40	Moderate	4	2	2	3	24	Low	No site-clearing activities should take place during periods of heavy rainfall.
Potential hazardous and non-hazardous waste disposal, including waste material spills and refuse deposits into the soil.	Construction	5	3	2	4	40	Moderate	4	2	2	3	24	Low	Development of detailed procedures for spill containment and soil clean-up.
Potential leaching of hydrocarbon chemicals into the soils from construction vehicles leads to the alteration of the soil's chemical status. Potential hazardous and non-hazardous waste disposal, including waste material spills and refuse deposits into the soil.	Construction	6	3	2	3	33	Moderate	4	2	2	3	24	Low	Implementing regular site inspections for materials handling and storage.
Operational Phase														
Loss of arable/grazing land due to trenching/drilling	operational	**6**	**3**	**2**	**4**	44	Moderate	**4**	**3**	**2**	**2**	18	Low	Avoid high-potential Agri-zones; drill selectively; minimise trench footprint
Soil contamination from machinery/oil/fuel leaks	operational	6	4	2	3	36	Moderate	2	3	2	2	14	Low	Maintain equipment; use drip trays, bunded refuelling areas
Reduced productivity in bulk sampling zones	operational	**6**	**3**	**2**	**4**	44	Moderate	**2**	**3**	**2**	**2**	14	Low	Control Vehicle Movement and Site Demarcation to reduce compaction beyond the trench area
Soil compaction from heavy machinery	operational	6	3	2	4	44	Moderate	4	3	2	2	18	Low	Designate travel paths; decompact soil post-activity
Operation and maintenance of the road; constant traffic and frequent soil disturbances resulting in land capability loss.	operational	**5**	**4**	**2**	**3**	33	Moderate	**3**	**3**	**2**	**2**	16	Low	
Potential frequent movement of digging machinery within loose and exposed soils, leading to excessive erosion.	operational	**6**	**3**	**2**	**4**	44	Moderate	**4**	**3**	**2**	**3**	27	Low	The footprint of the proposed development and construction activities should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible.
Decommissioning and Closure Phase														
Rehabilitation and recovery of land capability	Decommissioning	**6**	**2**	**2**	**4**	40	Moderate	**4**	**2**	**2**	**3**	24	Low	Backfill; replant; recontour; use local species; monitor post-rehab
Potential future decommissioning activities will likely involve dismantling and removing the supporting infrastructure, as well as transferring waste materials to disposal, recycling, and/or treatment facilities, as applicable (where re-use is not possible).	Decommissioning	**6**	**2**	**2**	**3**	30	Moderate	**4**	**2**	**2**	**3**	24	Low	The study area should be revegetated with indigenous vegetation to help with soil compaction, runoff, erosion and dust control as required or returned to agricultural use.
Potential decommissioning activities will likely involve dismantling on-site, equipment and facilities. During this period, there will be heavy vehicular traffic, thus increasing the likelihood of soil contamination.	Decommissioning	6	2	2	3	30	Moderate	4	1	2	3	21	Low	Any portions of the site with compacted soil should be decompacted.

7. CONCLUSION AND RECOMMENDATIONS

Conclusion

Rofhiwavhutali (Pty) Ltd was appointed to undertake a Soil, Land Use, Land Capability and Agricultural Potential Verification Assessment as part of the Environmental Authorisation (EA) process for the proposed Mining Right application for Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc, and Iron Ore, in Respect of Portions Re/2/313, Re/3/313, and Re /4/313 of the Farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province, South Africa.

The soil pH in the study area ranges from 6.5 to 7.4, indicating neutral to slightly alkaline conditions. This pH range is generally considered highly suitable for most cultivated crops, as it supports optimal availability of essential plant nutrients and promotes favourable soil biochemical processes.

The desktop-predicted soil loss across the study area is predominantly classified as very low, with only a small portion reflecting low soil loss. This indicates that the prevailing soil characteristics, topography, vegetation cover, and current land use practices collectively contribute to a stable landscape with minimal erosion risk. The generally gentle slopes, adequate ground cover, and inherent soil stability reduce soil particle detachment and limit surface runoff, thereby minimizing the potential for soil degradation.

The study area is characterised by a combination of non-soil land uses, red apedal or yellow structureless soils with plinthic horizons, freely drained structureless soils, and associations of shallow soil land classes (Classes 13 and 16). These land classes typically represent landscapes where soil depth, rocky terrain, and drainage conditions impose limitations on intensive cultivation.

According to the desktop soil potential mapping, the study area is predominantly classified as wilderness, moderately potential arable land, and marginal potential arable land. Areas classified as wilderness generally represent land with very limited or no agricultural potential due to inherent soil and terrain limitations such as shallow soils, rocky outcrops, or unfavourable terrain conditions. Moderately potential arable land may support crop production under appropriate soil management practices, while marginal potential arable land is constrained by soil depth, fertility, and drainage limitations, which restrict sustainable cropping potential.

The dominant soil groups within the study area are Lithic Leptosols, which are typically shallow soils occurring over hard rock and generally associated with limited agricultural capability. The second dominant soil group is Ferric Lixisols, which occur mainly in the south-eastern portion of the site and are characterised by subsurface clay accumulation and relatively low natural fertility. A smaller portion of the north-western section is associated with Ferric Luvisols, which may exhibit comparatively better natural fertility where soil depth and drainage conditions are favourable.

Field observations further identified several dominant soil forms including Glenrosa, Mispah, Dundee, Hutton, Oakleaf, Shortlands, Bonheim, Avalon, Bainsvlei, and Longlands soils. While some deeper soils such as Hutton, Bonheim, Dundee and Oakleaf may support agricultural activities under favourable conditions, other soils such as Glenrosa and Mispah are shallow and lithic, significantly limiting their agricultural capability. In addition, soils such as Avalon and Longlands may experience drainage limitations or periodic wetness, which further restricts their suitability for cultivation.

The study area presents a mixed agricultural capability profile, with soils predominantly classified as moderate to marginal potential arable land, together with areas classified as wilderness due to inherent soil and terrain limitations. While certain portions of the site may support limited cultivation under appropriate management practices, the presence of shallow soils, rocky terrain, drainage constraints, and localized seasonal wetness reduces the overall suitability of the area for intensive agricultural production.

It is the opinion of the specialist that without mitigation, there is a significant risk to the long-term viability of moderate-potential soils that could support agricultural use. As such, appropriate and integrated mitigation measures should be adopted to reduce the risk of losing these valuable soil resources, in line with sustainable development principles. It is far more acceptable to sacrifice small areas of land with limited cultivation potential, due to inherent soil limitations, than to compromise higher, potential agricultural land, which is far less common and more difficult to replace elsewhere in the country.

The screening tool analysis was conducted, which presented the findings as the impact on agricultural resources being very High sensitivity in terms of agricultural potential. Based on the outcomes of the field assessment, this was found to be moderate to marginal, with significant portions classified as wilderness due to inherent soil and terrain limitations and have a less significant impact as presented on the screening tool due to the dominant soil forms that are not high-potential agricultural soils due to various limitations, including shallower depth, rocky terrain and requiring intensive management strategies to cultivate. It is the opinion of the specialist that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in the study area are made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.

Recommendations

- The project operations must stay inside the clearly delineated footprint zones;
- During the construction period, bare soils within the access roads can be routinely moistened with water to minimize dust, especially when strong winds are anticipated according to the local weather prediction; and
- Soil Compaction is usually greatest when soils are moist, so soils should be stripped when moisture content is as low as possible. If they have to be moved when wet, truck and shovel methods should be used as bowl scrapers create excessive compaction when moving wet soils;
- Ensure proper handling and storage of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets.

- As much as is practically possible, the projected development and construction activities' footprints should be clearly marked to limit vegetation clearing activities inside the infrastructural footprint;
- Usable topsoil from the construction of the surface infrastructure areas must be removed prior to construction and stockpiled separately within the demarcated areas with measures to protect this valuable resource from impacts such as chemical contamination as well as mixing with less valuable overburden types.
- Development of detailed procedures for spill containment and soil clean up.
- Vehicle and equipment maintenance should be carried out in designated, appropriate facilities fitted with spillage containment, floors, and sumps to capture fugitive oils and greases.
- Unnecessary traffic and movement over the areas targeted for construction must be avoided, especially heavy machinery
- Revegetate with an indigenous grass mix, to re-establish a protective cover, in order to minimise soil erosion and dust emissions.

8. REFERENCES

- Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
- Council of GeoScience (CGS)., 2001.Geological Survey (South Africa). Pretoria, South Africa.
- Department of Agriculture, Forestry and Fisheries. Agricultural Geo-Referenced Information System (AGIS). Grazing Capacity Maps.
- Department of Agriculture, Forestry and Fisheries.,1993. Agricultural Geo-referenced Information System (AGIS). Grazing Capacity Maps.
- Klingebiel, A. A., & Montgomery, P. H. (1961). Land-Capability Classification. Soil Conservation Service, U.S. Department of Agriculture, Agriculture Handbook No. 210.
- Land Type Survey Staff, 1976-2006. Land type Survey Database. ARC-ISCW, Pretoria.
- National Department of Agriculture, 2002. Development and Application of a Land Capability Classification System for South Africa
- Scotney, D.M., Ellis, F., Nott, R.W., Taylor, K.P., Van Niekerk, B.J., Verster, E. & Wood, P.C., 1987. A system of soil and land capability classification for agriculture in the SA TBVC states. Dept. Agric., Pretoria.
- Smith, B., 2006. The Farming Handbook. Netherlands & South Africa: University of KwaZulu Natal Press & CTA.
- Soil Classification Working Group, 2018. Soil classification. A Natural and Anthropogenic System for South Africa. Mem. agric. nat. Resource. S. Afr. No. 15. Dept. Agric. Dev., Pretoria.
- Department of Agriculture, Forestry and Fisheries, 2017. National land capability evaluation raster data: Land capability data layer, 2017. Pretoria.

Heritage Impact Assessment

PREPARED BY:

Rofhiwavhutali (Pty) Ltd
Environmental and Engineering Best Practices

Contact Person: Mutali Guduvheni
Contact No: 076 176 0655
Email: info@rofhiwavhutali.co.za
Website: www.rofhiwavhutali.co.za

PREPARED FOR:

VAHLENGWE MINING ADVISORY AND CONSULTING

DMRE Ref No: LP 30/5/1/2/3/2/1 10287 MR

NAME OF THE APPLICANT: ARENGO 297 (PTY) LTD

MINING RIGHT APPLICATION FOR DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC, AND IRON ORE, IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE., IN RESPECT OF PORTIONS RE/2/313, RE/3/313, AND RE/4/313 OF THE FARM CORNWALL 313 KQ AND THE REMAINING EXTENT OF PORTIONS 2, 5, 8, 9, 10, AND 11 OF THE KOEDOEVLEI 128 KQ, WITHIN THE THABAZIMBI LOCAL MUNICIPALITY OF THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.

2026

ABILITY TO CONDUCT THE PROJECT

Alvord Nhundu is a professional archaeologist. He completed his Bachelor of Science with honours degree in archaeology with the University of the Witwatersrand (Wits) and Masters in Archaeology with the University of Pretoria (UP). His research interest lies in old and new world archaeology, palaeoenvironmental and climatology, archaeological theory, Later Stone Age, rock art, hunter-gatherers, hunter-gatherer interactions, several aspects of Southern African Iron Age and Indigenous archaeologies. Alvord is an accredited Cultural Resource Management (CRM) member of the Association of Southern African Professional Archaeologists (ASAPA No.338) with Field Director status in Iron Age and Stone Age, and Field Supervisor status in Grave Relocation and Rock Art. He is also affiliated to Society of South Africanist Archaeologists (SAfA) and the International Council of Archaeozoology (ICAZ). He has been practising CRM for more than 10 years and has completed over 100 Archaeological Impact Assessments (AIA) for developmental projects in the Limpopo, Mpumalanga, North-West, Eastern Cape, Free State, Northern Cape and KwaZulu Natal provinces of South Africa. The projects include establishment and upgrade of power substations, road construction, development of malls, housing developments, establishment and expansion of mines. He has also conducted the relocation of graves. His detailed CV is available on request.

INDEPENDENCE

I, Alvord Nhundu, declare that:

- I act as an independent specialist;
- I am conducting work relating to the proposed mining right application in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required experience in conducting the specialist report and I will comply with legislation, regulations and any guidelines that have relevance to the proposed activity;
- I have not, and will not engage in conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the details and particulars furnished by me in this declaration are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the regulations and is punishable in terms of section 24F of the NEMA.

Cell: 078 344 2671
E-mail: nalvord@yahoo.com

CLIENT CONTACT DETAILS:

Items	Details
Company Name	Vahlengwe Mining Advisory and Consulting (Pty) Ltd
Contact Person	Mr S Mabaso
Physical address	238 Voster Avenue, Glenvista Ext 03, Johannesburg South
Telephone/ Cell	+27 11 432 0062
Email	info@vahlengweadvisory.co.za

ACKNOWLEDGMENTS

The author would like to acknowledge Vahlengwe Mining Advisory and Consulting (Pty) Ltd staff for their assistance in conducting the project Google Earth and Wikipedia are also acknowledged.

EXECUTIVE SUMMARY

Introduction

Rofhiwavhutali (Pty) Ltd was appointed by Vahlengwe Mining Advisory and Consulting (Pty) Ltd to conduct an Archaeological and Cultural Heritage Impact Assessment study for the proposed Iron Ore Mining Right Application on portions Re/2/313, Re/3/313, and Re/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the farm Koedoevlei 128 KQ within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province. As prescribed by SAHRA and stipulated by the legislation, an HIA is a pre-requisite for such a development. The main purpose of the study was to identify and document the archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed iron ore mining development. To reach a defensible recommendation, both a desktop study and a field survey were conducted. The desktop study was undertaken through the South African Heritage Resources Information System (SAHRIS) for previous Archaeological Impact Assessments conducted in the region of the proposed development, and also for research that has been carried out in the wider area over recent years. The field survey was conducted to validate any assumptions made during the desktop study. The Heritage Impact Assessment was undertaken in terms of Section 38 (8) of the National Heritage Resources Act (Act No. 25 of 1999).

Methods

To understand the archaeology of the area, a background study was undertaken, and relevant institutions were consulted. These studies entail the view of archaeological and heritage impact assessment studies that have been conducted in and around the proposed area through SAHRIS. The author conducted the field survey on the **12th of March 2026.** The area of land for the proposed development was investigated on foot for any traces of material culture.

Restrictions and constraints

The study noted that the site is disturbed by current and previous game farming and mining land use activities. As with any survey, archaeological materials may be under the surface and therefore unidentifiable to the surveyor until they are exposed once mining begins. As a result, should any archaeological/ or grave site be observed during the mining stage, a heritage specialist monitoring the development must immediately be notified.

Results

The Phase I Cultural-Heritage Impact Assessment study for the proposed mining right application did not reveal any significant archaeological material within the footprint of the proposed development. The study

noted that the area proposed for development has been heavily disturbed by previous land use activities. The study also noted that buildings and structures do exist within the study area, the structures were noted to be younger than sixty years. The study therefore does not trigger Section 34 of the NHRA Act of 1999. The study identified two burial sites **TBS01** and **TBS02** on the GPS coordinates **24°30'56.81"S, 27°24'37.58"E** and **24°32'6.40"S, 27°23'39.40"E**. The study therefore triggers Section 36 of the NHRA Act of 1999. It is also important to note that the possibility of chance finds is ever present and during the mining phase the developer is urged to be careful and heedful of that.

Recommendations

Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of this heritage report, there are no significant cultural heritage resources barriers to the proposed development project. SAHRA may approve the project as planned with special commendations to implement the recommendations here in made:

1. It is recommended that SAHRA endorse the report as having satisfied the requirements of Section 38 (8) of the NHRA requirements;

2. It is recommended that SAHRA make a decision in terms of Section 38 (4) of the NHRA to approve the proposed mining right application;

3. The identified burial sites must be protected from the proposed mining activities, this is done by maintaining a reasonable buffer zone of 100m between the burial sites and the mining activities;

4. The Public Participation Process should ensure that any cultural heritage related matters for this project are given due attention whenever they arise and communicated to the SAHRA through the proposed project development Archaeologist. This form of extended community involvement would pre-empty any potential disruption that may arise from previous unknown cultural heritage matters that may have escaped the attention of the study; and

5. From a heritage perspective supported by the findings of this study, the project is supported. However, mining activities should be approved under the observation that the dimensions do not extend beyond the area considered in this report.

Conclusions

A thorough background study and survey of the proposed development was conducted in line with SAHRA guidelines. As per the recommendations above, the project may proceed subject to adherence of the above recommendations.

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ACRONYMS AND ABBREVIATIONS

AIA	Archaeological Impact Assessment
EMP	Environmental Management Plan
HIA	Heritage Impact Assessment
LIA	Late Iron Age
MIA	Middle Iron Age
EIA	Early Iron Age
HMP	Heritage Management Plan
LSA	Late Stone Age
MSA	Middle Stone Age
ESA	Early Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
SAHRA	South African Heritage Resources Agency

GLOSSARY OF TERMS

The following terms used in this Archaeology are defined in the National Heritage Resources Act [NHRA], Act Nr. 25 of 1999, South African Heritage Resources Agency [SAHRA] Policies as well as the Australia ICOMOS Charter *(Burra Charter)*:

Archaeological Material: remains resulting from human activities, which are in a state of disuse and are in, or on, land and which are older than 100 years, including artifacts, human and hominid remains, and artificial features and structures.

Artefact: Any movable object that has been used, modified or manufactured by humans.

Conservation: All the processes of looking after a site/heritage place or landscape including maintenance, preservation, restoration, reconstruction and adaptation.

Cultural Heritage Resources: refers to physical cultural properties such as archaeological sites, palaeolontological sites, historic and prehistorical places, buildings, structures and material remains, cultural sites such as places of rituals, burial sites or graves and their associated materials, geological or natural features of cultural importance or scientific significance. This include intangible resources such religion practices, ritual ceremonies, oral histories, memories indigenous knowledge.

Cultural landscape: "the combined works of nature and man" and demonstrate "the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both internal and external".

Cultural Resources Management (CRM): the conservation of cultural heritage resources, management, and sustainable utilization and present for present and for the future generations

Cultural Significance: is the aesthetic, historical, scientific and social value for past, present and future generations.

Chance Finds: means Archaeological artefacts, features, structures or historical cultural remains such as human burials that are found accidentally in context previously not identified

during cultural heritage scoping, screening and assessment studies. Such finds are usually found during earth moving activities such as water pipeline trench excavations.

Compatible use: means a use, which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance.

Conservation means all the processes of looking after a place so as to retain its cultural significance.

Expansion: means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Grave: A place of interment (variably referred to as burial), including the contents, headstone or other marker of such a place, and any other structure on or associated with such place.

Heritage impact assessment (HIA): Refers to the process of identifying, predicting and assessing the potential positive and negative cultural, social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law, and which may significantly affect the cultural and natural heritage resources. The HIA includes recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

Historic Material: remains resulting from human activities, which are younger than 100 years, but no longer in use, including artifacts, human remains and artificial features and structures.

Impact: the positive or negative effects on human well-being and / or on the environment.

***In situ* material:** means material culture and surrounding deposits in their original location and context, for instance archaeological remains that have not been disturbed.

Interested and affected parties Individuals: communities or groups, other than the proponent or the authorities, whose interests may be positively or negatively affected by the proposal or activity and/ or who are concerned with a proposal or activity and its consequences.

Interpretation: means all the ways of presenting the cultural significance of a place.

Late Iron Age: this period is associated with the development of complex societies and state systems in southern Africa.

Material culture means buildings, structure, features, tools and other artefacts that constitute the remains from past societies.

Mitigate: The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

Place: means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views.

Palaeontology: Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Protected area: means those protected areas contemplated in section 9 of the NEMPAA and the core area of a biosphere reserve and shall include their buffers.

Public participation process: A process of involving the public in order to identify issues and concerns and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters.

Setting: means the area around a place, which may include the visual catchment.

Significance: can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgments and science-based criteria (i.e. biophysical, physical cultural, social and economic).

Site: a spatial cluster of artifacts, structures, organic and environmental remains, as residues of past human activity.

1 INTRODUCTION

At the request of Vahlengwe Mining Advisory and Consulting (Pty) Ltd, Rofhiwavhutali (Pty) Ltd conducted a Phase I Archaeological and Heritage Impact Assessment Study for the proposed Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc and Iron Ore Mining Right Application on portions Re/2/313, Re/3/313, and Re/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the farm Koedoevlei 128 KQ within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province. The survey was conducted in accordance with the SAHRA Minimum Standards for the Archaeology and Paleontology Study. The minimum standards clearly specify the required contents of the report of this nature. The study aims to identify and document archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed development, these will in turn assist the developer in ensuring proper conservation measures in line with the National Heritage Resources Act, 1999 (Act 25 of 1999).

2 SITES LOCATION AND DESCRIPTION

Arengo 297 (Pty) Ltd proposes to undertake the mining right activities in respect of portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the farm Koedoevlei 128 KQ within the Thabazimbi Local Municipality of the Waterberg District Municipality. This area covers an extent of 3,892.0 ha. The project entails the proposed mining right application for the mining of iron ore (Fe).

The proposed mining right is located in the northern part of Thabazimbi and approximately 6.02 km, in respect of portions Municipality RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the farm Koedoevlei 128 KQ within the Thabazimbi Local Municipality of the Waterberg District, Limpopo Province.

Table 1: Summary of project location details.

Province	Limpopo
District Municipality	Waterberg
Local Municipality	Thabazimbi
Affected farms	Cornwall 313 KQ and Koedoevlei 128 KQ
Proposed development	Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc and Iron Ore Mining Right Application
DMRE REF	GP 30/5/1/2/3/2/1/(10287) MR

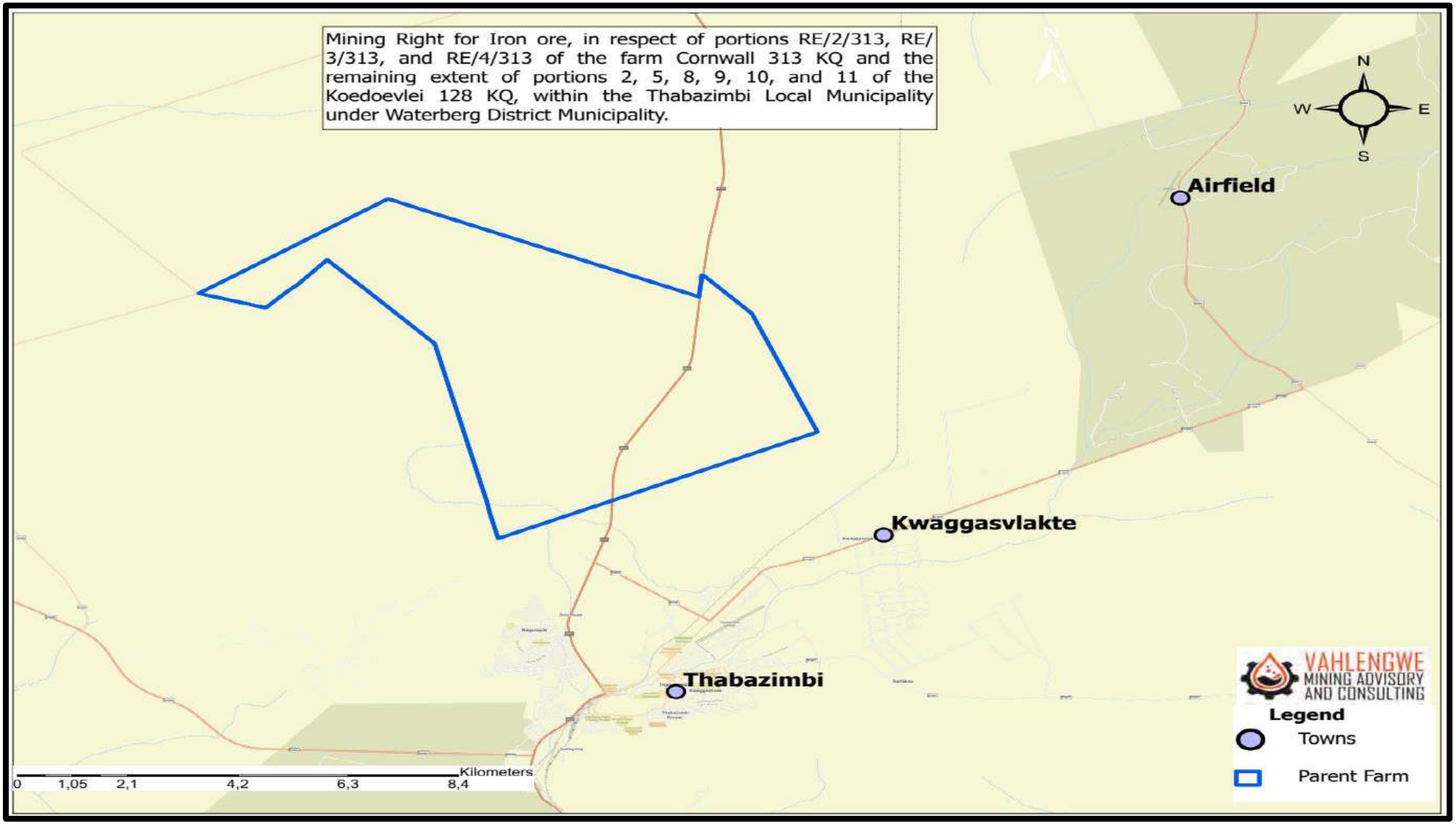

Figure 1: Locality Map of the site proposed for the development (Vahlengwe 2026).

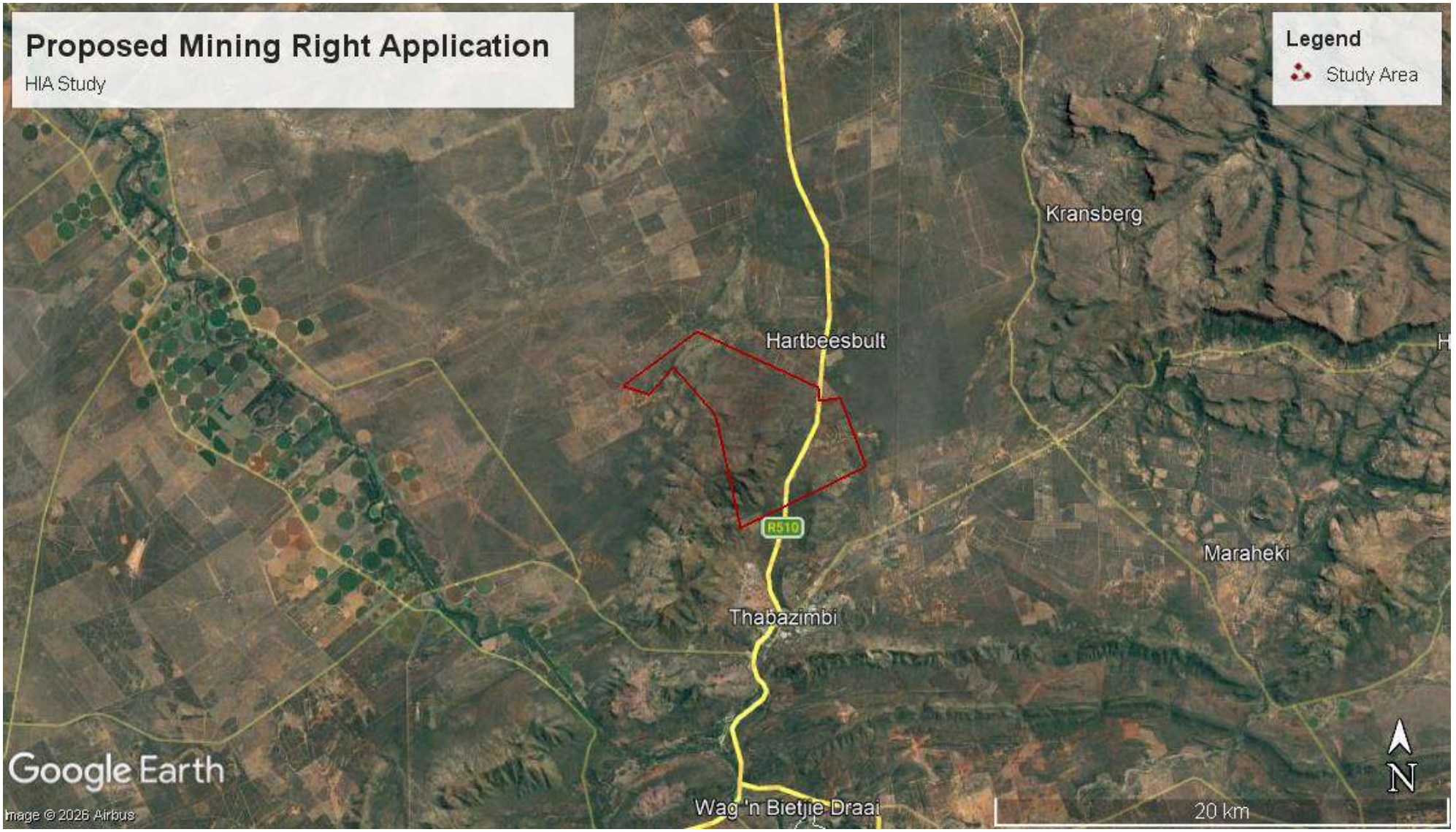

Figure 2: A satellite view of the site proposed for the development (Author 2026).

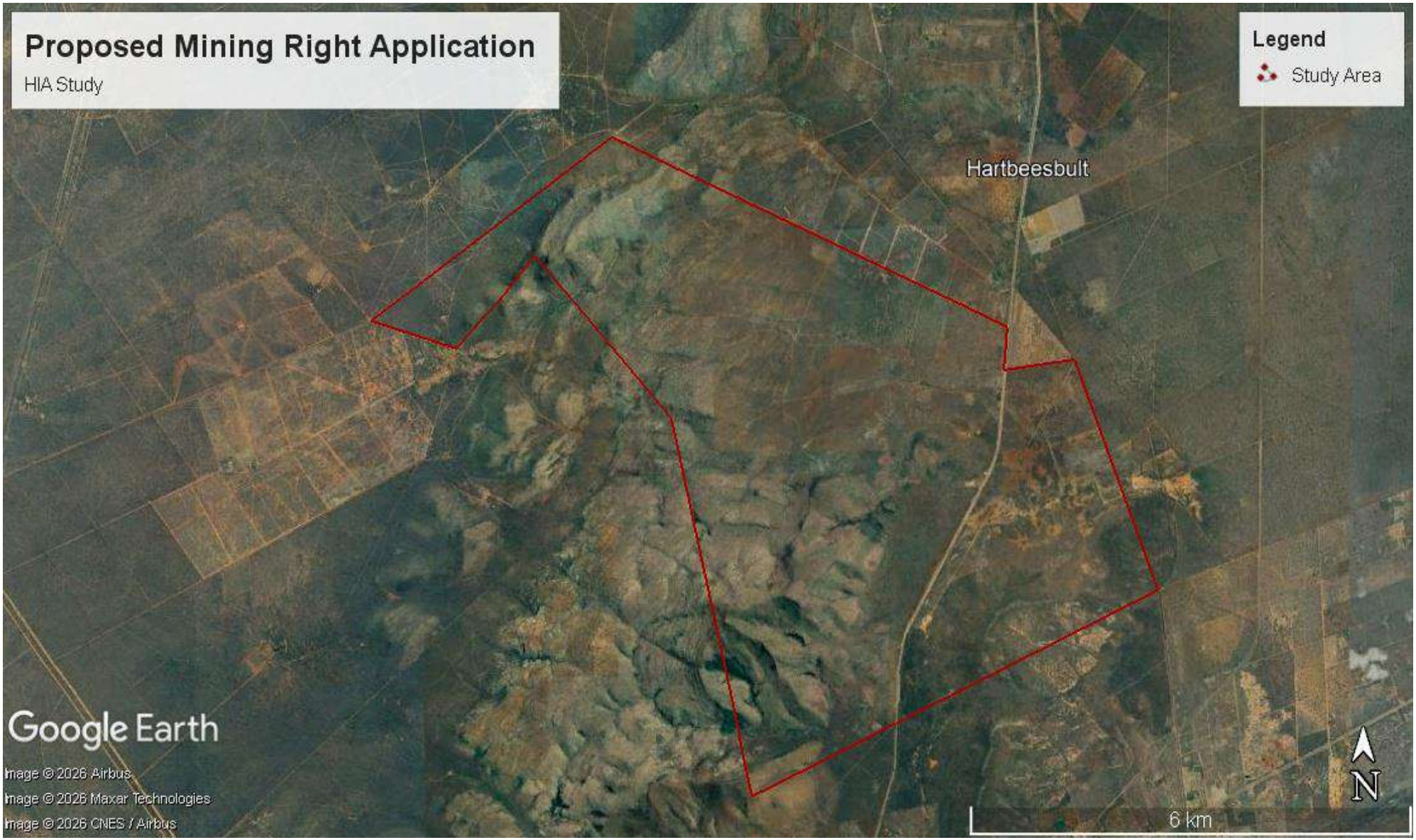

Figure 3: A Google Earth Image showing the study area (Author 2026).

Figure 4: Survey tracks within the site proposed for the development (Author 2026).

Figure 5: Showing the Heritage sites identified within the study area (Author 2026).

Figure 6: A historical (1969) satellite image showing the farms proposed for the development (NGIGEOPORTAL 2026).

PHOTOGRAPHS OF THE STUDY AREA

Figure 7: General view of the site proposed for the development.

Figure 8: View of access roads within the study area.

Figure 9: Showing a section of the project area.

Figure 10: Showing previously excavated area within the proposed development site.

Figure 11: View of earth moving activities within the study area.

Figure 12: View of a section of the study area that is mountainous.

Figure 13: The proposed development site is characterized by dense vegetation.

Figure 14: View of heavily disturbed section of the site proposed for the development.

Figure 15: The development area is not on pristine ground, note the powerline.

Figure 16: View of dense vegetation cover within the site proposed for the development.

Figure 17: View of some of the game identified within the development area.

Figure 18: View of man-made dams within the development area.

3 PURPOSE OF THE CULTURAL HERITAGE STUDY

The purpose of this Archaeological and Cultural Heritage study was to entirely identify and document archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed mining development, these will in turn assist the developer in ensuring proper conservation measures in line with the National Heritage Resources Act, 1999 (Act 25 of 1999). Impact assessments highlight many issues facing sites in terms of their management, conservation, monitoring and maintenance, and the environment in and around the site. Therefore, this study involves the following:

- Identification and recording of heritage resources that may be affected by the proposed mining right application; and
- Providing recommendations on how best to appropriately safeguard the identified heritage sites. Mitigation is an important aspect of any development on areas where heritage sites can be identified.

4 METHODOLOGY AND APPROACH

The methods utilised in this study are informed by the 2012 SAHRA Policy Guidelines for impact assessment. To achieve the purpose and objectives, different sources were used, this includes;

I. Literature review

Relevant literature was consulted through the SAHRIS website, with an intention to review previous Cultural Heritage Impact Assessments conducted in and around the area of the proposed development. Various archaeological, historical sources and recently published and unpublished books were used to aid this study.

II. Field survey

The field survey was undertaken by the author on **12 March 2026.** The survey made use of a vehicle to get to site, and the site was surveyed on foot.

III. Public Participation

A public participation will be undertaken by the project EAP to gather the issues and concerns of interested and affected parties (IAPs) and Authorities, including community leaders. The process consists of contacting the IAPs, having a public meeting with the stakeholders and informing and engaging with them on the project proposal. The issues raised will be incorporated in the EIA/EMP where relevant and outcome of heritage issues will be forwarded to the Author.

IV. Documentation

In line with the appropriate legislation, the site was documented by taking photographs using a camera 10.1 mega pixel Sony Cybershort Digital Camera and plotting of finds using a Garmin etrex Venture HC.

V. Restriction and assumption

Underground heritage may not be represented on the surface making the identification difficult. This serves as considerable limitation. Should any cultural material be identified when the development begins, a specialist must be consulted to examine the finds.

5 APPLICABLE HERITAGE LEGISLATION

Several legislations provide the legal basis for the protection and preservation of both cultural and natural resources. These include the National Environment Management Act (No. 107 of 1998); Tourism Act, 2014 (Act No.3 of 2014); Cultural Institution Act (No. 119 of 1998), and the National Heritage Resources Act (Act 25 of 1999). Section 38 (1) of the National Heritage Resources Act requires that where relevant, an Impact Assessment is undertaken in case where a listed activity is triggered. Such activities include:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50 m in length; and
(c) any development or other activity which will change the character of an area of land, or water -
(i) exceeding 5 000 m² in extent;
(ii) involving three or more existing erven or subdivisions thereof; or
(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a Provincial Heritage Resources Authority;
(d) the re-zoning of a site exceeding 10 000 m2 in extent; or
(e) any other category of development provided for in regulations by SAHRA or a Provincial Heritage Resources Authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Section 3 of the National Heritage Resources Act (25 of 1999) lists a wide range of national resources protected under the act as they are deemed to be national estate. When conducting Heritage Impact Assessment (HIA) the following heritage resources have to be identified:

(a) Places, buildings structures and equipment of cultural significance
(b) Places to which oral traditions are attached or which are associated with living heritage
(c) Historical settlements and townscapes
(d) Landscapes and natural features of cultural significance
(e) Geological sites of scientific or cultural importance
(f) Archaeological and paleontological sites
(g) Graves and burial grounds including-
- *(i) ancestral graves*
- *(ii) royal graves and graves of traditional leaders*
- *(iii) graves of victims of conflict*
- *(iv) graves of individuals designated by the Minister by notice in the Gazette*
- *(v) historical graves and cemeteries; and*

(vi) other human remains which are not covered by in terms of the Human Tissue Act,1983 (Act No. 65 of 1983)

(h) Sites of significance relating to the history of slavery in South Africa

(i) moveable objects, including -

(i) objects recovered from the soil or waters of South Africa, including archaeological and paleontological objects and material, meteorites and rare geological specimens

(ii) objects to which oral traditions are attached or which are associated with living heritage

(iii) ethnographic art and objects

(iv) military objects

(v) objects of decorative or fine art

(vi) objects of scientific or technological interest; and

(vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1 of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

Section 3 of the National Heritage Resources Act (No. 25 of 1999) also distinguishes nine criteria for places and objects to qualify as 'part of the national estate if they have cultural significance or other special value …' These criteria are the following:

(a) Its importance in the community, or pattern of South Africa's history

(b) Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage

(c) Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage

(d) Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects

(e) Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group

(f) Its importance in demonstrating a high degree of creative or technical achievement at particular period

(g) Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons

(h) Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and

(i) Sites of significance relating to the history of slavery in South Africa.

Other sections of the Act with a direct relevance to the AIA are the following:

Section 34(1) *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.*

Section 35(4) *No person may, without a permit issued by the responsible heritage resources authority:*

- *destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite*

Section 36 (3) *No person may, without a permit issued by SAHRA or a provincial heritage resources authority:*

- *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside formal cemetery administered by a local authority; or*
- *bring onto or use at a burial ground or grave any excavation equipment, or any equipment which assists in detection or recovery of metals.*

6 ARCHAEOLOGY AND HISTORY OF THE AREA

The archaeology of southern Africa is broadly divided into Stone Age, Iron Age and the Historical Period, and South Africa fits well into this periodisation.

6.1 The Stone Age

The Stone Age is the period in history of human evolution when lithic material was mainly used to make tools (Robins et al. 1998). In South Africa, in line with the picture in southern Africa, the period is divided into three phases. It is important to note that these dates are relative and only provide a broad framework for interpretation. The division for the Stone Age according to Lombard et al 2012: 125 is as follows

Earlier Stone Age (ESA) 2 million-150 000 years ago

Middle Stone Age (MSA) 150 000-30 000 years ago.

Later Stone Age (LSA) 40 000-1840 A.D

Sprinkling of Stone Age tools have been found in the Thabazimbi area. ESA tools have been identified close to the Crocodile River (Bergh 1999). Scatters of MSA tools have been found in the Thabazimbi area (Huffman 2004). MSA artefacts have also been found in the Olieboompoort Cave to the south of Thabazimbi (Mason 1962; Van der Ryst 2006), and in the wider region at Marakele as well as on farms New Belgium 608 LR, Schurfpoort 112 KR and Goergap 113 KR (Birkholtz & Steyn 2002). There are LSA sites in the Magaliesburg Mountains (Wadley 2015).A rock art site is known to exist in the general project area (Huffman 2004).Rock engravings dating to the LSA are also known to exist in the Rustenburg area (Bergh 1999). Despite the fact that no Stone Age tools were noted during the study, some portions of the project area fall in an area that could be ideal for ESA, MSA and LSA occupations. The surrounding mountains may have sheltered LSA people. In addition, the area probably provided good grazing land making it likely that LSA people could have utilised the surroundings for hunting. Given the conducive environment for LSA people, it is therefore possible to find Stone Age material although as alluded to above, none were identified during the survey.

6.2 The Iron Age

The Iron Age is the period in human history when metal was mainly used to produce tools. The primary technology used by the Bantu people was the 'Iron hoe', hence the advent of the Iron Age to designate the period which these groups expanded throughout southern Africa (Huffman 2000, 2007). In South Africa, the period is divided into two separate phases namely Early Iron Age (EIA) 200-1000A.D and Late Iron Age (LIA) 1000-1850A.D. Huffman

(2007:361), however, indicates that a Middle Iron Age must be included although some feel that the Middle Iron Age should be restricted to the Limpopo where it is clear. His dates which now seem to be widely accepted in South Africa are:

Early Iron Age (EIA) 250-900 A.D

Middle Iron Age (MIA) 900-1300 A.D

Late Iron Age (LIA) 1300-1840 A.D

Iron Age settlements in the Thabazimbi in the form of stone walling can undoubtedly be traced back to ancestral Sotho-Tswana occupation and developments from the sixteenth century AD onwards. Diagnostic pottery assemblages are commonly used in the South African Iron Age to infer group identities and to trace movements across the landscape. Similarly, the migration of the Sotho Tswana speakers in South Africa in the 16th century marked a new ceramic style, known as Moloko. The Moloko Tradition can be divided into two phases: an early phase (e.g. Icon) in which sites were usually located at the foot of hills and contained little or no stone walling; and a later phase characterised by extensive stone wall complexes which were often erected on hills (Huffman 2007). In the Waterberg area, this later phase manifested in the Madikwe ceramic facies with pottery typically displaying stab and fingernail impression decoration motives (Huffman 2007:434). At around the 17th century, Madikwe pottery developed into a tradition known as "Buispoort", sites of which display complex and elaborate stone walling (Huffman 2007:434). The stone walls were erected to construct stock byres and to demarcate residential units where pole-and-dhaka (clay) huts were placed. In addition, various Sotho-Tswana groups were found in the interior of the Highveld areas of South Africa by the end of the 18th century. These units occupied a large area, from present-day Botswana across large sections of the old Transvaal, the Free State Province into the Northern Cape. Based on Sotho-Tswana oral histories various groups acted as cores from which the Sotho speaking communities sprouted.

In the project area, the history and archaeology of the Sotho Tswana are of interest. The ceramic sequence for the Sotho Tswana is referred to as Moloko and consists of different facies with origins in either the Icon facies or a different branch associated with Nguni speakers. Several sites belonging to the Madikwe and Olifantspoort (from Icon) have been recorded close to the project area. These sites date to between AD 1500 and 1700 and predate stone walling ascribed to Sotho-Tswana speakers. Sotho Tswana stonewalled sites with Uitkomst pottery have been found close to the study area and dates to the seventeenth to nineteenth centuries.

Stone walled sites belonging to the LIA have also been identified next to the study area but so far have not been linked to a cultural group. Late Iron Age peoples were attracted to the area because of the relatively fertile soils around the hills and valleys, and because of the iron ore and red ochre. Mining techniques associated with the ancient mine workings are the same as those found in the Rooiberg area some 30km from Thabazimbi (Huffman 2006). Three groups are found in the Rooiberg area, specifically Madikwe, Melora and Rooiberg groups. Stratigraphically, the relationship between Madikwe and Rooiberg is evident where the Madikwe site 20/85 lies underneath the Rooiberg site 11/85, suggesting that Rooiberg is the more recent (Mason 1986). Ceramic evidence suggests then that Sotho-Tswana people were mining at Rooiberg. The ceramic evidence from the Rhino Andalusite Mine shows that the Sotho-Tswana people living there were directly related to the miners at Rooiberg: both belonged to the Western Sotho-Tswana cluster. Therefore, the relationship, between the ochre mine and Madikwe settlements, is of importance. Associated with the Madikwe settlements, in addition to the ochre mine is the several maize grindstones found (Huffman 2004, 2006).

Trade connections for ochre and tin have a bearing on the presence of maize. Trade networks spanned a wide area, up to the Zimbabwe culture area in the north, and as far as Maputo in the east before the arrival of the Dutch (Friede & Steel 1976). Maize came to Maputo sometime after the early 16th century through Portuguese trade with the New World. The grindstones found at the site CB14 in the Rhino Andalusite Mine indicate that maize was grown in the Thabazimbi area during the 17th century (Huffman 2006). If one accepts the grindstone as diagnostic, then maize was cultivated some 150 years earlier than in Kwazulu-Natal. Evidence for Iron Age activity will most likely be concentrated along water courses and rocky outcrops marked by ceramic clusters or dry-stone walling.

6.3 Historical Period

The Historical period dates from 1600. It deals with the infiltration, settlement, spread and domineering of European influence in southern Africa. Its segments are; Dutch settlement in the Western Cape, the troubled times of Zululand (Mfeqane/Difaqane), Voortrekkers, early missions and the diamond rush. This period also witnessed or saw the compilation of early maps by missionaries, explorers and military personnel.

Just like any other part of the country, the study area was not spared by these early travellers; the first of these was Dr. Andrew Cowan and Lieutenant Donovan in 1808. These two were followed by Robert Scoon and William McLucke in 1827. The Missionary Dr. Robert Moffat

passed through the area in 1827, and Reverend James Archibell in 1829 (Bergh 1999). Hume passed through the area in 1830, and then Andrew Gaddes Bain in 1831. After them, came Dr. Andrew Smith in 1835. Hume again passed through the area with Scoon in 1835. One of the most well-known explorers, David Livingstone passed through the area in 1847 (Bergh 1999).

6.4 Brief History of Mining in the area

Thabazimbi town owes its existence to the mine. The name itself means "mountain of iron," reflecting the ore reef found by Williams in 1919. Mining spurred growth: rail was extended from Rustenburg in the 1930s and full-scale production began, prompting town infrastructure. The town was proclaimed in 1953 (Raper 2014). The mining history of Thabazimbi began in 1919, when geologist J.H. Williams discovered a rich hematite iron-ore reef in the Ysterberg mountain range near the present town. The discovery confirmed the presence of high-grade iron ore deposits in the region and attracted industrial interest. These deposits were estimated to contain around 100 million tons of iron ore, making the area one of the significant iron-ore sources in the Transvaal region during the early twentieth century.

Commercial mining began in 1931, marking the start of large-scale iron-ore extraction in the area. Important developments followed in the 1930s: Construction of a railway link from Rustenburg enabled iron ore to be transported to steel plants in Pretoria and elsewhere. The mine became closely connected to South Africa's growing iron and steel industry, particularly the steelworks that later formed part of ArcelorMittal South Africa. Mining operations expanded and helped stimulate the establishment of a permanent settlement around the mine.
By the early twenty-first century, the Thabazimbi mine was facing economic and geological challenges including high operational costs, complex mining conditions and declining ore reserves. In 2015, the operator initiated closure procedures, and mining operations ceased in September 2016 after more than 80 years of production. The mine was later transferred to ArcelorMittal South Africa, which assumed responsibility for rehabilitation and closure of the site.

7 PREVIOUS HERITAGE IMPACT STUDIES

There are a number of Cultural Resources Management (CRM) studies that have been carried out within the project area. These studies show the nature of heritage of the study area. It should be noted that these reports are generally from within 20 km of the study area, but some studies from the wider project area have only been included here to provide a significant contribution to the assessment.

Below is a table of summary for the studies as well as findings for the assessment carried out in the study area and its immediate surroundings.

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Table 2: A summary table of previous heritage studies conducted in the locality and vicinity of the project area:

Author/Year	Local Municipality	Farm name	Findings
Mclean (2025)	Thabazimbi	Portions 2 and 3 of the Farm Goevernements Plaats 417KG Remainder of the farm Kopje Alleen 422KG	2 fragments of a lower grinding stone
van der Walt (2023)	Thabazimbi	Various farms	Stone Age scatters 16 stonewalled sites Two stone-packing graves
van Vollenhoven (2018)	Thabazimbi	Various farms	No heritage resources were identified
Magoma (2017)	Thabazimbi	Various farms	Structures of historical significance; bulk-loading structure, railway line, historical light pole
Gaigher (2017)	Thabazimbi	Moddergat 389 KQ Kaalvakte 416 KQ Vlakpoort 388KQ	No heritage resources
Birkholtz & Birkholtz (2017)	Thabazimbi	Various farms	No material of cultural significance
van der Walt (2016)	Thabazimbi	Portion 6 of the farm Aaspiesdoorn	Remains of an LIA site
Gaigher (2016a)	Thabazimbi	A number of farms	No heritage of significance
Gaigher (2016b)	Thabazimbi	A number of farms	No heritage resources were identified

van Schalkwyk (2016)	Thabazimbi	Nooitgedacht 338KQ	No heritage of significance
Miller (2014)	Thabazimbi	Donkerspoort 448 KQ Randstephne 455 KQ Watervaal 443 KQ	Grave of J.H.T.O Perreira Dolomite cave as a shrine Randstephne homestead as a historical building Graveyard of farm labourers The weir and bridge over the Sandagsrivier, historical dating to the 1940s and 1960s
van Schalkwyk (2014)	Thabazimbi	Portion 6 of the farm Aapieskraal	No heritage of significance
Huffman (2004)	Thabazimbi	Buffelsfontein 353KQ Tygesskloof 354 KQ	One pre-colonial mining site One rock art site Two LIA sites with pottery, upper and lower grinding stones, mud and burnt dhaka hut remains One small piece of slag as evidence of smelting

8 DEGREE OF SIGNIFICANCE

Assessment of significance is important in this study as it provides rating of the impact prompted by the proposed development on heritage resources. The assessment of significance gives mitigation measures to limit the effects of the impact that could result as the cause of the development on heritage resources.

Table 3: Grading systems for the identified heritage resources in terms of the NHRA **(**Act 25 of 1999).

Level	Significance	Possible action
National (Grade I)	Site of National Value	Nominated to be declared by SAHRA
Provincial (Grade II)	Site of Provincial Value	Nominated to be declared by PHRA
Local Grade (IIIA)	Site of High Value Locally	Retained as heritage
Local Grade (IIIB)	Site of High Value Locally	Mitigated and part retained as heritage
General Protected Area A	Site of High to Medium	Mitigation necessary before destruction
General Protected Area B	Medium Value	Recording before destruction
General Protected Area C	Low Value	No action required before destruction

9 SURVEY FINDINGS

9.1 Archaeological

The Phase I Cultural-Heritage Impact Assessment study for the proposed mining right did not reveal any significant Archaeological material within the footprint of the proposed development.

9.2 Historical Buildings and Structures

The study noted that the proposed development is within an area that is heavily disturbed by previous and ongoing game farming activities. The structures identified during the study were noted to be younger than sixty years, therefore the study does not trigger Section 34 of the NHRA Act of 1999

Figure 19: View of structures that exist within the development area

Figure 20: View of rusted zinc structure within the development area.

Figure 21: View of structures that exist at the hunters camp within the study area.

9.3 Burial sites and Graves

Human remains and burial sites 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 at the surface. Archaeological and historical burials are usually identified when they are exposed through erosion 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 study identified two burial sites **TBS01** and **TBS02** located on the GPS coordinates **24°30'56.81"S, 27°24'37.58"E** and **24°32'6.40"S, 27°23'39.40"E** respectively. The burial site **TBS01** has four graves, three adult graves and one infant grave, the site is unfenced and overrun by vegetation, the site does not show signs of visitation or rituals by grave custodians. The graves are assumed to be of Black African labourers who may have worked on the farm. The graves are marked by stone cairns, and now appear to be level due to settlement, erosion and neglect. The site **TBS02** has a solitary grave , the grave is marked by an inscribed tombstone, the site shows signs of regular visitation and clearing by grave custodians.

Figure 22: View of graves identified on site **TBS01.**

Figure 23: View of graves identified on site **TBS01**.Note the distinctive headstone.

Figure 24: View of a grave identified on the site **TBS02.**

9.4 Palaeontotological sensitivity

The SAHRIS Palaeo Map shows that the proposed development site has Very High (Red) to Moderate palaeontological sensitivity; therefore, a palaeontology field study of the area is required.

9.5 Public Monuments and Memorials

None exist within the study area.

10 Impact Assessment Statement

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 the project site under study for meeting a project need a quantitative impact assessment will be conducted for the project. The method to be used makes use of the basic risk assessment approach of deriving an expression for risk from the product of likelihood (probability) and consequences.

10.1 Pre Mining/Mining phase Impacts

Table 4**:** Loss of heritage during the mining phase.

	Loss of Heritage					
Phase		**Construction/ Excavation**				
Criteria		**Details / Discussion**				
Description of impact	• Destruction of archaeological remains during clearance. • Stumping of archaeological remains by movement of heavy mining vehicles. • Destruction/disturbance of graves and grave goods					
Mitigation required	• Use existing tracks and roads within the development area • Identified graves must be mapped on the mining layout map • Delineate and barricade identified burial sites • Induct construction/mine workers on heritage resources and chance finds • Use chance find procedure to manage accidental finds					
Parameters	***Magnitude***	***Spatial scale (Extent)***	***Reversibility***	***Duration***	***Probability***	***Significance***
Without-Mitigation	High (5)	Regional (3)	Irreversible (5)	Long-term (4)	Highly Probable (4)	Moderate to High (72)
With-Mitigation	Very Low (2)	Local (3)	Completely reversible (1)	Short-term (2)	Not Likely (2)	Low (16)

10.2 Decommissioning /closure phase Impacts

No direct loss of heritage resources is expected during this phase of the project. However, indirect impacts may occur during movement of vehicles.

Table 5: Loss of heritage during decommissioning/closure phase.

	Loss of heritage					
Phase		**Decommissioning (Removal infrastructure and equipment)**				
Criteria		**Details / Discussion**				
Description of impact	• Destruction of archaeological remains by moving vehicles. • Destruction/ disturbance of graves/grave goods					
Mitigation required	• Using existing tracks and roads to remove infrastructure and equipment. • Identified graves must be mapped on the mining layout map • Delineate and barricade identified burial sites • Use chance find procedure to manage any accidental exposure /damage of heritage resources.					
Parameters	***Magnitude***	***Spatial scale (Extent)***	***Reversibility***	***Duration***	***Probability***	***Significance***
Without-Mitigation	High (5)	Regional (4)	Irreversible (5)	Long-term (4)	Highly Probable (4)	Moderate to High (72)
With Mitigation	Very Low (2)	Local (3)	Completely reversible (1)	Short-term (2)	Unlikely (2)	Low (16)

Table 6: Anticipated Impact Rating

The status of the impact		
Status		**Description**
Positive:		a benefit to the holistic environment
Negative:		a cost to the holistic environment
Neutral:		no cost or benefit
The duration of the impact		
Score	Duration	Description
1	Short term	Immediate/ short term (less than 3 months)
2	Medium term	Construction or decommissioning period
3	Long term	For the life of the operation
5	Permanent	Permanent
The extent of the impact		
Score	Extent	Description
1	Footprint	Within the site boundary
2	Site	Affects immediate surrounding areas
3	Local	Local area / district (neighbouring properties, transport routes and adjacent towns) is affected
4	Regional	Extends to almost entire province or larger region
5	National	Affects the country.
The reversibility of the impact		
Score	Reversibility	Description
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable
The magnitude (severe or beneficial) of the impact		
Score	Severe/beneficial effect	Description
1	Zero	Natural and/or social functions and/or processes remain unaltered.
2	Very Low	Natural and/or social functions and/or processes are negligibly altered.
3	Low	Natural and/or social functions and/or processes are slightly altered and are reversible with time.
4	Moderate	Natural and/or social functions and/or processes are notably altered and are reversible with rehabilitation.
5	High	Natural and/or social functions and/or processes are permanently altered.
The probability of the impact		
Score	Rating	Description
1	Unlikely	The chance of this impact occurring is zero (0%).
2	Possible	May occur. The chances of this impact occurring is defined as 25%.
3	Probable	Likely to occur. The chances of this impact occurring is defined as 50%.
4	Highly Probable	The chances of this impact occurring is defined as 75%.
5	Definite	Will certainly occur. The chance of this impact occurring is defined as 100%.
The Consequence		= Magnitude (4) + Extent (4) + Duration (5) + Reversibility (5).
The Significance		= Consequence x Probability. 18×4=72

Table 7: Key and guidance to impact rating

Score	Significance
1 to 20	Low
21 to 40	Moderate to Low
41 to 60	Moderate
61 to 80	Moderate to high
81 to 100	High

11 RECOMMENDATIONS AND CONCLUSIONS

At the request of Vahlengwe Mining Advisory and Consulting (Pty) Ltd, Rofhiwavhutali (Pty) Ltd conducted a Phase I Archaeological and Heritage Impact Assessment Study for the proposed Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, Mercury, Nickel, Silver, Zinc and Iron Ore Mining Right Application on portions Re/2/313, Re/3/313, and Re/4/313 of the farm Cornwall 313 KQ and the remaining extent of portions 2, 5, 8, 9, 10, and 11 of the farm Koedoevlei 128 KQ within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province. In terms of the archaeology, there are no obvious 'Fatal Flaws' or 'No-Go' areas. However, the potential for chance finds, remains and the applicant and contractors are urged to lookout for chance finds during mining. The procedure for reporting chance finds has clearly been laid out and if this report is adopted by SAHRA, then there are no archaeological reasons why the proposed mining right application cannot be approved.

Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of this heritage report, there are no significant cultural heritage resources barriers to the proposed development project. SAHRA may approve the project as planned with special commendations to implement the recommendations here in made:

1. It is recommended that SAHRA endorse the report as having satisfied the requirements of Section 38 (8) of the NHRA requirements;

2. It is recommended that SAHRA make a decision in terms of Section 38 (4) of the NHRA to approve the proposed mining right application;

3. The identified burial sites must be protected from the proposed mining activities, this is done by maintaining a reasonable buffer zone of 100m between the burial sites and the mining activities;

4. The Public Participation Process should ensure that any cultural heritage related matters for this project are given due attention whenever they arise and communicated to the SAHRA through the proposed project development Archaeologist. This form of extended community involvement would pre-empty any potential disruption that may arise from previous unknown cultural heritage matters that may have escaped the attention of the study; and

5. From a heritage perspective supported by the findings of this study, the project is supported. However, mining activities should be approved under the observation that the dimensions do not extend beyond the area considered in this report.

12 REFERENCES

Bergh, J.S. (red.). 1999. Geskiedenisatlas van Suid-Afrika. Die viernoordelikeprovinsies. Pretoria: J.L. van Schaik.

Birkholtz, P.D & Steyn, H.S. 2002. Cultural Resource Management Plan for Marakele National Park. Report prepared for SANParks.

Birkholtz, P & Birkholtz, H.J. 2017. Heritage Impact Assessment for the proposed development of 2 open mining pits 62E/60E (Dishaba) and 36W (Tumela) at the Amadelbult mining complex located north of Northam, Thabazimbi Local Municipality, Waterberg District Municipality. Unpublished report prepared for Aurecon South Africa (Pty) Ltd.

Breutz, P.L. 1953. The tribes of Rustenburg and Pilanesburg Districts, Pretoria.

Clark, J.D. 1970. The Prehistory of Africa. London: Thames and Hudson.

Clarke, R.T. & Kuman, K. 2000.The Sterkfontein Palaeontological and Archaeological sites. Johannesburg: University of Witwatersrand.

Deacon, H. J. and Deacon, J.1999. Human beginnings in South Africa: Uncovering the secrets of the Stone Age. Cape Town: David Philip

Deacon, J.1984. Later Stone Age people and their descendants in southern Africa. In: Klein, R. (ed.) Southern African prehistory and palaeoenvironments: 221-328. Rotterdam: Balkema.
Eastwood, E.B and Cnoops, C. 1999. Results of the Limpopo-Shashi Confluence rock art study.2 Vols, Louis Trichardt. Palaeo-Art Field Services.

Esterhuysen, A & Smith, J. 2007. The archaeology of Mpumalanga. In: P. Delius (ed.), Mpumalanga History and Heritage: Recapturing the past, redefining the future. KwaZulu-Natal: University of KwaZulu-Natal, pp 7-21.

Gaigher, S. 2016a. Heritage Impact Assessment Report for the Proposed Haakdoorndrift Opencast Activities at the Anglo-American Platinum's Amandelbult Mine at Thabazimbi, Limpopo Province. Unpublished report submitted to SAHRA.
Gaigher, S. 2016b. Heritage Impact Assessment report for the proposed realignment of the

railway line at the proposed 37 Open Pit, Amandelbult Mine in Thabazimbi, Limpopo Province. Unpublished report submitted to SAHRA.

Gaigher, S. 2017. Heritage Impact Assessment for the proposed installation of water pipeline to the Maroeloesfontein Andalusite Mine on portions of the farms Moddergat 389KQ, Kaalvlaakte 416KQ and Vlakpoort 388KQ, south of Thabazimbi. Unpublished report prepared for Andalusite Resources (Pty) Ltd.

Hall, S. 1985. Excavations at Rooikrans and Rhinosterkloof Late Iron Age sites in the Rooiberg area of the Transvaal. Annals of the Cape provincial museums (human sciences) 1 (5) 131-210.

Hall, S and Smith, B. W. 2000. Empowering places: rock shelters and ritual control in farmer-forager interactions in the Northern Province. South African Archaeological society Doodwin Series, 8: 30-46.

Huffman, T.N. 2004. Archaeological Impact Assessment for the Rhino Andalusite Mine. Unpublished report prepared for Rhino Andalusite Mine.

Huffman, T.N. 2007. Handbook to the Iron Age: The Archaeology of Pre-Colonial Farming Societies in Southern Africa. Scottsville: University of KwaZulu- Natal Press.

Lombard, M., Wadley, L., Deacon, J., Wurz, S., Parsons, I., Mohapi, M., Swart, J and Mitchell, P. 2012. South African and Lesotho Stone Age sequence updated. The South African Archaeological Bulletin 67 (195): 123-144.

Magoma, M. 2017. Archaeological and Cultural Heritage Impact Assessment specialist report for the proposed expansion of railway loops at Thabazimbi to Ferrogate through Northam within Thabazimbi Local Municipality of Waterberg District, Limpopo Province. Unpublished report prepared for Nsovo Environmental Consulting.

Middleton, J. 1997. Encyclopaedia of Africa south of the Sahara, volume 4. New York: Charles Scribners' sons.

Miller, S. Cultural Heritage Impact Assessment for the farms Donkerpoort 448 KQ, Randstephne 455KQ, Watervaal 443 KQ. Unpublished report submitted to SAHRA.

Mitchell, P. 2002. The Archaeology of Southern African. Cambridge: Cambridge University Press.

Oberholster, J.J. 1972. The historical monuments of South Africa. Cape Town: C. Struik (Pty.) Ltd.

Pager, H. 1973. Shaded rock-paintings in the Republic of South Africa, Lesotho, Rhodesia and Botswana. The South African Archaeological Bulletin.

Raper, P.E. 2014. South African Place Names. Johannesburg: Jonathan Ball Publishers.

Ross, R, 2002. A concise history of South Africa. Cambridge: Cambridge University Press.

Sadr, K. 2005. Mphekwane test excavation of site MB5 (Mont Blanc) (Unpublished report, WITS University).

Smith, B.W. and van Schalkwyk, J.A. 2002. The white camel of the Makgabeng. Journal of African History. 43, pp. 235-254.

Toth, N. & Schick, K. 2007.Handbook of Paleoanthropology. Berlin: Springer.

van der Walt, J. 2016. Archaeological Impact Assessment for the proposed Thabazimbi Ex 169 Development, Limpopo Province. Unpublished report prepared for Tekplan Environmental.

van der Walt, J. 2023. Heritage Impact Assessment for the Proposed Future of Amandelbult (FOA) Capital and Supporting Infrastructure at the Amandelbult Platinum Mine, Limpopo Province. Unpublished report prepared for Tekplan Environmental.

van Schalkwyk, J. A. 1999. A survey of cultural resources at the Mampakuil Base Station, Louis Trichardt area, Limpopo Province. Unpublished report prepared for Environmental Impact Management Services.

Villa, P., Sonano, S., Tsanova, T., Dengano, I., Higham, T. F. G., d´Erico, F., Blackwell, L., Lucejko, J. J., Colombini, M. P & Beaumont, P. B. 2012.*National Academy of Sciences* 109 (33): 13208-13213.

Wright, J and Hamilton, C. 1989. Traditions and Transformations. The Phongolo-Mzimukulu Region in the late 18th and 19th centuries. In: Duminy, A & Guest, B (eds.) Natal and Zululand from earliest times to 1910. A New History. Pietermaritzburg: University of KwaZulu-Natal Press and Shutter & Shooter (Pty) Ltd, pp 49-82.

Legislation, Policy and Official documents

SAHRA, 2005. *Minimum Standards for the Archaeological and Paleontological components of Impact Assessment Reports*, Draft Version 1.4.

The National Heritage Resources Act 25 of 1999. South Africa: Government Gazette.

Internet sources

www.angloboerwar.com

www.sahistory.org.za

www.wikipedia.org

www.sahris.o

13 APPENDIX 1: SITE SIGNIFICANCE

The following guidelines for determining site *significance* were developed by SAHRA in 2003. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

(a) Historic value

- Is it important in the community, or pattern of history?
- Does it have strong or special association with the life or work of a person, group or organization of importance in history?
- Does it have significance relating to the history of slavery?

(b) Aesthetic value

- Is it important in exhibiting particular aesthetic characteristics valued by a community or cultural group?

(c) Scientific value

- Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage?
- Is it important in demonstrating a high degree of creative or technical achievement at a particular period?

(d) Social value

- Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons?

(e) Rarity

- Does it possess uncommon, rare or endangered aspects of natural or cultural heritage?

(f) Representivity

- Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects?
- What is the importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class?
- Is it important in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality?

14 APPENDIX 2: CHANCE FIND PROCEDURE

The following procedure is to be executed in the event that archaeological material is discovered:

- All construction/clearance activities in the vicinity of the accidental find/feature/site must cease immediately to avoid further damage to the find site.
- Briefly note the type of archaeological materials you think you have encountered, and their location, including, if possible, the depth below surface of the find
- Report your discovery to your supervisor or if they are unavailable, report to the project ECO who will provide further instructions.
- If the supervisor is not available, notify the Environmental Control Officer immediately. The Environmental Control Officer will then report the find to the Site Manager who will promptly notify the project archaeologist and SAHRA.
- Delineate the discovered find/ feature/ site and provide 25m buffer zone from all sides of the find.
- Record the find GPS location, if able.
- All remains are to be stabilised in situ.
- Secure the area to prevent any damage or loss of removable objects.
- Photograph the exposed materials, preferably with a scale (a yellow plastic field binder will suffice).
- The project archaeologist will undertake the inspection process in accordance with all project health and safety protocols under direction of the Health and Safety Officer.
- Finds rescue strategy: All investigation of archaeological soils will be undertaken by hand, all finds, remains and samples will be kept and submitted to a Museum as required by the heritage legislation. In the event that any artefacts need to be conserved, the relevant permit will be sought from the SAHRA.
- An on-site office and finds storage area will be provided, allowing storage of any artefacts or other archaeological material recovered during the monitoring process.
- In the case of human remains, in addition to the above, the SAHRA Burial Ground Unit will be contacted and the guidelines for the treatment of human remains will be adhered to. If skeletal remains are identified, an archaeological will be available to examine the remains.
- The project archaeologist will complete a report on the findings as part of the permit application process.
- Once authorisation has been given by SAHRA, the Applicant will be informed when construction activities can resume.

TRAFFIC IMPACT ASSESSMENT (TIA)

Portions RE/2/313, RE/3/313 And RE/4/313 of the Farm Cornwall 313 KQ And Remainder of Portion 2, 5, 8, 9, 10, & 11 of The Farm Koedoevlei 128 KQ

Report No.: J095
Report Date.: April 2026

PREPARED BY:

TT Traffic Engineers (Pty) Ltd
3 Linate Crescent
Bonaero Park
Kempton Park
1619

LOCAL MUNICIPALITY:

Thabazimbi Local Municipality
7 Rietbok Street
Thabazimbi
Private Bag X530
Thabazimbi
0380

CONTACT PERSON:

Mr Jonas Makala
Cell: 082 090 7541
Email: jonas@tttrafficeng.com

CONTACT DETAILS:

Tel: 014 772 2295

TT TRAFFIC ENGINEERS
(PTY) LTD "on the dot!"
Reg No: 2024/608044/07

THABAZIMBI LOCAL MUNICIPALITY

TRAFFIC IMPACT ASSESSMENT INFORMATION & CONTROL SHEET

Local municipal area	:	Thabazimbi Local Municipality
Property description	:	Portions RE/2/313, RE/3/313 And RE/4/313 of the Farm Cornwall 313 KQ And Remainder of Portion 2, 5, 8, 9, 10, & 11 of The Farm Koedoevlei 128 KQ
Application type	:	Various Minerals Mining Rights

Author of the Report:

TT TRAFFIC ENGINEERS (PTY) LTD "on the dot!"
Reg No: 2024/608044/07

Compiled / Reviewed	*Jonas Makala (Pr. Techni Eng.)*
Qualifications	*B. Tech. Transportation Engineering*
ECSA Registration	*No.: 201330047*
SAICE Registration	*No.: 204411*
Certification	*It is herewith certified that this Traffic Impact Assessment has been prepared according to requirements of the TMH 16 South African Traffic Impact and Site Traffic Assessment Manual.*
Signed	

Portions RE/2/313, RE/3/313 And RE/4/313 of the Farm Cornwall 313 KQ And Remainder of Portion 2, 5, 8, 9, 10, & 11 of The Farm Koedoevlei 128 KQ

TRAFFIC IMPACT ASSESSMENT (TIA)

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1 INTRODUCTION

1.1 Background

TT Traffic Engineers (Pty) Ltd were appointed by KMG Environmental Solutions Services (Pty) Ltd to undertake a Traffic Impact Assessment (TIA) required to supplement the Environmental Impact Assessment (EIA) in support of the mining rights and environmental authorization application.

Extract of the scoping report pertaining the application and proposed development is contained in ***Annexure A***.

The applicant, Arengo 297 (Pty) Ltd intends to undertake the surface mining right activities in respect of Portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ. The minerals to be mined include diamonds, gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore.

The proposed mining area measures approximately 4 209 hectares in extent.

The envisaged annual mineral production is estimated at 200 000 tonnages, with a monthly target of approximately 15 000 tonnages.

The purpose of this study is to investigate the site accessibility, transportation infrastructure provision requirements, traffic flow conditions at the key intersection/s within the study area, development trip generation estimates and determine any road and/or intersections improvements required to mitigate the anticipated development traffic impact.

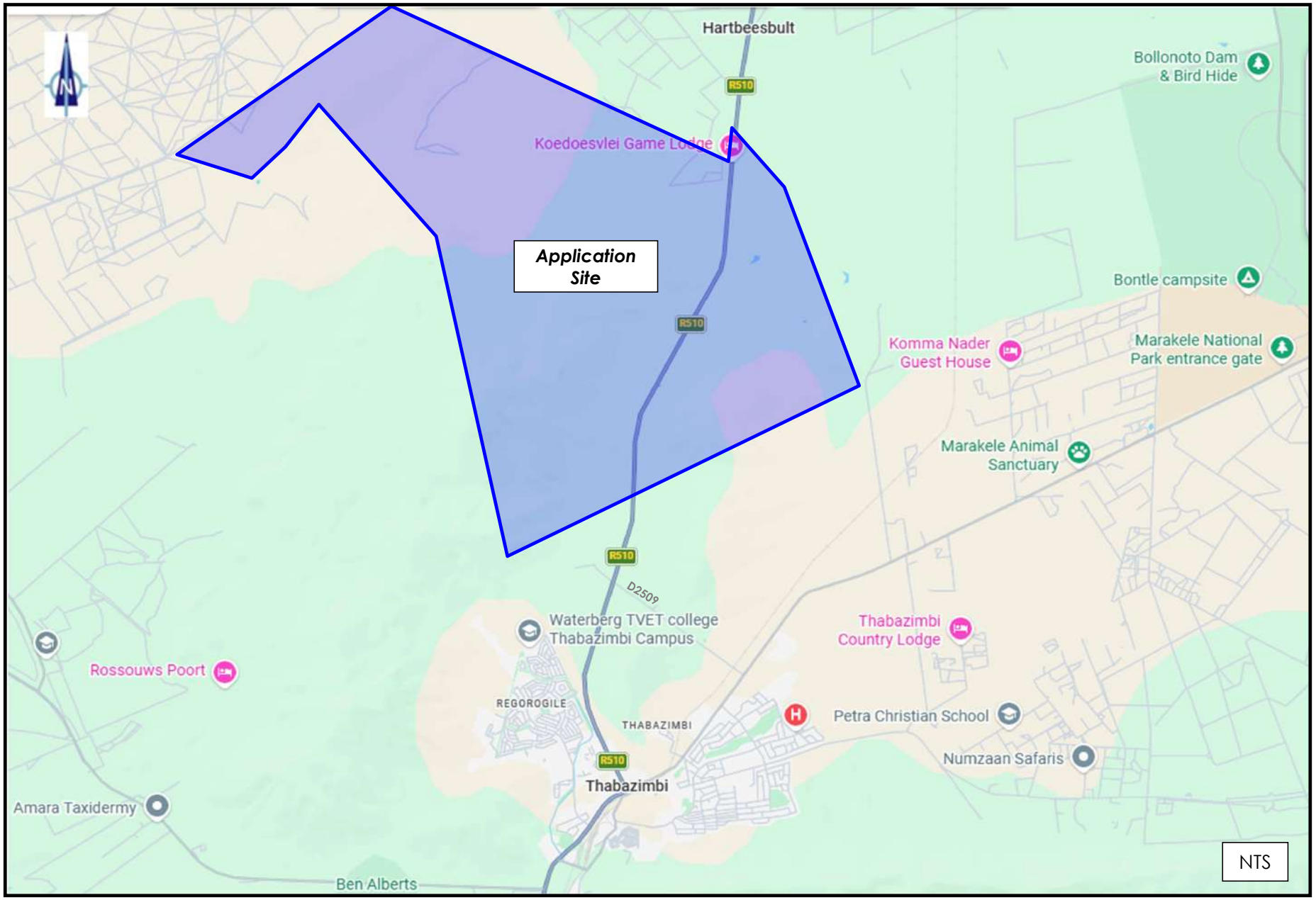
Comments are also made in respect of the non-motorised and public transport in this TIA.

The study has been undertaken considering the requirements and guidelines as set out in the *TMH 16 Volume 1 (South African Traffic Impact and Site Traffic Assessment Manual), COTO Committee Draft 2.1, dated April 2021.*

1.2 Location

The application site is located along road R510, approximately 5km to the north of Thabazimbi CBD, within the jurisdiction of Thabazimbi Local Municipality in the Limpopo Province.

Figures 1.1 and ***1.2*** depict the site location from regional and local contexts respectively, relative to the surrounding road network.



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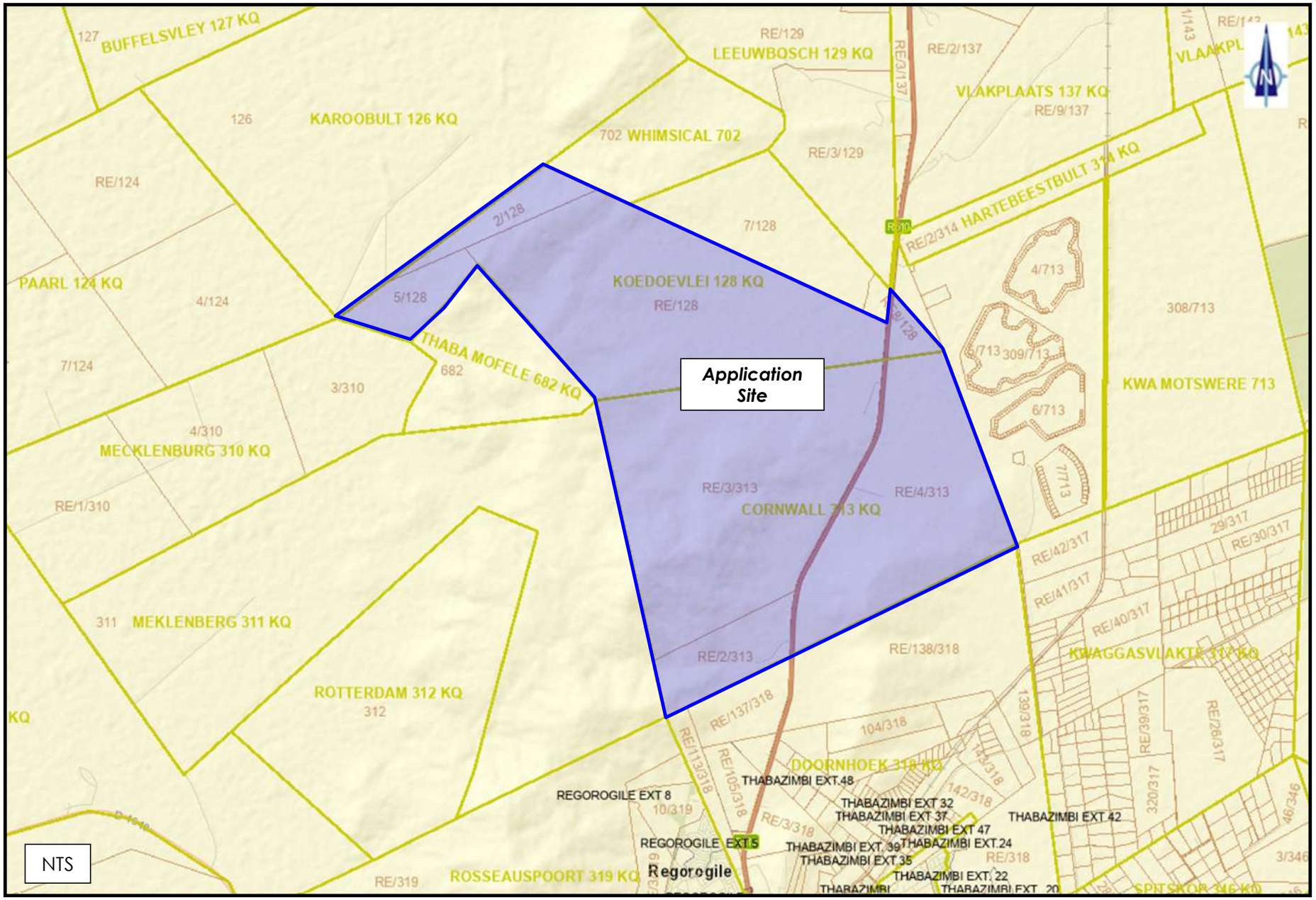
Portions RE/2/313, RE/3/313 & RE/4/313 of the farm Cornwall 313 KQ & Remainder of Portion 2, 5, 8, 9, 10, & 11 of The Farm Koedoevlei 128 KQ
Locality Plan – Regional Context

Figure 1.1



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Locality Plan – Regional Context

Figure 1.2

1.3 Methodology

Methodology of this TIA includes the following:

- ✓ Site visit for visual inspection and obtain road geometry.
- ✓ Liaison with road authorities to obtain any other information that may be relevant to the TIA.
- ✓ Consider relevant road authority road network planning (if any).
- ✓ Traffic surveys / counts at relevant intersection/s.
- ✓ Development trip generation estimate calculations.
- ✓ Capacity analyses for the relevant peak periods (as appropriate).
- ✓ Preparation of schematic access intersection layout plan.
- ✓ Assess development traffic impact on the receiving environment.
- ✓ Non-motorised and public transport assessment as necessary.
- ✓ Report on the findings, conclusions and recommendations.

2 DATA COLLECTION

2.1 Study Area & Traffic Surveys

Traffic surveys were conducted at an intersection identified to be *key* for the purpose of this study, along the R510 during a typical weekday, on the 25th of March 2026, namely:

- ✓ R510 / D2509 Intersection

The location of a key intersection referred to above is shown in ***Figure 2.1***.

From the traffic counts undertaken, the peak / busiest hours were found to be as follows;

- Weekday AM peak hour 08:00 – 09:00
- Weekday PM peak hour 14:30 – 15:30

The existing 2026 weekday AM and PM peak hour traffic volumes at the counted intersection are summarised in ***Figure 2.2.***

Annexure B contains detailed traffic surveys data.

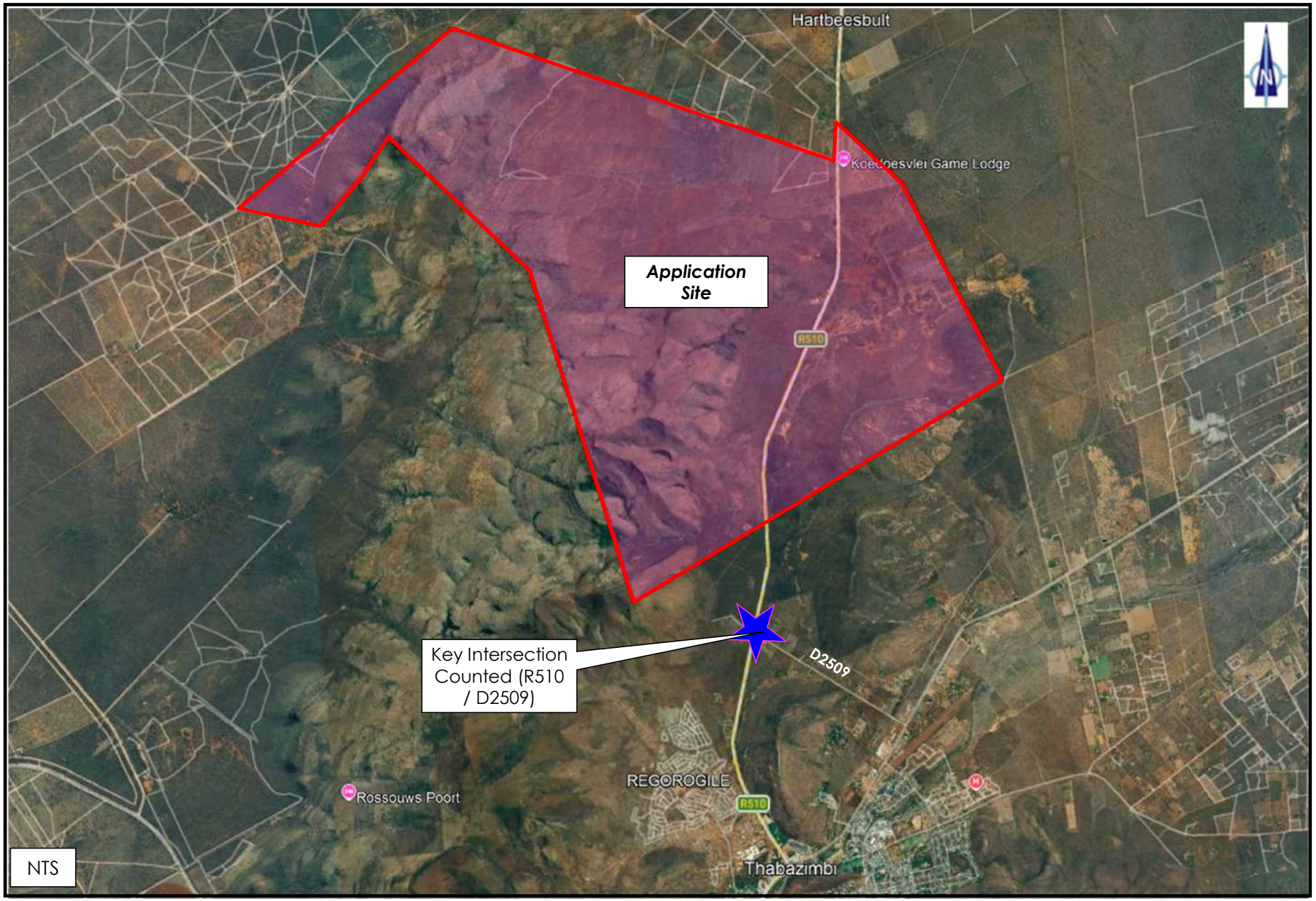
2.2 Latent Right Development

No approved other planned developments in the vicinity of the application site could be found and considered as latent rights for the purpose of this study.

It was however, considered appropriate to apply an adequately aggressive background traffic growth rate to the existing 2026 peak hour traffic demand in order to account for the potential latent right developments in the surroundings of the application site.

2.3 Intersections Geometry

The status quo intersection geometric configuration obtained from the field has been used for the capacity analysis's purpose.



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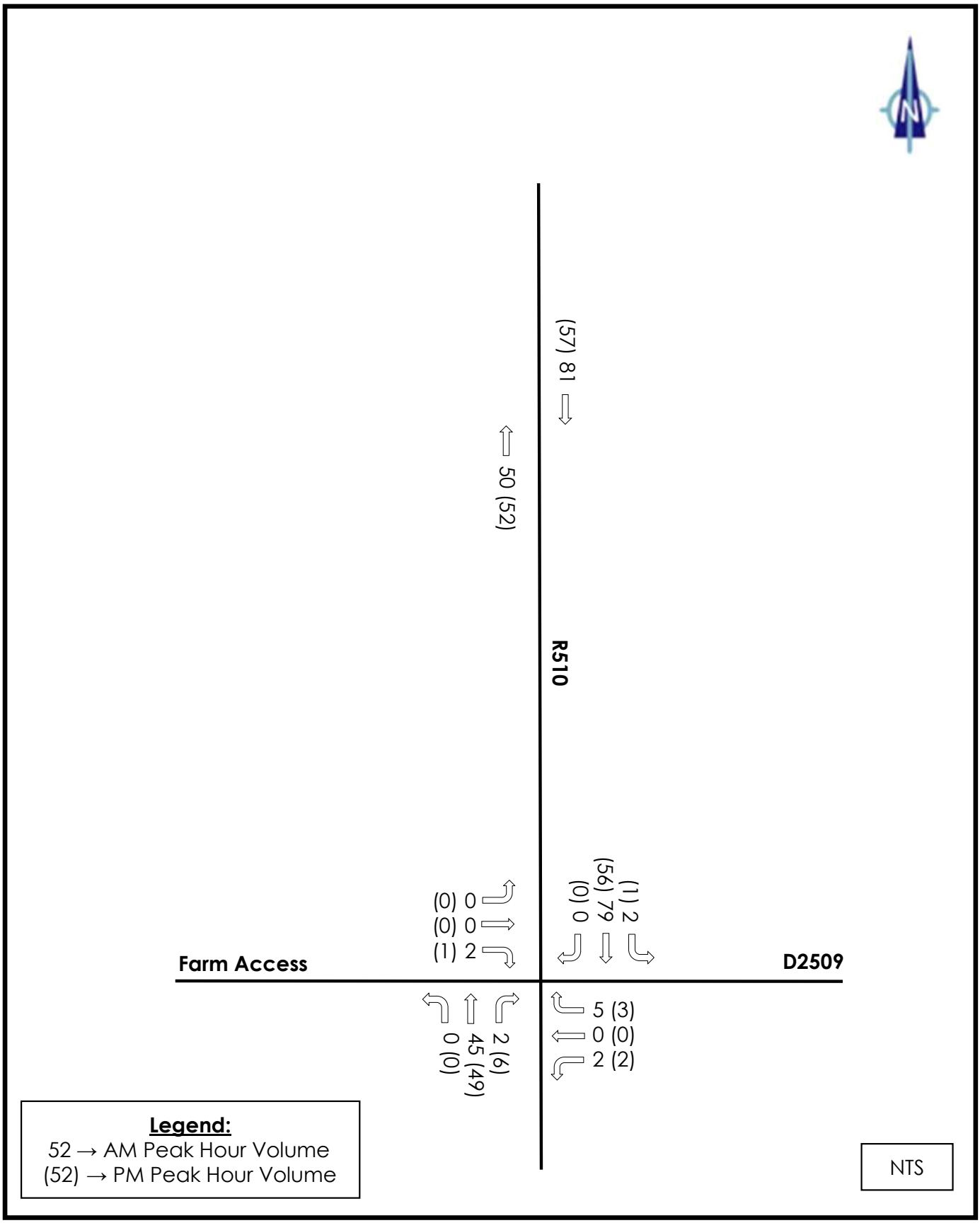
Portions RE/2/313, RE/3/313 & RE/4/313 of the farm Cornwall 313 KQ & Remainder of Portion 2, 5, 8, 9, 10, & 11 of The Farm Koedoevlei 128 KQ

Traffic Count Position

Figure 2.1



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Existing 2026 Peak Hour Traffic Demand

Figure 2.2

3 TRANSPORTATION SYSTEM NETWORK

There are two existing key roads infrastructure found within the vicinity of the application site as can be seen in ***Figure 3.1,*** *The Application Site Location Relative to RAL Provincial Road Network.*

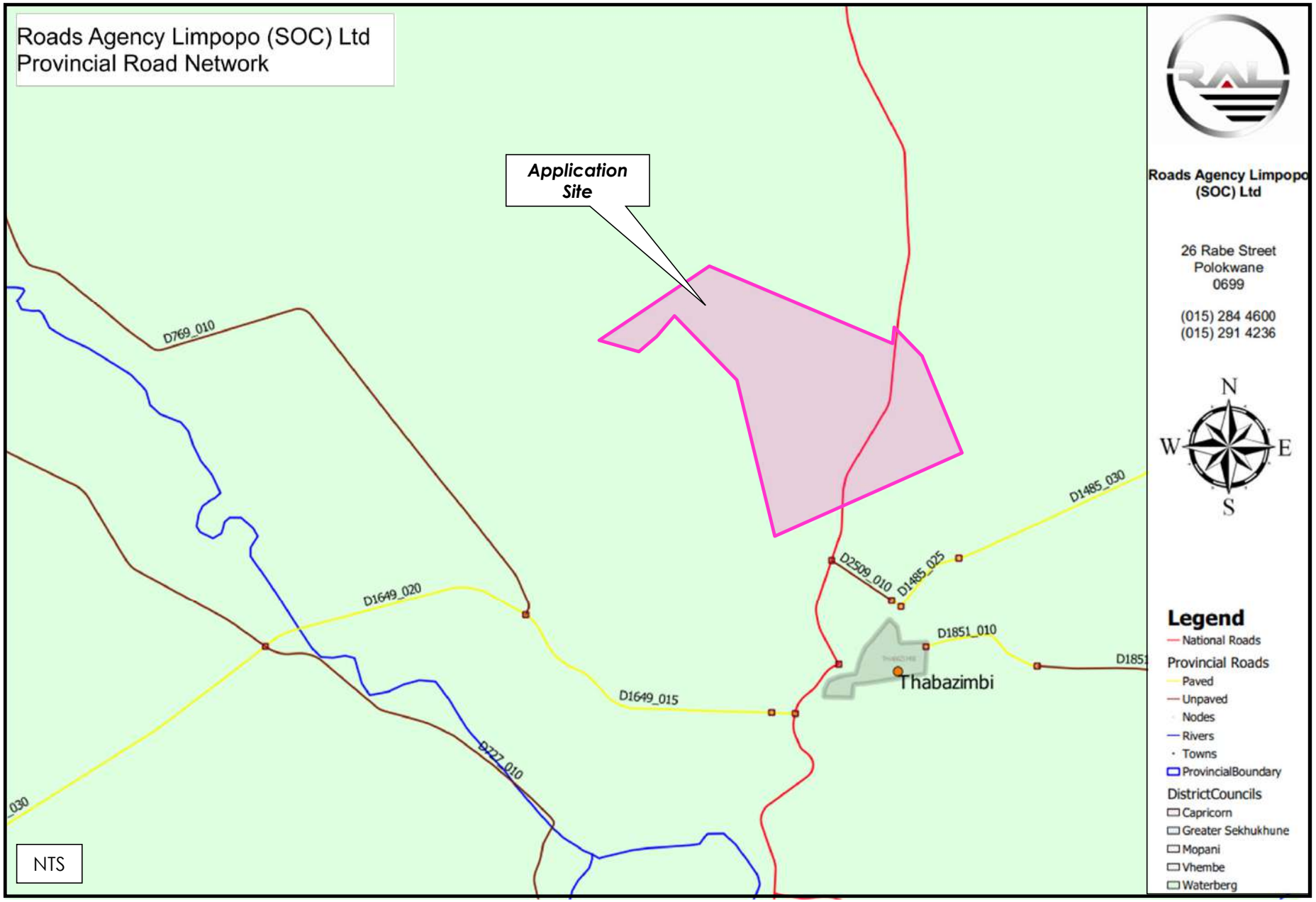
The key roads deemed applicable to the application site may be briefly described as follows;

- ✓ *R510:* → This is a single carriageway road comprising one surfaced traffic lane per direction and traversing in a north-to-south direction across the application site. This road currently carries in the order of 131 and 109 vehicles (total both directions) per hour during the respective critical weekday morning (AM) and afternoon (PM) peak hours past the application site. In terms of jurisdiction and functional classification, the R510 falls within the jurisdiction of the South African National Roads Agency SOC Ltd (SANRAL) and it functions as a typical Class 3 Rural Minor Arterial past the application site. This road forms a priority-controlled intersection with D2509 at a point some 1.6km to the south of the application site.

- ✓ *D2509:* → This road is mostly unsurfaced, and it serves as a direct link between the R510 and Warmbad Road (D1485). The road is considered falling with the jurisdiction of the local municipality and functioning as a typical Class 4 Rural collector road. The traffic counts undertaken indicated that this road currently carries in the order of 11 and 12 vehicles (total both directions) per hour during the respective critical weekday morning (AM) and afternoon (PM) peak hours near its intersection with the R510.

It is evident that only the R510 is affected by the existing roads network, which cuts through the property under consideration.

It thus recommended that the appropriate provision be made to exclude the application site and its boundaries from the R510 road reserve, together with the applicable building lines.



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Portions RE/2/313, RE/3/313 & RE/4/313 of the farm Cornwall 313 KQ & Remainder of Portion 2, 5, 8, 9, 10, & 11 of The Farm Koedoevlei 128 KQ

The Application Site Location Relative to RAL Provincial Road Network

Figure 3.1

4 PROPOSED DEVELOPMENT & ACCESS

4.1 Proposed Development

The proposed development is a surface mining type of development, and it will be situated on Portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ.

The minerals to be mined include diamonds, gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore.

Extract of the scoping report pertaining the application and proposed development is contained in ***Annexure A***.

The proposed mining area measures approximately 4 209 hectares in extent.

The envisaged annual mineral production is estimated at 200 000 tonnages, with a monthly target of approximately 15 000 tonnages.

It is envisaged that the mineral mined will be processed on site and transported locally.

The proposed mining development will consist of two key phases; namely, the *construction phase* as well as the *operational phase* as briefly described in the next subsections.

4.2 Construction Phase

The information in respect of the envisaged mining operations was obtained from the applicant, and reasonable activity assumptions were also made; namely:

- ✓ Total number of construction workers is no more than 200, inclusive of labour workforce and staff personnel.
- ✓ Construction workers would commute using transport provided by the employer (staff transport), which is assumed for the purpose of this study to have a vehicle occupancy of say 14 passenger seats per vehicle.
- ✓ The staff personnel component constitutes about 10% of total employees (i.e. 20) and would commute using personal private transport which is assumed for the purpose of this study to have an average vehicle occupancy of 1.5 occupants per vehicle.
- ✓ The peak hour development traffic directional split percentage as follows,
    - o Inbound / outbound in the morning (AM) = 80% / 20%.
    - o Inbound / outbound in the afternoon (PM) = 20% / 80%.
- ✓ Construction vehicles will operate and remain on site for the duration.
- ✓ Delivery vehicles are expected to travel to and from the application site twice a week, during any time of the day.

- ✓ The construction phase duration is estimated at only 6 months.

4.3 Operational Phase

The information in respect of the envisaged mining operations was obtained from the applicant, and reasonable activity assumptions were also made; namely:

- ✓ A total number of workers entailing both the labour workforce and the staff personnel is estimated at 200 for the first 12 months then increases to 500.
- ✓ Annual mineral production is aimed at approximately 200 000 tonnages.
- ✓ Monthly mineral production is aimed at approximately 15 000 tonnages.
- ✓ Haul truck capacity of 30-tonnes.
- ✓ A total of 6 hauling days in a week.
- ✓ A total of 12 hauling hours per day.
- ✓ The mineral mined will be processed on site and transported locally via the road system.
- ✓ Construction workers would commute using transport provided by the employer (staff transport), which is assumed for the purpose of this study to have a vehicle occupancy of say 14 passenger seats per vehicle.
- ✓ The staff personnel component constitutes about 10% of total employees (i.e. 50) and would commute using personal private transport which is assumed for the purpose of this study to have an average vehicle occupancy of 1.5 occupants per vehicle.
- ✓ The peak hour development traffic directional split percentage as follows,
    - o Inbound / outbound in the morning (AM) = 80% / 20%.
    - o Inbound / outbound in the afternoon (PM) = 20% / 80%.
- ✓ Construction vehicles will operate and remain on site for the duration.
- ✓ Delivery vehicles are expected to travel to and from the application site twice a week, during any time of the day.
- ✓ The operational phase life span of the proposed mining development is estimated at 30 years.

4.4 Proposed Site Access

4.4.1 General

Considering location of the proposed development relative to the existing transportation infrastructure network, only the R510 avails itself to cater for the proposed development in terms of access.

Although the primary function of the R510 is to promote and protect mobility as opposed to accessibility, the *TRH 26 South African Road Classification and Access Management Manual* states that ***"As a rule, access to property is not allowed along such a route, unless the property is sufficiently large to warrant its own intersection and there is no present or future need to provide a public road intersection."***

The Manual further goes on states that ***"For safety and capacity, right turn bays will usually be required at intersections, but left turners will not normally need separate deceleration lanes."***

In this case the application site considered sufficiently large, in the excess of 4 000 hectares in extent and thus warrants its own access off the R510.

4.4.2 Site Access Point

In terms of location, the site access intersection is proposed at a point located approximately 7,6km to the north of the R510 and D2509 intersection as in ***Figure 4.1.***

The approximate site access intersection position is a point latitude and longitude 24°29'50.50"S 27°24'52.95"E as shown in ***Figure 4.2***.

It is recommended as part of the site access intersection proposal that the current speed limit of 120km/hr be reduced to 80km/hr on both approaches of the intersection for safety reasons.

4.4.3 Shoulder Sight Distance Requirements

According to the *TRH 17 (Technical Recommendations for Highways 17) Geometric Design of Rural Roads of 1988* (refer to ***Figure 4.3***), the minimum shoulder sight distance required for the longest design vehicle is ±340m, considering the intersection cross section width and the proposed reduced design speed of the R510 on both approaches.

It is evident, considering both the horizontal and vertical alignments of the R510 at the proposed site access intersection (see ***Figure 4.4***), that the minimum required shoulder sight distance requirements are comfortably achievable. The details will be dealt with as part of the detail design of the proposed site access intersection.

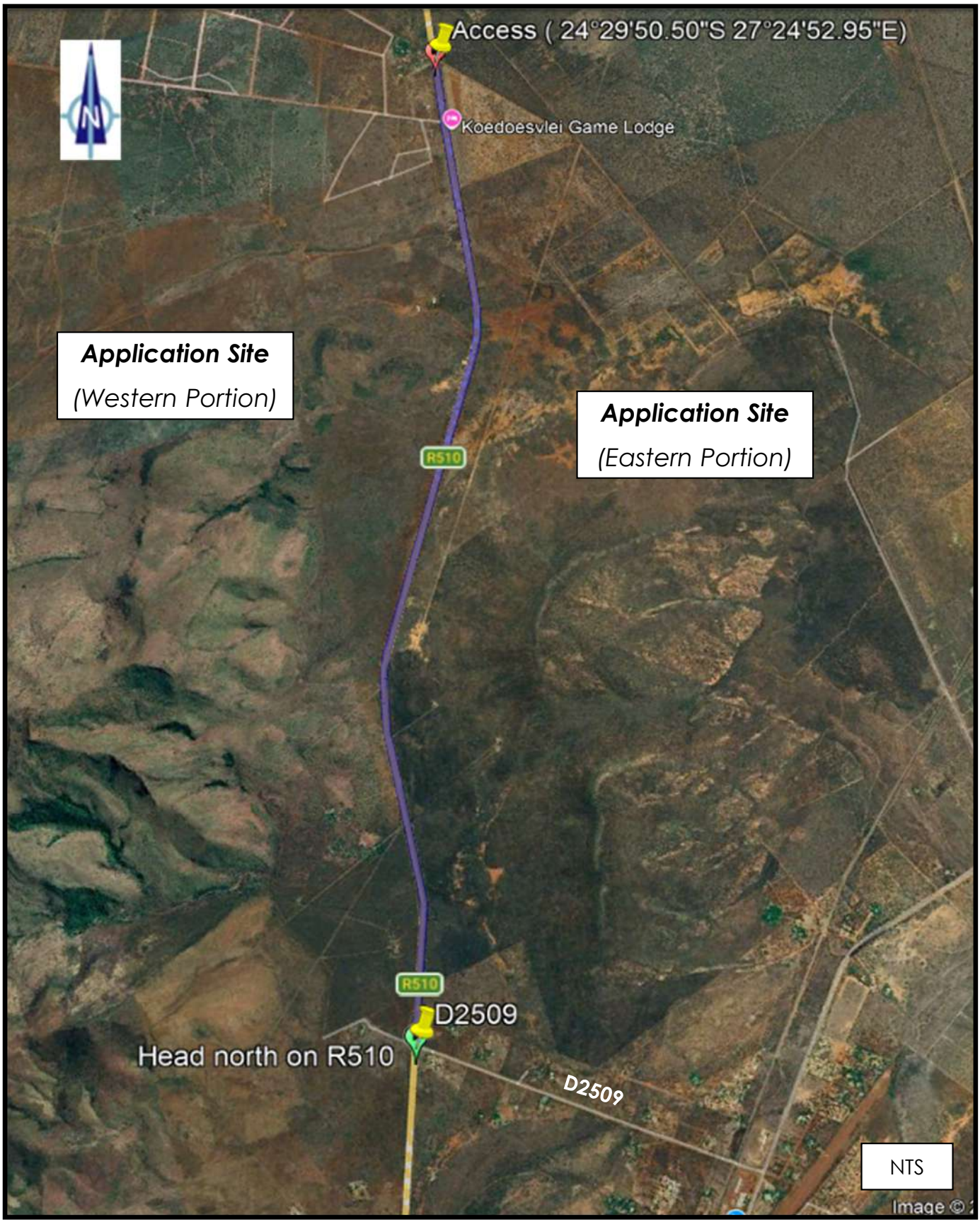
4.4.4 Geometric Configuration

The proposed site access intersection is proposed to comprise dedicated right turning traffic lanes along R510 as shown schematically in ***Figure 4.2***.

The traffic travelling along R510 will continue having right of way whilst the stop condition will be applicable to the side roads (site access roads).

It is recommended that the first section of the proposed site access roads connecting to the R510 be surfaced (dust free) before terminating at a point where the concrete edge beams will be provided, to the appropriate design standards of the road authority.

It is further recommended that the proposed site access intersection be constructed to the satisfaction of, and to the appropriate design standards of the South African National Roads Agency SOC Ltd (SANRAL).



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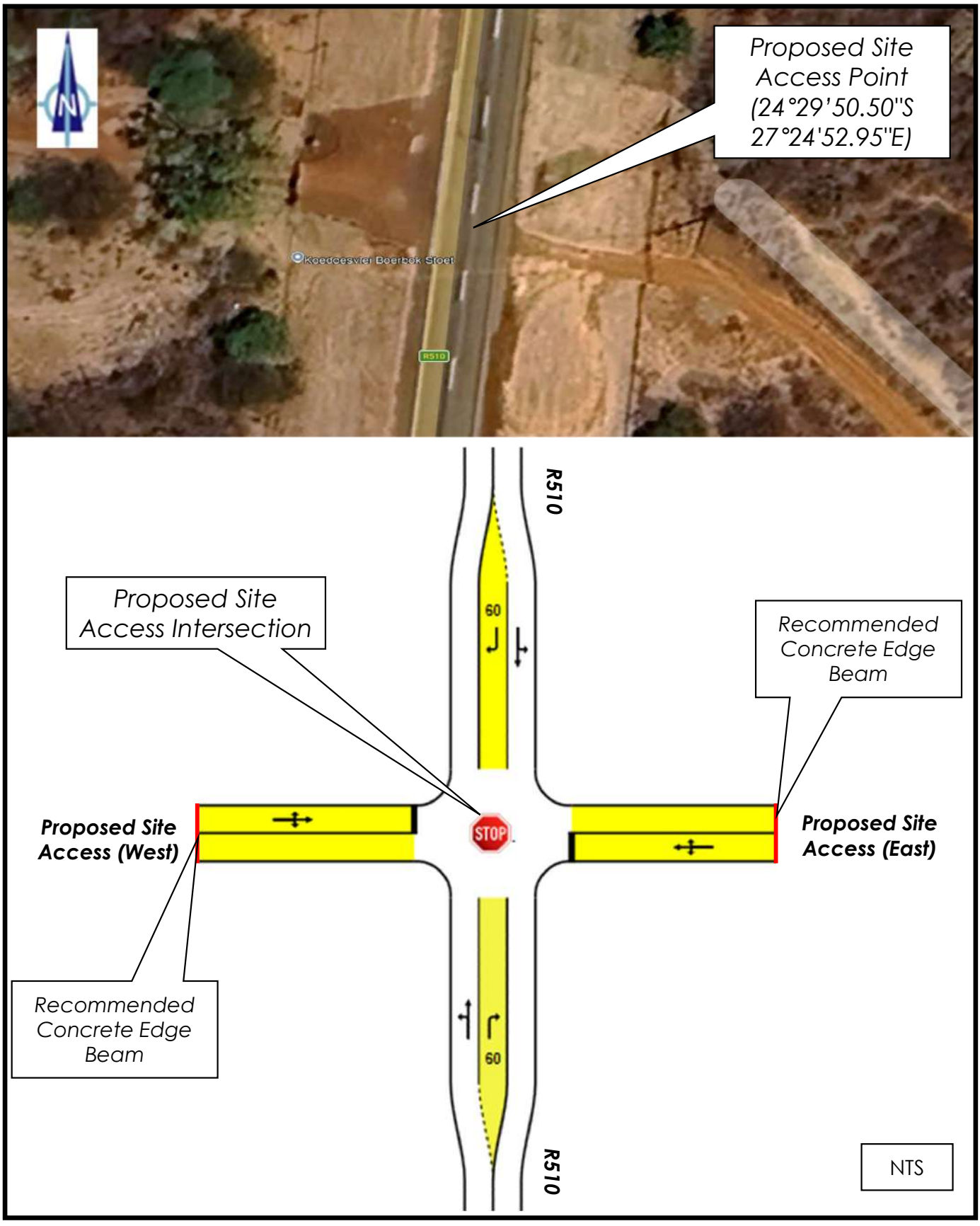
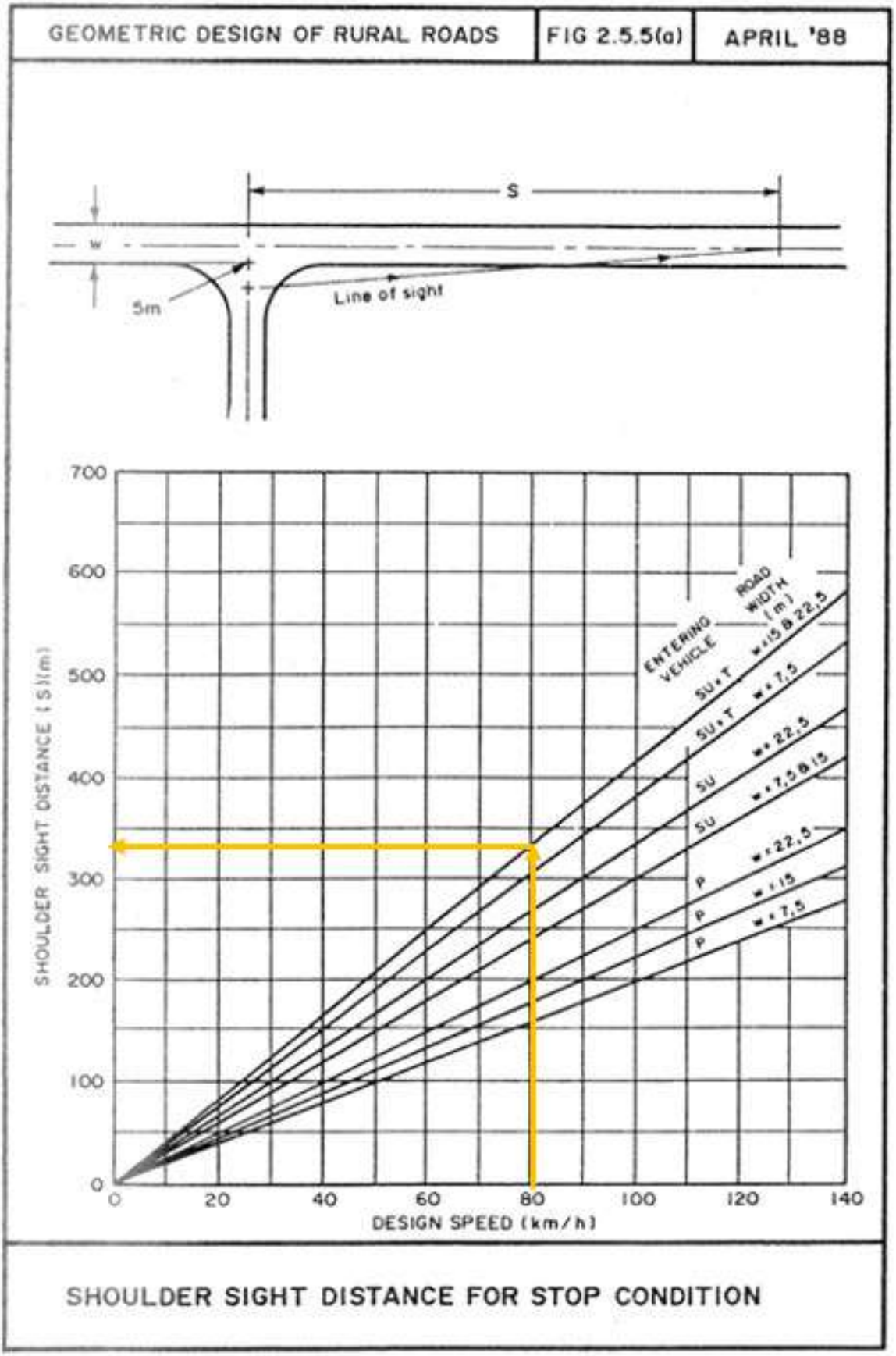
Approximate Site Access Point – Regional Context

Figure 4.1



TT TRAFFIC ENGINEERS (PTY) LTD "on the dot!" Reg No: 2024/608044/07	**Ptns. RE/2/313, RE/3/313 & RE/4/313 of the farm Cornwall 313 KQ & Rem. of Ptn 2, 5, 8, 9, 10, & 11 of The Farm Koedoevlei 128 KQ** Approximate Site Access Point – Local Context	**Figure 4.2**

Figure 4.3: Shoulder Sight Distance for Stop Condition (Fig. 2.5.5a of TRH17)



Geometric design
TRH17, Pretoria, South Africa, 1988

19

4.4.5 Road Conditions

Section of the R510 past the application site is currently in the good conditions as can be seen in ***Figure 4.4***. It is recommended that the scheduled routine maintenance of the R510 be adhered to, to keep it in the acceptable conditions and promote road safety.

4.5 Site Access Control & Throat Length Requirements

According to *TMH 16 Volume 2 South African Traffic Impact and Site Impact Assessment Standards and Requirements Manual Access*, the following throat length requirements will apply for a security access-controlled condition, given the functional and classification of the R510, a typical Class 3 Road;

- ✓ Ingress throat length → 75m (measured from the road reserve boundary to the nearest edge of a crossroad or boom gate)
- ✓ Egress throat length → 25m (measured from the stop line)

The capacity analyses carried out indicated shorter stacking space requirements, as compared to the above.

It is therefore recommended that these access throat length requirements be complied with, to ensure the adequate stacking space and avoid vehicles spillback onto R510.

4.6 On-site Parking Requirements

It is recommended that on-site parking be provided to the satisfaction of and in accordance with the requirements of *Thabazimbi Local Municipality Town Planning Scheme.*

5 DEVELOPMENT TRIP GENERATION ESTIMATES

5.1 Construction Phase Trip Generation Estimates

The *South African Trip Data Manual (TMH 17 – Committee Draft 2.3 Dated May 2021)* has been used as a guideline to determine the estimated peak hour development trip generation.

The mining land use trip generation is based on the number of employees.

The following parameters as detailed in Sub-section 4.2 have been used in the trip generation estimation calculations;

- ✓ Total number of employees (labour workforce & staff personnel) = 200
- ✓ Labour workforce commuting by staff transport = 90%
- ✓ Staff personnel commuting by own / private transport = 10%
- ✓ Staff transport vehicle occupancy = 14-seater
- ✓ Own / private transport vehicle occupancy = 1.5 person
- ✓ Development trip directional split percentage = 80% / 20%

It estimated that the construction phase could generate up to 27 peak hour trips during the critical weekday morning and afternoon peak periods, as summarised in ***Table 5.1***.

Table 5.1: Summary of Construction Phase Trip Generation

Total Number of Employees = 200	Vehicle Occupancy	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Staff Transport (90% = 180)	14-seater	10	3	13	3	10	13
Staff Personnel (10% = 20)	1.5 person	11	3	14	3	11	14
Total Trips Generated		***21***	***6***	***27***	***6***	***21***	***27***

5.2 Operational Phase Trip Generation Estimates

The following parameters as detailed in Sub-section 4.3 have been used in the trip generation calculations;

- ✓ Monthly mineral production is aimed at approximately 15 000 tonnages
- ✓ Haul truck capacity of 30-tonnes
- ✓ A total of 6 hauling days in a week
- ✓ A total of 12 hauling hours per day
- ✓ Haul trucks trip directional split percentage = 50% / 50%

- ✓ Total number of employees (labour workforce & staff personnel) = 500
- ✓ Labour workforce commuting by staff transport = 90%
- ✓ Staff personnel commuting by own / private transport = 10%
- ✓ Staff transport vehicle occupancy = 14-seater
- ✓ Own / private transport vehicle occupancy = 1.2 person
- ✓ Employees trip directional split percentage = 80% / 20%

It estimated that the operational phase could generate up to 79 peak hour trips during the critical weekday morning and afternoon peak periods, as summarised in ***Table 5.2***.

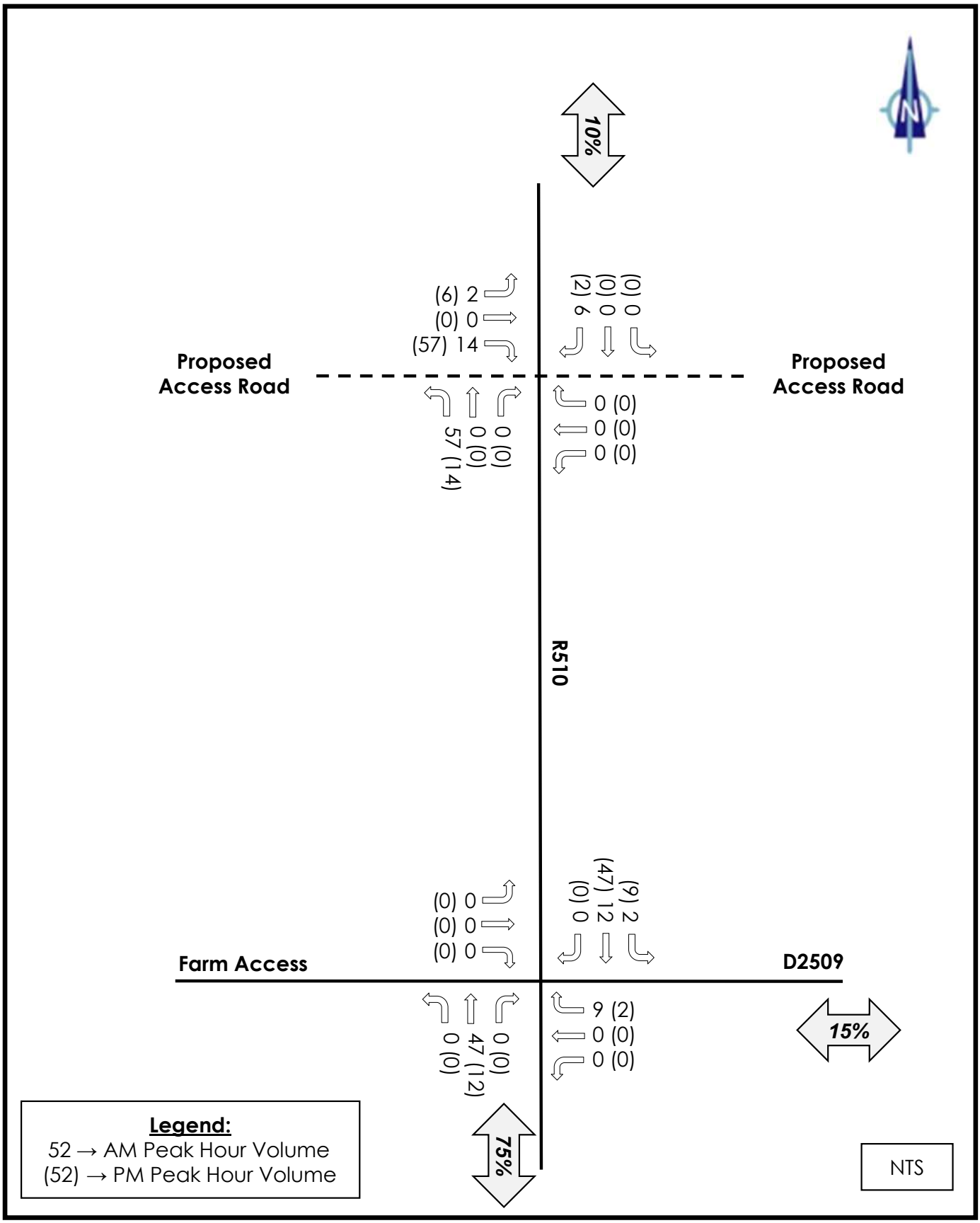
Table 5.2: Summary of Operational Phase Trip Generation

Trip Generation Component	Vehicle Occupancy	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Staff Transport (90% = 450)	14-seater	27	6	33	6	27	33
Staff Personnel (10% = 50)	1.2 person	34	8	42	8	34	42
Mining Output = 15 000 tonnes / month		2	2	4	2	2	4
Total Trips Generated		***63***	***16***	***79***	***16***	***63***	***79***

5.3 Development Trip Distribution & Assignment

Assumptions on the expected trip distribution and assignment were based on the type of development proposed, anticipated origins and destinations of the trips relative to the site accessibility and location, in respect of the surrounding road network, as well as the background traffic volumes and patterns in the surrounding area.

Figure 5.1 depicts summary of the trip distribution and assignment estimates for the worst-case scenario (viz; operational phase).



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Development Trip Distribution & Assignment

Figure 5.1

6 FUTURE TRAFFIC DEMAND

6.1 Traffic Growth

The background traffic growth rate has been estimated in accordance with the guidelines of the *TMH 17 (South African Trip Data Manual), COTO, Draft 2.3* dated May 2021.

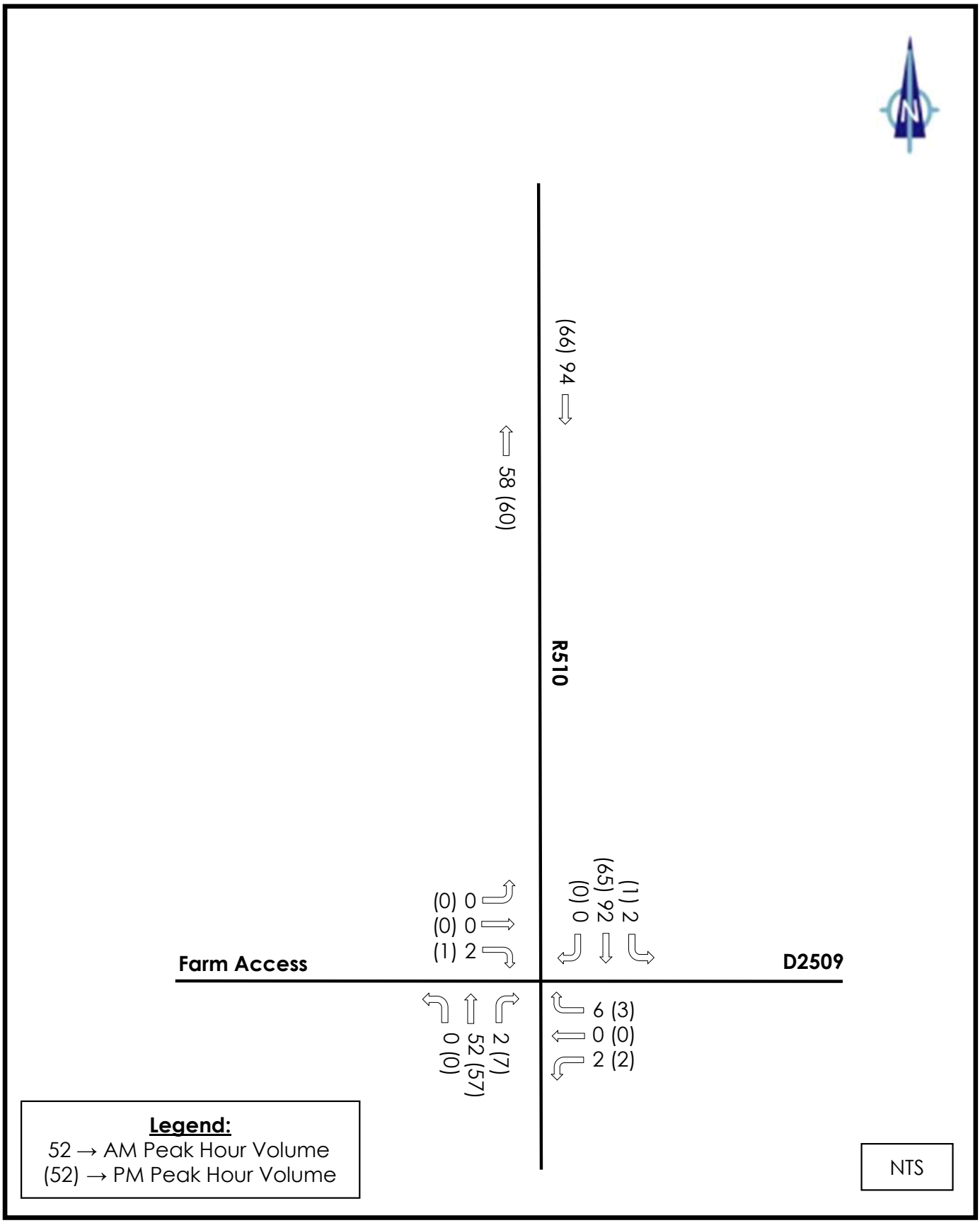
A traffic growth rate of 3.0% per annum has been used to account for both the growth in the background traffic as well as the potential unknown other planned developments (i.e. latent rights) trips in the area.

The existing 2026 peak hour traffic has been inflated by a 3.0% annual traffic growth rate to determine the estimated future 2031 (5-year horizon) background peak hour traffic demand.

Figure 6.1 depicts the estimated future 2031 background peak hour traffic demand.

6.2 Total Future Traffic Demand

Figure 6.2 depicts the estimated total future 2031 peak hour traffic demand, which includes the background 2026 traffic demand inflated to the future 2031 at an annual traffic growth rate of 3.0%, plus the estimated additional development trip generation.



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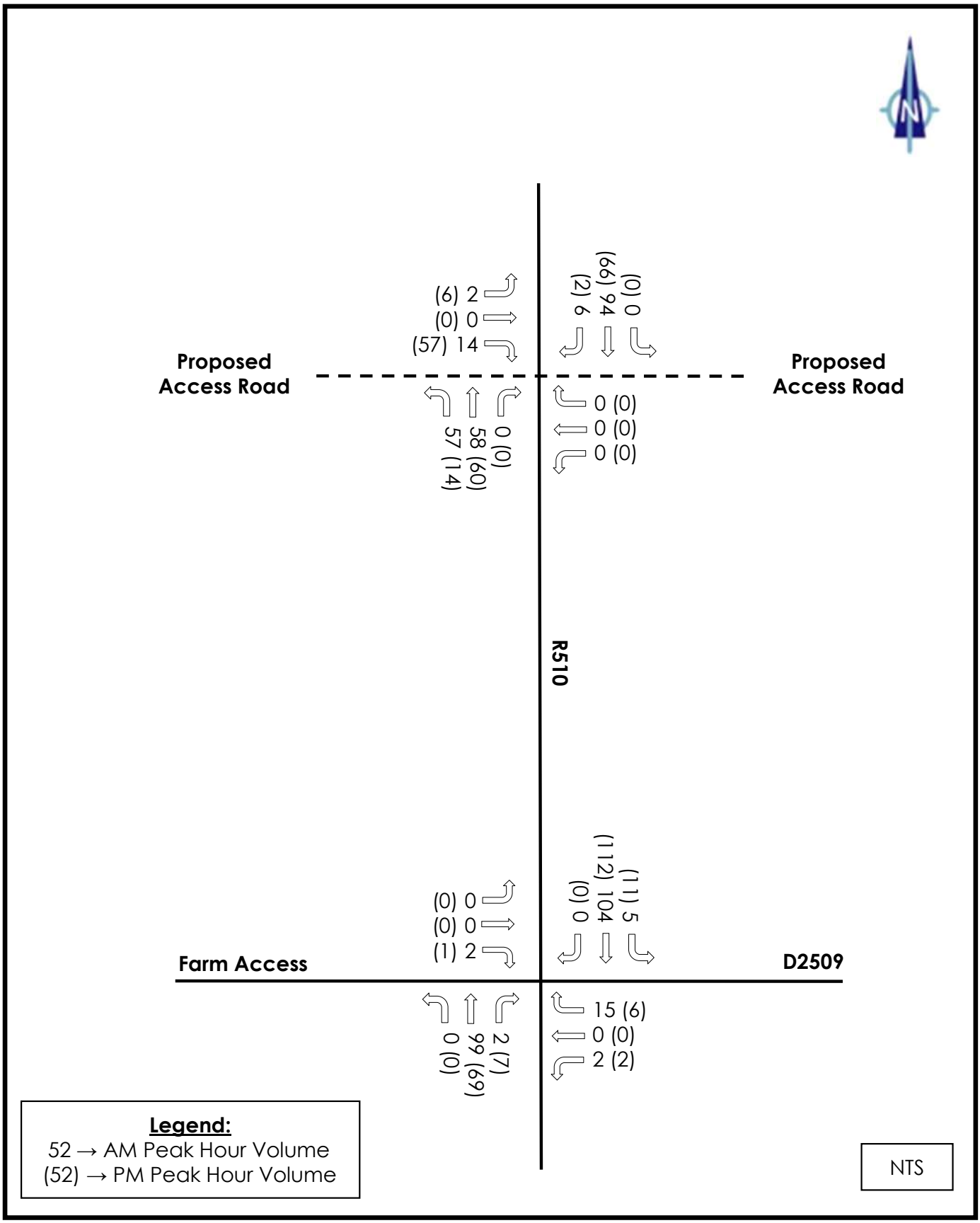
Future 2031 Peak Hour Traffic Demand

Figure 6.1



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Ptns. RE/2/313, RE/3/313 & RE/4/313 of the farm Cornwall 313 KQ & Rem. of Ptn 2, 5, 8, 9, 10, & 11 of The Farm Koedoevlei 128 KQ

Total Future 2031 Peak Hour Traffic Demand

Figure 6.2

7 DEFINITIONS RELEVANT TO CAPACITY ANALYSIS

The following definitions from the 2000 Highway Capacity Manual are used in this report. A revised LOS method for vehicles were introduced in HCM 2010 (TRB 2010). It offers an important variation on the Delay (HCM 2000) method in using both the average control delay and the v/c (demand volume / capacity) ratio, or degree of saturation for LOS determination.

Capacity → The maximum hourly rate at which vehicles can reasonably be expected to traverse a lane or roadway during a given period under prevailing traffic and control conditions.

Volume → The hourly rate of vehicle arrivals at an intersection.

Volume to capacity ratio (v/c) → Is the ratio of volume to capacity.

Level of service (LOS) → Level of service is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time. The levels of service for signalised and un-signalised intersections as defined in the Highway Capacity Manual are tabulated in **Table 7.1** below.

Table 7.1: Delay & v/c (HCM 2010) definitions for LOS Based on delay and v/c ratio

Level of Service for **v/c≤1.0**	Rating	Average delay per vehicle in seconds (d)			Level of Service for for **v/c>1.0**
		Signals	"SIDRA Roundabout LOS" option	Priority Control *(HCM2010 default for roundabouts)*	All Intersection Types
A	Excellent	d ≤ 10	d ≤ 10	d ≤ 10	**F**
B	Very Good	10 < d ≤ 20	10 < d ≤ 20	10 < d ≤ 15	**F**
C	Good	20 < d ≤ 35	20 < d ≤ 35	15 < d ≤ 25	**F**
D	Acceptable	35 < d ≤ **55**	35 < d ≤ **50**	25 < d ≤ **35**	**F**
E	Poor	**55** < d ≤ 80	**50** < d ≤ 70	**35** < d ≤ 50	**F**
F	Very Poor	80 < d	70 < d	50 < d	**F**

Note: v/c (demand volume / capacity) ratio, or degree of saturation: v/c > 1.0 represents oversaturated conditions.

An intersection is deemed to be operating acceptably at levels of service A to D. If an intersection operates at a level of service E or F or has a volume to capacity ratio higher than 0.95 the intersection is considered to be operating at capacity.

8 TRAFFIC IMPACT & CAPACITY ANALYSES

8.1 General

In order to determine the expected traffic impact of the proposed development at the key intersections within the study area, the capacity analyses were carried out using ***Automated Junction Traffic Analysis (AutoJ)*** software program developed by Dr John Sampson**.** The following key intersections were analysed:

- ✓ R510 / D2509 Intersection
- ✓ R510 / Proposed Site Access Intersection

The critical peak hour analyses were considered for the following scenarios where applicable:

- *Scenario 1:* Existing 2026 background traffic demand only - as per ***Figure 2.2.*** This scenario verifies the status-quo traffic operations only.
- *Scenario 2:* Future 2031 background traffic demand only - as per ***Figure 6.1.*** This scenario estimates the anticipated traffic operations for the future background traffic without any development added.
- *Scenario 3:* Total future 2031 traffic demand - as per ***Figure 6.2.*** This scenario estimates the anticipated total future background traffic operations, taking into consideration the background traffic growth, allowance made for potential latent rights as well as this application.

8.2 Intersections` Capacity Analyses Results Interpretation

AutoJ Capacity Analyses Results provide the intersection individual movement approach v/c, average delay, average queue length (vehicles), auxiliary lane length requirements as well as the traffic signal phasing summary where applicable.

Tables 8.1 to ***8.2*** interpret the capacity analyses results of all the scenarios analysed, with the detailed AutoJ capacity analyses results appended in ***Annexure C.***

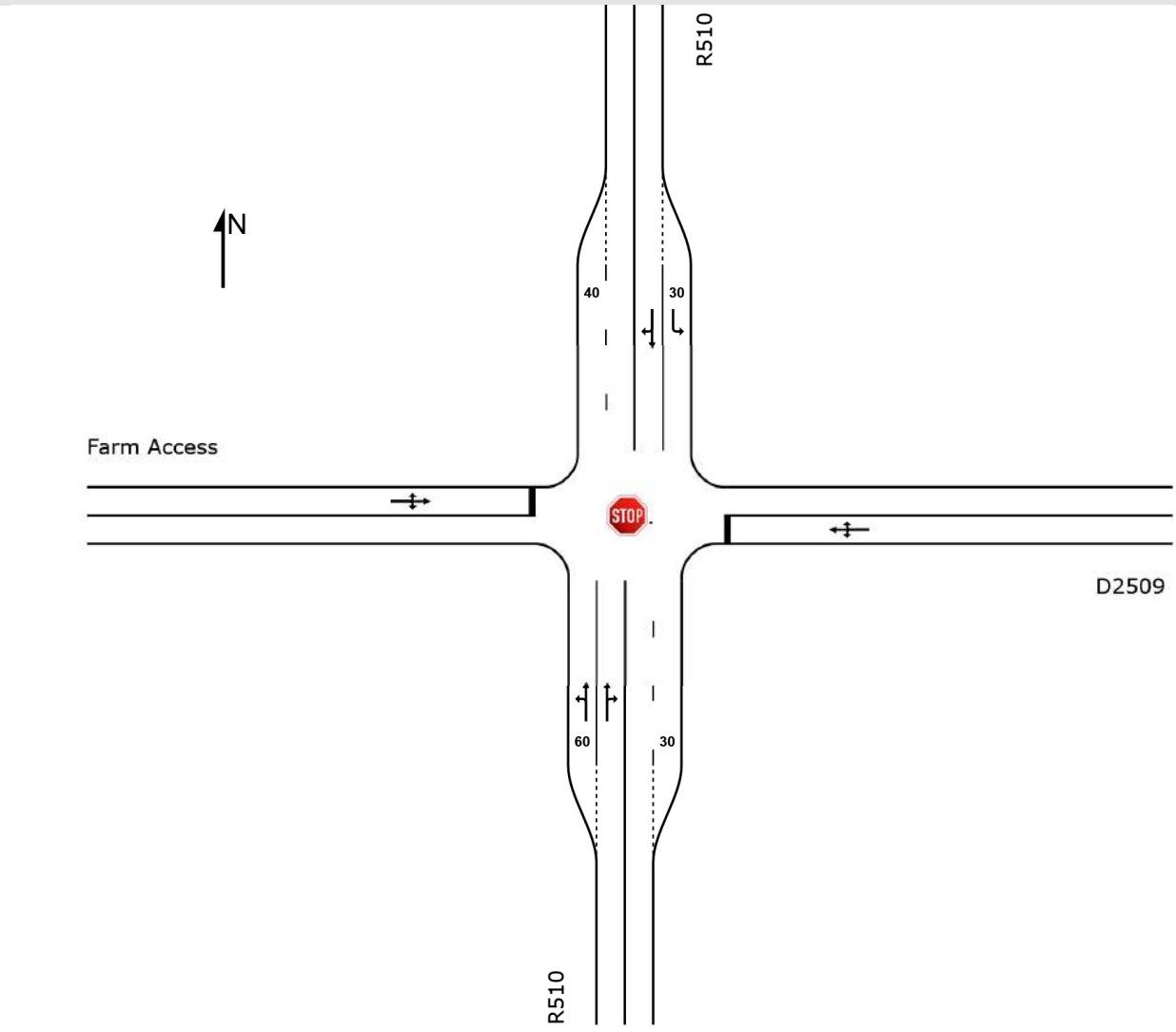
8.3 Bulk Services Contributions

It is recommended that any bulk services contributions payable in respect of this application (if applicable), be offset against provision of additional transportation infrastructure and/or non-motorised and public transport facilities requirements.

Table 8.1: Performance – R510 / D2509 Intersection

Scenario Analysed	Peak Hour	Overall Traffic Operations		
		LOS	v/c	Delay
Existing 2026 Background Peak Hour Traffic Demand	AM	A	0.03	1.000
	PM	A	0.02	1.000
Future 2031 Background Peak Hour Traffic Demand	AM	A	0.03	1.000
	PM	A	0.02	1.000
Total Future 2031 Peak Hour Traffic Demand	AM	A	0.04	1.000
	PM	A	0.04	1.000

Existing Intersection Geometric Layout



Concluding Remarks

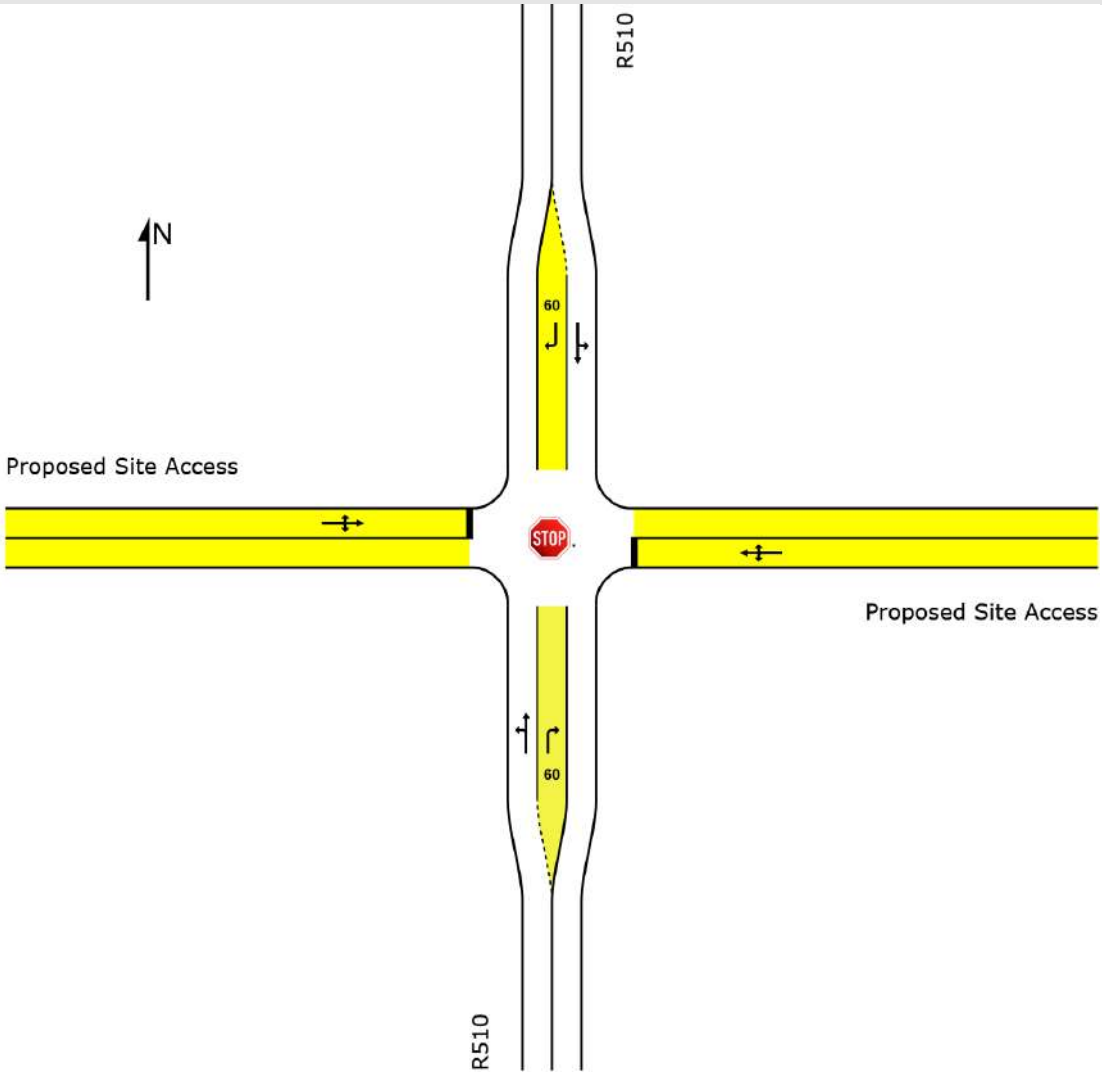
The AutoJ capacity analyses results appended in ***Annexure C1*** indicate that this intersection currently operates excellently at overall LOS A and it has ample spare capacity to continue doing with the total future traffic demand.

It is, therefore evident that this intersection does not require any form of upgrading to accommodate the anticipated development traffic impact.

Table 8.2: Performance – R510 / Proposed Site Access Intersection

Scenario Analysed	Peak Hour	Overall Traffic Operations		
		LOS	v/c	Delay
Total Future 2031 Peak Hour Traffic Demand	AM	A	0.05	1.000
	PM	A	0.05	3.000

Proposed Intersection Geometric Layout



Concluding Remarks

The AutoJ capacity analyses results appended in ***Annexure C2*** indicate that the proposed intersection geometric configuration will operate excellently at overall LOS A with the total future traffic demand.

It is recommended that the proposed site access intersection be constructed to the satisfaction of, and to the appropriate design standards of The South African National Roads Agency SOC Ltd (SANRAL).

9 ENVIRONMENTAL IMPACT IMPLICATIONS

9.1 Nature of Impact

Based on both the construction and operational phases traffic characteristics stated in Sub-sections 5.1 and 5.2 and considering ***Table 9.1*** below, nature of the traffic impact expected is considered "*low-medium*" and thus scores *Rating 2*.

Table 9.1: Nature of The Impact, Description and Rating

Impact Nature	Description	Rating
Low	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes are not affected.	1
Low-Medium	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes are affected insignificantly.	2
Medium	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes are altered.	3
Medium-High	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes are severely altered.	4
High	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes will temporarily or permanently cease.	5

9.2 Extent of Impact

Although some of the traffic generated during the construction or operational phases will be destined locally and regionally, the impact (as determined by the defined study area) will be concentrated locally.

The traffic influence outside the boundaries of the study area is expected to be insignificant. In terms of ***Table 9.2*** below, extent of the traffic impact expected is considered "*Site*" and thus scores *Rating 2*.

Table 9.2: Extent of The Impact, Description and Rating

Impact Extent	Description	Rating
Local	The impacted area will only extend as far as the activity being conducted, e.g., the activity footprint.	1
Site	Impact occurs within a 20km radius of the site.	2
Regional	Impact occurs within a 100km radius of the site.	3

9.3 Duration of Impact

The traffic impact due to the construction phase will only last for the duration of the activity, which is estimated to be 6 months, whilst that of the operational phase will last for the entire operational life span of the project. The life of mine (LOM) is expected to be 30 years plus.

In terms of ***Table 9.3***, duration of the traffic impact expected may be assigned as follow,

- ✓ Construction phase → *"Medium-term"* and thus scores *Rating 2.*
- ✓ Operational phase → *"Long-term"* and thus scores *Rating 3.*

Table 9.3: Duration of The Impact, Description and Rating

Impact Duration	Description	Rating
Short-term	The impact will either disappear with mitigation or will be mitigated through the natural processes in shorter time span.	1
Medium-term	The impact will last up to the end of the project phases, where after it will be negated. The impact will cease within 5 years if the activity is stopped.	2
Long-term	The impact will last for the entire operational phase and after the operational life of the operation but will be mitigated by direct human action or by natural processes thereafter.	3
Permanent	Intervention will not occur in such a way or in such a time span that the impact can be considered transient.	4

9.4 Frequency of the Occurrence of The Impact

Traffic will be generated in daily basis during both the construction and operational phases.

In terms of ***Table 9.4*** below, frequency of the occurrence of the traffic impact expected is considered *"Daily"* and thus scores *Rating 5* for both the construction and operational phases.

Table 9.4: Frequency of the Occurrence of The Impact, Description and Rating

Impact Frequency	Description	Rating
Annually or less	Impact occurs at least once in a year or less frequently.	1
6 monthly	Impact occurs at least once in 6 months.	2
Monthly	Impact occurs at least once a month.	3
Weekly	Impact occurs at least once a week.	4
Daily	Impact occurs daily.	5

9.5 Probability of the Occurrence of The Impact

In accordance with ***Table 9.5*** below, probability of the occurrence of the traffic impact expected is considered "*highly probable*" and thus scores *Rating 3* for both the construction and operational phases.

Table 9.5: Probability of the Occurrence of The Impact, Description and Rating

Impact Probability	Description	Rating
Improbable	The possibility of the impact materializing is very low either because of design or historic experience.	1
Probable	The possibility of the impact materializing will occur to the extent that provision must be made thereof.	2
Highly Probable	It is most.	3
Definite	The impact will occur regardless of any prevention measures.	4

9.6 Severity of The Impact

In accordance with ***Table 9.6*** below, severity of the traffic impact expected is considered "*Low*" and thus scores *Rating 2* for both the construction and operational phases.

Table 9.6: Magnitude of The Impact, Description and Rating

Impact Magnitude	Description	Rating
Low	The impact alters the affected environment in such a way that the natural processes are not affected.	2
Medium	The affected environment is altered; however, the functions and processes continue in a modified way.	4
High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.	6

9.7 Significance of The Impact

A significance rating can be allocated to the expected traffic impact, based on the following equation and the descriptions provided in ***Table 9.7***.

Significance = (Duration + Extent + Severity) x Probability

Table 9.7: Significance of The Impact, Description and Rating

Impact Significance	Description	Rating
Negligible	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.	<20
Low	The impact is limited in extent, with low to medium intensity and whatever the probability of the occurrence may be, the impact will not have a material effect on the decision and is likely to require the management intervention with increased costs.	<40
Moderate	The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.	<60
High	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.	>60

9.8 Aspect & Impact

Table 9.8 provides summary of the anticipated impact as a result of the proposed mineral mining development in respect of the traffic and transportation aspect.

Table 9.8: Traffic Aspect and Impact

Aspect	Traffic and transportation system
Impact	The proposed mining activities will result in additional trips to the transportation system
Nature	Low-Medium
Extent	Site
Duration	Construction Phase = Medium-term Operational Phase = Long-term
Frequency	Daily
Magnitude	Low
Probability	Highly Probable
Significance	Construction Phase = (2 + 2 + 2) X 3 = 18 (i.e. <20) Operational Phase = (3 + 2 + 2) X 3 = 21 (i.e. 20 < 21 < 40)
Reversibility	Reversible
Replaceability	Replaceable

9.9 Impact Mitigation Measures

In terms of ***Table 9.9*** below, likelihood and severity of the anticipated traffic impact on the receiving environment is considered "*Possible*" and thus scores *Rating 3.*

Table 9.9: Likelihood Rating System

Rating	Definitions	Likelihood
5	The event is expected to occur in most circumstances (The event is likely to occur once per year).	Almost certain
4	The event will probably occur in most circumstances (The event is likely to occur once every 1 – 2 years).	Likely
3	The event might occur at some time (The event is likely to occur once every 2 – 5 years)	Possible
2	The event could occur at some time (The event is likely to occur once every 5 – 10 years)	Unlikely
1	The event may occur only in exceptional circumstances (The event is unlikely to occur in any 10-year period)	Rare

9.10 Risk Analysis Matrix

A significance rating can be allocated to the expected traffic impact based on the significance assessment matrix provided in ***Table 9.10*** below.

Table 9.10: Significance Assessment Matrix

		Severity of Consequence				
Likelihood of Consequence		Critical (5)	Major (4)	Significant (3)	Moderate (2)	Minor (1)
	Almost Certain (5)	Extreme	Extreme	High	High	Medium
	Likely (4)	Extreme	High	High	Medium	Medium
	Possible (3)	Extreme	High	Medium	Medium	Low
	Unlikely (3)	High	Medium	Medium	Low	Very Low
	Rare (1)	Medium	Medium	Low	Low	Very Low

The anticipated traffic impact consequence severity may therefore be classified as being "*Medium*".

The significant ratings for the proposed mining development project phases are provided in ***Table 9.12***.

Table 9.11: Positive & Negative Impacts of The Proposed Project

Impact	Rating Pre-Mitigation	Construction Phase	Operational Phase	Decommissioning Phase	Rating Post Mitigation
Positive (+)	Medium	✓ Employment opportunities ✓ Support to local businesses and SMME's ✓ Income generation for accommodation business sector ✓ Contributing to the national's economy	✓ Employment opportunities ✓ Support to local businesses and SMME's ✓ Income generation for accommodation business sector ✓ Contributing to the national's economy	✓ Employment opportunities ✓ Land and soils capability restoration ✓ Re-vegetation and regeneration of the indigenous vegetation	Low
Negative (-)	Moderate	✓ Visual nuisance ✓ Health and Safety impacts ✓ Surface and groundwater contamination ✓ Impacts on traffic ✓ Unsustainable job security ✓ Disturbance on the landscape ✓ Waste generation ✓ Alien vegetation species invasion ✓ Noise disturbances	✓ Visual nuisance ✓ Health and Safety impacts ✓ Surface and groundwater contamination ✓ Impacts on traffic ✓ Unsustainable job security ✓ Disturbance on the landscape ✓ Waste generation ✓ Alien vegetation species invasion ✓ Noise disturbances	✓ Visual nuisance ✓ Health and Safety impacts ✓ Surface and groundwater ✓ contamination ✓ Impacts on traffic ✓ Job losses	Low
Negative (-)	High	✓ Habitat disturbance ✓ Vegetation disturbances ✓ Loss of biodiversity ✓ Soil erosion ✓ Impacts on groundwater quality ✓ Soils contamination ✓ Visual nuisance to moving equipment and vehicles	✓ Habitat disturbance ✓ Vegetation disturbances ✓ Loss of biodiversity ✓ Soil erosion ✓ Impacts on groundwater quality ✓ Soils contamination ✓ Visual nuisance to moving equipment and vehicles	✓ Habitat disturbance ✓ Vegetation disturbances due to vegetation clearance ✓ Alien vegetation species invasion ✓ Soil erosion ✓ Impacts on groundwater quality ✓ Waste generation ✓ Visual nuisance to moving equipment and vehicles	Medium

9.11 Positive & Negative Traffic Impact Assessment

Reference is made to ***Table 9.11*** above, the assessment criteria for positive and negative impacts that the proposed mining development may have on the receiving environment.

Based on the significance scores contained in ***Table 9.12*** below, the proposed mining development project *can be authorised* in terms of the impact rating criteria, without the need to implement any other mitigation measures, except for ***construction of the site access intersection*** as identified in Section 4 of this study.

Table 9.12: Impact Assessment for the Project Phases Considered

Project Phase	Mitigation Stage & Rating	Nature	Impact Rating Criteria				Significance
			Extent	Duration	Magnitude	Probability	
Construction Phase	Pre-Mitigation → Medium Post-Mitigation → Low	+	2	2	2	3	<20
Operational Phase	Pre-Mitigation → Medium Post-Mitigation → Low	+	2	3	2	3	<40

9.12 Legal Requirements & Other Considerations

The following comments may be made, regarding the legal requirements and other considerations during the proposed project:

- ✓ All legal authorisations and permits must be obtained for the transportation of abnormal loads and hazardous materials on public roads.
- ✓ Measures should be taken to ensure that all health and safety requirements regarding transportation activities are complied with.
- ✓ It is proposed that flagmen and temporary warning signs be placed at the access point where heavy vehicles will access to public roads during any of the project phase.
- ✓ Controls should be put in place to ensure that vehicles exiting the site are not overloaded.

10 NON-MOTORISED & PUBLIC TRANSPORT

In terms of Section 35 of the *National Land Transport Act (NLTA) (Act No 5 of 2009)*, it is a requirement to include assessment of non-motorised and public transport in the traffic impact assessments.

The following comments are relevant in respect of the public transport availability and provision in support of the proposed mineral mining development.

Due to the remote location of the application site relative to the existing transportation infrastructure and likely places of residence, it was confirmed that the employer would provide transport to the employees in need of such a service.

Considering the above discussions, the proposed mining development is supported from the non-motorised & public transport point of view.

11 CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusions

- ✓ Arengo 297 (Pty) Ltd intends to undertake the surface mining right activities in respect of Portions RE/2/313, RE/3/313, and RE/4/313 of the farm Cornwall 313 KQ and the remaining extent of Portions 2, 5, 8, 9, 10, and 11 of the Koedoevlei 128 KQ.
- ✓ The minerals to be mined include diamonds, gold, platinum group metals, arsenic, chrome, cobalt, copper, mercury, nickel, silver, zinc, and iron ore.
- ✓ The proposed mining area measures approximately 4 209 hectares in extent.
- ✓ This Traffic Impact Assessment (TIA) has therefore been undertaken in support of the mining rights and environmental authorization application.
- ✓ The application site is located along road R510, approximately 5km to the north of Thabazimbi CBD, within the jurisdiction of Thabazimbi Local Municipality in the Limpopo Province.
- ✓ The study has been undertaken considering the requirements and guidelines as set out in the *TMH 16 Volume 1 (South African Traffic Impact and Site Traffic Assessment Manual), COTO Committee Draft 2.1, dated April 2021.*
- ✓ This study investigates the site accessibility, transportation infrastructure provision requirements, traffic flow conditions at the key intersection/s within the study area, development trip generation estimates and determine any road and/or intersections improvements required to mitigate the anticipated development traffic impact.
- ✓ Traffic surveys were conducted at a key intersection along the R510 during a typical weekday, on the 25th of March 2026.
- ✓ No approved other planned developments in the vicinity of the application site could be found and considered as latent rights for the purpose of this study.
- ✓ An adequately aggressive background traffic growth rate has been applied to the existing 2026 peak hour traffic demand in order to account for the potential latent rights developments in the surroundings of the application site.
- ✓ The envisaged annual mineral production is estimated at 200 000 tonnages, with a monthly target of approximately 15 000 tonnages.
- ✓ The information in respect of the envisaged mining operations was obtained from the applicant, and reasonable activity assumptions were also made for both the construction and operational phases.
- ✓ In terms of trip generation, development trip generation estimates are as follows;
    - Construction phase → 27 peak hour trips
    - Operational phase → 79 peak hour trips

- ✓ The site access intersection is proposed at a point located approximately 7,6km to the north of the R510 and D2509 intersection as in ***Figure 4.1.***
- ✓ The approximate site access intersection position is a point latitude and longitude 24°29'50.50"S 27°24'52.95"E as shown in ***Figure 4.2.***
- ✓ The proposed site access intersection will comprise dedicated right turning traffic lanes along R510 for safety reasons.
- ✓ A traffic growth rate of 3.0% per annum has been used to account for background traffic growth and the potential unknown other planned developments (i.e. latent rights) trips in the area.
- ✓ The minimum shoulder sight distance required for the longest design vehicle is ±340m, considering the intersection cross section width and the proposed reduced design speed of the R510 on both approaches.
- ✓ The details of shoulder sight distance requirements will be dealt with as part of the detailed design of the proposed site access intersection.
- ✓ Section of the R510 past the application site is currently in the good conditions.
- ✓ The following throat length requirements will apply for a security access-controlled condition, given the functional and classification of the R510, a typical Class 3 Road;
    - Ingress throat length → 75m (measured from the road reserve boundary to the nearest edge of a crossroad or boom gate)
    - Egress throat length → 25m (measured from the stop line)
- ✓ The AutoJ capacity analyses results indicated that the intersection of R510 and D2509 has ample spare capacity to accommodate the total future traffic demand and therefore does not require any form of upgrading.
- ✓ The AutoJ capacity analyses results further indicate that the proposed site access intersection off R510 (see ***Figure 8.2***) will operate excellently at overall LOS A with the total future traffic demand.
- ✓ From the environmental impact point, the proposed mining development project can be authorised in terms of the impact rating criteria, without the need to implement any other mitigation measures, except for construction of the site access intersection as identified in Section 4 of this study.
- ✓ The following comments may be made regarding the legal requirements and other considerations during the proposed project:
    - All legal authorisations and permits must be obtained for the transportation of abnormal loads and hazardous materials on public roads.
    - Measures should be taken to ensure that all health and safety requirements regarding transportation activities are complied with.
    - It is proposed that flagmen and temporary warning signs be placed at the access point where heavy vehicles will access to public roads during any of the project phase.
    - Controls should be put in place to ensure that vehicles exiting the site are not overloaded.

- ✓ The proposed mining development is supported from non-motorised & public transport point of view, given that the employer would provide transport to the employees in need of such a service.

11.2 Recommendations

- ✓ The current speed limit of 120km/hour be reduced to 80km/hour on both approaches of the proposed site access intersection for safety reasons.
- ✓ The proposed site access intersection be constructed to the satisfaction of, and to the appropriate design standards of The South African National Roads Agency SOC Ltd (SANRAL).
- ✓ The access throat length requirements identified in this study be complied with, to ensure the adequate stacking space and avoid vehicles spillback onto R510.
- ✓ On-site parking be provided to the satisfaction of and in accordance with the requirements of Thabazimbi Local Municipality Town Planning Scheme.
- ✓ Any bulk services contributions payable in respect of this application (if applicable), be offset against provision of additional transportation infrastructure and/or non-motorised and public transport facilities requirements.
- ✓ This application is supported from traffic and transportation engineering viewpoints and be therefore approved by the road authorities.

12 REFERENCES

1. *Committee of Transport Officials (COTO) - TMH 16 Volume 1 (South African Traffic Impact and Site Traffic Assessment Manual), COTO Committee Draft 2.1,* April 2021.
2. Committee of Transport Officials (COTO) - *TMH16 Vol. 2 South African Traffic Impact and Site Impact Assessment Standards and Requirements Manual*, August 2012
3. Committee of Transport Officials (COTO) - *TMH17 South Africa Trip Data Manual, Committee Draft 2.3,* May 2021
4. Committee of Transport Officials (COTO) – *TRH26 South Africa Road Classification and Access Management Manual*, August 2012
5. Committee of State Road Authorities (CSRA) - TRH17: Geometric Design of Rural Roads, 1988

ANNEXURE A

Extract of the Scoping Report

FINAL SCOPING REPORT

FOR ENVIRONMENTAL AUTHORISATION [DIAMONDS, DIAMONDS (GENERAL), GOLD, PLATINUM GROUP METALS, ARSENIC, CHROME, COBALT, COPPER, MERCURY, NICKEL, SILVER, ZINC AND IRON ORE MINING RIGHT], WASTE MANAGEMENT LICENCE, WATER USE LICENCE APPLICATIONS ON FARM CORNWALL 313 KQ AND PORTION RE,2,5,RE/8,9,10 AND 11 OF THE FARM KOEDOEVLEI 128 KQ SITUATED WITHIN THE MAGISTERIAL DISTRICT OF THABAZIMBI, LIMPOPO PROVINCE.

Prepared for: Arengo 297 (Pty) Ltd

DMRE REFERENCE: LP 30/5/1/2/2/ 10287MR

Prepared by:

Physical Address: 100 Booted Eagle Street Elandspoort, Pretoria, 0183

boipelo@mges.co.za and (+27) 081 388 1187

SEPTEMBER 2025

mineral resources & energy

Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

SCOPING REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH MINING RIGHT AND/OR BULK SAMPLING ACTIVITIES INCLUDING TRENCHING IN CASES OF ALLUVIAL DIAMOND PROSPECTING.

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS 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).

NAME OF APPLICANT : ARENGO 297 (PTY) LTD

TEL NO : +27 83 333 0000

FAX NO : N/A

POSTAL ADDRESS : P O BOX 96023, WATERKLOOF VALLEY 0145

PHYSICAL ADDRESS : 533 CLIFF AVENUE, WATERKLOOF RIDGE, PRETORIA 0181

FILE REFERENCE NUMBER SANRAD : **LP 30/5/1/2/2/ 10287MR**

(i) 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 right 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 taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or 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 required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

(ii) OBJECTIVES OF THE SCOPING PROCESS

The objective of the scoping process is to, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

(iii) DOCUMENT CONTROL

Document Title	Draft Environmental Scoping Report for Diamonds, Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, mercury, Nickel, Silver, Zinc and Iron Ore mining right on farm Cornwall 313 KQ and portion RE,2,5, RE/8,9,10 and 11 of the farm Koedoevlei 128 KQ situated within Thabazimbi Magisterial District, Limpopo Province.	
Client Name	Arengo 297 (Pty) Ltd	
Application Reference	DMRE REFERENCE: LP 30/5/1/2/2/ 10287MR	
Date	August 2025	
Environmental Assessment Practitioner	Boipelo Motlhatlhedi	EAPASA (2019/2021) and SACNASP (144383)
Prepared By:	Moepathutsi Geo-Environmental Solution, 100 Booted Eagle Street Elandspoort, Pretoria, 0183	

DOCUMENT OUTLINE

Document	**Environmental Scoping Report**
Report Status	**Final**

(iv) EXECUTIVE SUMMARY

Arengo 297 (Pty) Ltd has submitted a Mining Right application to the Limpopo Department of Mineral and Petroleum Resources (DMPR) in terms of section 22(1) of MPRDA. An application for Environmental Authorization (EA) has also been submitted simultaneously with the Mining Right to the DMPR. The EA is subject to an EIA process. This Scoping Report is prepared as part of the EIA study, supporting the Mining Right application.

The purpose of this document is to provide supplementary environmental information in support of an application for Diamonds, Diamonds (General), Gold, Platinum Group Metals, Arsenic, Chrome, Cobalt, Copper, mercury, Nickel, Silver, Zinc and Iron Ore mining right on farm Cornwall 313 KQ and portion RE,2,5,RE/8,9,10 and 11 of the farm Koedoevlei 128 KQ, situated in the Magisterial District of Thabazimbi, Limpopo Province. The mining right application area is situated approximately 5.022km North of Thabazimbi, 109,201km Northwest of Bela Bela and 111,569km Southwest of Lephalale. The R510 road cut through the project area from Thabazimbi to Hartbeesbuilt.

Depending on the geology of the deposits, depth, thickness and quality of minerals the extraction will be done using the open-cast mining method. This approach is suitable because the mineral deposit is located close to the surface, making it more practical and cost-effective than underground mining. The process will begin with site preparation, where the area will be cleared of vegetation and topsoil, and the necessary access roads and drainage systems will be established. The overburden will be carefully removed and stored for later use in rehabilitating the site. Once the mineral layer is exposed, it may be loosened through controlled blasting and then loaded to the processing plant. Mining will be carried out in benches, which will allow safe access for machinery and maintain pit stability. The operation will gradually expand both outward and downward until the ore is fully extracted. After mining is completed, the site will be rehabilitated by replacing the stored overburden and topsoil, reshaping the land, and restoring vegetation to ensure the area is returned to a stable and environmentally acceptable condition.

It is important to note that the proposed mining activity will be conducted in accordance with the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) as amended, which regulates listed activities. In support of the mining right application submitted to the Department of Mineral Resources and Energy, this environmental scoping report has been prepared to facilitate the requisite applications for environmental authorization, waste management license, and water use license. In this regard, Arengo 297 (Pty) Ltd (the "Applicant") has appointed Moepathutsi Geo-Environmental Solution as an independent Environmental Assessment Practitioner to oversee and manage the environmental authorization application process, ensuring compliance with all relevant regulatory requirements.

The proposed mining project will trigger the following regulations:

Environmental Authorisation by means of a Scoping and EIA Process for GNR 984 (Listing Notice 2, as amended) Activity 17: Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity

as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right.

Waste Management License by means of a Scoping and EIA Process for GN No. 921 Category B, Activity 11: The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

Water Use License by means of a WULA for the following water uses: Section 21(a): taking water from a water resource; Section 21(c): impeding or diverting the flow of water in a watercourse; Section 21(g): disposing of waste in a manner which may detrimentally impact on a water resource; Section 21(i): altering the bed, banks, course or characteristics of a watercourse; and Section 21(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.

Public Participation Process

The public participation process (PPP) and stakeholder engagement process, as part of the Environmental Authorization process is being conducted in terms of Section 41 of NEMA: 5 EIA regulation 326 of 2017 which provides clear guidelines for PPP and stakeholder engagement during the process. One of the general objectives of environmental management is to ensure an “adequate and appropriate opportunity for public participation in decisions that may affect the environment”. The PPP is primarily aimed at affording Stakeholders and Interested and Affected Parties (I&APs) an opportunity to gain an understanding of the project. In addition, to afford an opportunity to inform and consult with the landowners, I&APs and to provide them with the necessary information about the proposed project. Thus, they can make informed decisions as to whether to proceed or decline and to weigh the consequences of the project. Registered I&AP’ will be given time to comment on the draft report prior to the submission of the final report to the competent authorities for approval.

Scoping and environmental impact assessment process

The objectives of the Environmental Impact Assessment (EIA) phase are to conduct a comprehensive evaluation of the potential environmental and social impacts associated with the preferred project alternatives, as specified in the terms of reference outlined in the scoping report. The subsequent EIA/EMPr report will document the assessment findings and detail the necessary measures to avoid, mitigate, or manage these impacts. The requirements governing the S&EIA process are contained in Chapter 4, Part 3 of the National Environmental Management Act (NEMA) Regulation 326, as amended on April 7, 2017. The EIA process is anticipated to take approximately 300 days to complete, comprising 87 days for the scoping phase, 106 days for the EIA phase, and 107 days for review by the competent authority.t

Conclusion

The EIA Phase will encompass the completion of all specialist studies, which will provide critical inputs for the impact assessment and enable the identification of additional mitigation measures to be implemented for the Project. This phase will facilitate a thorough and detailed evaluation of the potential impacts, viable mitigations, and supplementary recommendations to inform the Project's advancement and ensure its sustainable progression.

d) Description of the scope of the proposed overall activity.

(i) Listed and specified activities

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attach as appendix 4.

The proposed mining site covers a total area extent of 4209 Hectors and is located approximately 5.022km North of Thabazimbi, 109,201km Northwest of Bela Bela and 111,569km Southwest of Lephalale. The R510 road cut through the project area from Thabazimbi to Hartbeesbuilt. The schematic representation provided below **(Figure 4)** depicts the planned mine layout configuration, which will be implemented to facilitate enhanced safety and operational efficiency during the mining activities.

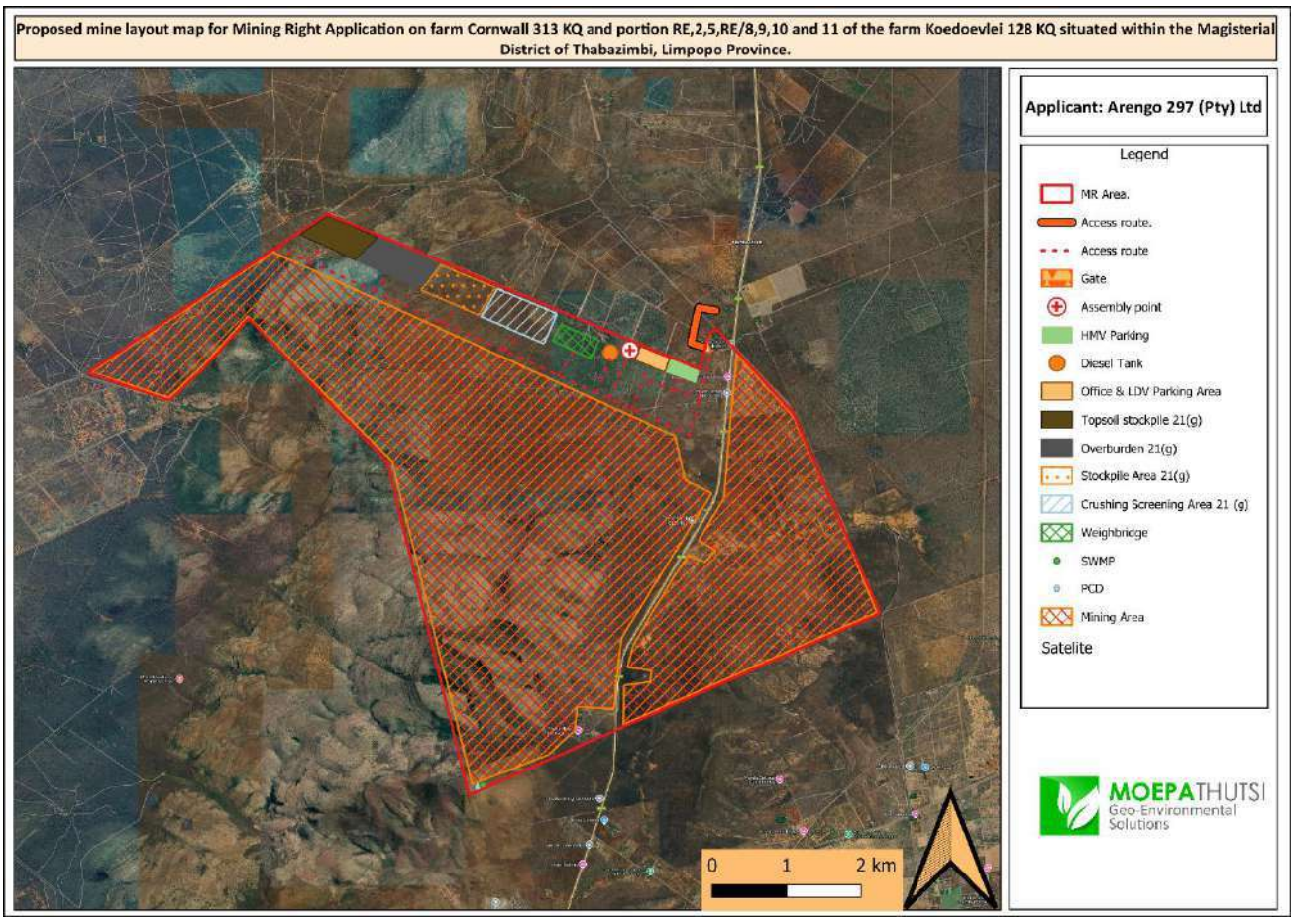
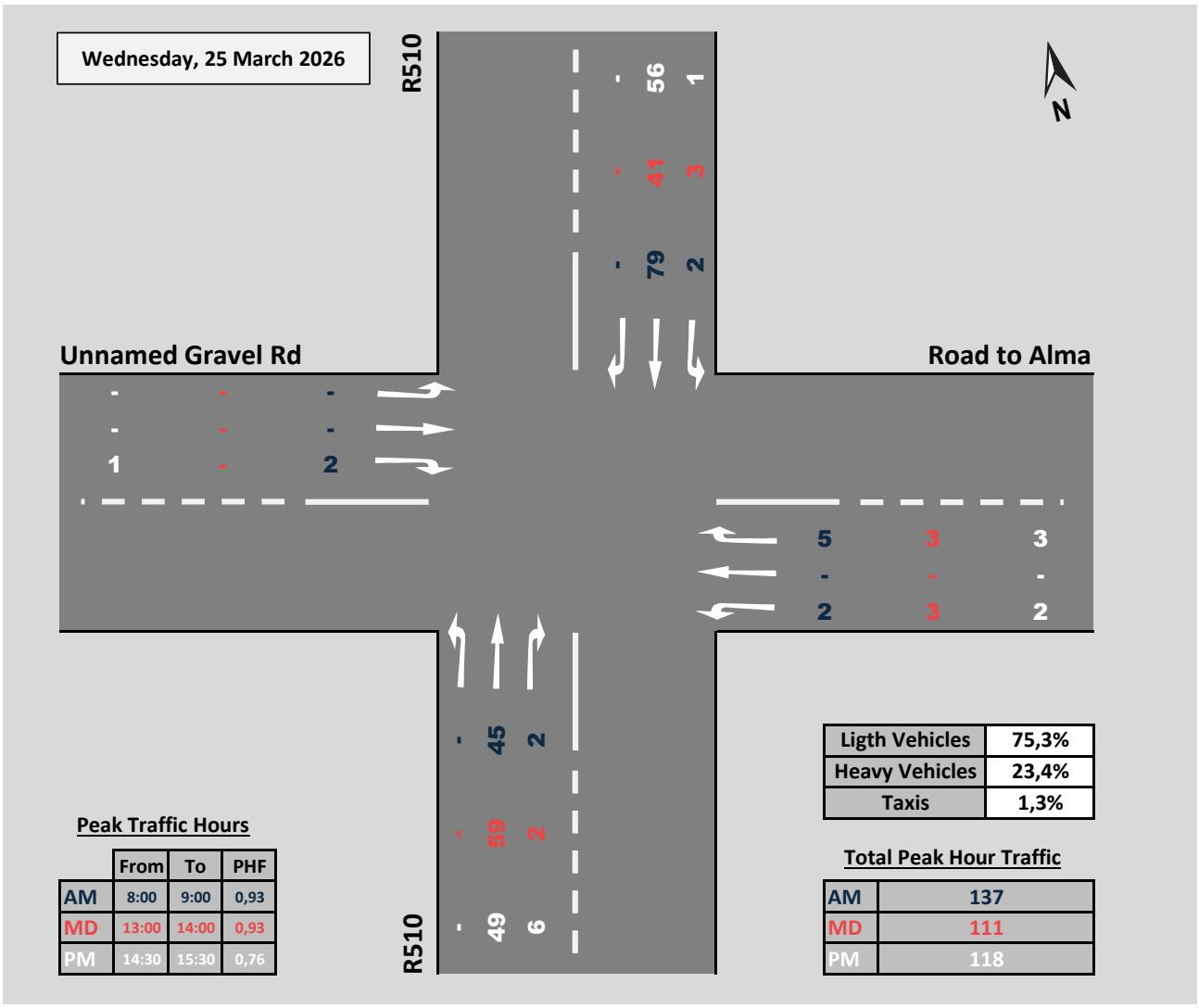


Figure 4: Mine layout plan.

ANNEXURE B

Detailed Traffic Surveys Data



Ligth Vehicles	75,3%
Heavy Vehicles	23,4%
Taxis	1,3%

Peak Traffic Hours

	From	To	PHF
AM	8:00	9:00	0,93
MD	13:00	14:00	0,93
PM	14:30	15:30	0,76

Total Peak Hour Traffic

AM	137
MD	111
PM	118

SURVEY DATA (ALL VEHICLES)

TRAFFIC SURVEYS

SURVEY DATE: Wednesday, 25 March 2026

TIME		MOVEMENT												
FROM	TO	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
06:00	06:15	-	11	-	-	-	1	-	6	-	-	-	-	18
06:15	06:30	-	9	-	1	-	-	-	7	-	-	-	-	17
06:30	06:45	-	8	-	1	-	-	1	18	-	-	-	-	28
06:45	07:00	-	11	2	2	-	1	-	15	-	-	-	-	31
07:00	07:15	-	13	2	1	-	2	-	10	-	-	-	-	28
07:15	07:30	-	9	1	-	-	-	-	11	-	-	-	-	21
07:30	07:45	-	9	1	1	-	-	4	11	-	-	-	-	26
07:45	08:00	-	10	1	-	1	-	-	7	-	-	-	-	19
08:00	08:15	-	8	-	-	-	-	-	26	-	-	-	-	34
08:15	08:30	-	9	2	-	-	3	1	21	-	-	-	1	37
08:30	08:45	-	8	-	2	-	1	-	18	-	-	-	-	29
08:45	09:00	-	20	-	-	-	1	1	14	-	-	-	1	37
09:00	09:15	-	9	1	-	-	-	-	8	-	-	-	-	18
09:15	09:30	-	16	-	1	-	-	1	5	-	-	-	-	23
09:30	09:45	-	5	1	1	-	1	1	9	-	-	-	-	18
09:45	10:00	-	8	-	1	-	1	2	5	-	-	-	-	17
10:00	10:15	-	4	-	-	-	-	1	15	-	-	-	-	20
10:15	10:30	-	8	-	-	-	3	-	15	-	-	-	1	27
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10:45	11:00	-	7	-	-	-	1	-	11	-	-	-	-	19
11:00	11:15	1	10	-	-	-	-	-	14	-	-	-	-	25
11:15	11:30	-	12	1	-	-	-	-	14	-	-	-	-	27
11:30	11:45	-	12	-	-	-	1	-	6	-	-	-	-	19
11:45	12:00	-	14	-	-	-	1	2	11	-	-	-	-	28
12:00	12:15	-	11	2	2	-	-	1	12	-	-	-	1	29
12:15	12:30	-	11	-	1	-	2	1	9	-	-	-	-	24
12:30	12:45	-	8	1	-	-	-	2	7	-	-	-	-	18
12:45	13:00	-	16	-	-	-	1	-	11	-	-	-	-	28
13:00	13:15	-	15	-	-	-	1	-	10	-	-	-	-	26
13:15	13:30	-	15	-	2	-	-	1	12	-	-	-	-	30
13:30	13:45	-	12	1	1	-	-	1	11	-	-	-	-	26
13:45	14:00	-	17	1	-	-	2	1	8	-	-	-	-	29
14:00	14:15	-	9	1	2	-	-	-	7	-	-	-	-	19
14:15	14:30	-	11	2	-	-	1	-	6	-	-	-	-	20
14:30	14:45	-	7	1	-	-	2	-	15	-	-	-	-	25
14:45	15:00	-	22	2	-	-	-	-	14	-	-	-	1	39
15:00	15:15	-	11	2	1	-	-	-	15	-	-	-	-	29
15:15	15:30	-	9	1	1	-	1	1	12	-	-	-	-	25
15:30	15:45	-	5	1	3	-	1	-	7	-	-	-	-	17
15:45	16:00	-	8	1	-	-	2	1	14	-	-	-	-	26
16:00	16:15	-	15	1	-	-	-	1	6	-	-	-	-	23
16:15	16:30	-	8	-	-	-	-	-	11	-	-	-	-	19
16:30	16:45	-	13	-	-	-	1	3	15	-	-	-	-	32
16:45	17:00	-	9	3	3	-	1	2	15	-	-	-	-	33
17:00	17:15	-	10	1	1	-	1	1	6	-	-	-	-	20
17:15	17:30	-	22	3	1	-	-	-	6	-	-	-	1	33
17:30	17:45	-	4	5	-	-	1	2	13	-	-	-	-	25
17:45	18:00	2	9	1	4	-	1	2	8	-	-	-	-	27
18:00	18:15	-	-	-	-	-	-	-	-	-	-	-	-	-
18:15	18:30	-	-	-	-	-	-	-	-	-	-	-	-	-
18:30	18:45	-	-	-	-	-	-	-	-	-	-	-	-	-
18:45	19:00	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	3	515	42	33	1	36	35	536	0	0	0	6	1 207

SURVEY DATA (LIGHT VEHICLES)

TRAFFIC SURVEYS

SURVEY DATE: Wednesday, 25 March 2026

TIME		MOVEMENT												
FROM	TO	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
06:00	06:15	-	5	-	-	-	1	-	4	-	-	-	-	10
06:15	06:30	-	6	-	1	-	-	-	5	-	-	-	-	12
06:30	06:45	-	4	-	1	-	-	1	5	-	-	-	-	11
06:45	07:00	-	10	2	2	-	1	-	13	-	-	-	-	28
07:00	07:15	-	11	2	1	-	2	-	8	-	-	-	-	24
07:15	07:30	-	7	1	-	-	-	-	10	-	-	-	-	18
07:30	07:45	-	6	1	1	-	-	1	3	-	-	-	-	12
07:45	08:00	-	8	1	-	1	-	-	7	-	-	-	-	17
08:00	08:15	-	8	-	-	-	-	-	4	-	-	-	-	12
08:15	08:30	-	6	2	-	-	2	1	17	-	-	-	1	29
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09:00	09:15	-	5	1	-	-	-	-	4	-	-	-	-	10
09:15	09:30	-	10	-	1	-	-	1	4	-	-	-	-	16
09:30	09:45	-	4	1	1	-	1	1	7	-	-	-	-	15
09:45	10:00	-	6	-	1	-	1	2	5	-	-	-	-	15
10:00	10:15	-	2	-	-	-	-	-	8	-	-	-	-	10
10:15	10:30	-	8	-	-	-	1	-	12	-	-	-	1	22
10:30	10:45	-	6	-	-	-	1	-	6	-	-	-	-	13
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18:45	19:00	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	3	413	41	32	1	28	25	360	0	0	0	6	909

SURVEY DATA (TAXIS)

TRAFFIC SURVEYS

SURVEY DATE: Wednesday, 25 March 2026

TIME		MOVEMENT												
FROM	TO	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
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06:30	06:45	-	1	-	-	-	-	-	-	-	-	-	-	1
06:45	07:00	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00	07:15	-	-	-	-	-	-	-	1	-	-	-	-	1
07:15	07:30	-	1	-	-	-	-	-	-	-	-	-	-	1
07:30	07:45	-	1	-	-	-	-	-	-	-	-	-	-	1
07:45	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00	08:15	-	-	-	-	-	-	-	-	-	-	-	-	-
08:15	08:30	-	1	-	-	-	-	-	-	-	-	-	-	1
08:30	08:45	-	1	-	-	-	-	-	1	-	-	-	-	2
08:45	09:00	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00	09:15	-	-	-	-	-	-	-	-	-	-	-	-	-
09:15	09:30	-	-	-	-	-	-	-	-	-	-	-	-	-
09:30	09:45	-	-	-	-	-	-	-	1	-	-	-	-	1
09:45	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00	10:15	-	-	-	-	-	-	-	-	-	-	-	-	-
10:15	10:30	-	-	-	-	-	-	-	-	-	-	-	-	-
10:30	10:45	-	-	-	-	-	-	-	-	-	-	-	-	-
10:45	11:00	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00	11:15	-	1	-	-	-	-	-	-	-	-	-	-	1
11:15	11:30	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30	11:45	-	-	-	-	-	-	-	-	-	-	-	-	-
11:45	12:00	-	-	-	-	-	-	-	1	-	-	-	-	1
12:00	12:15	-	-	-	-	-	-	-	1	-	-	-	-	1
12:15	12:30	-	-	-	-	-	-	-	-	-	-	-	-	-
12:30	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-
12:45	13:00	-	-	-	-	-	-	-	-	-	-	-	-	-
13:00	13:15	-	-	-	-	-	-	-	-	-	-	-	-	-
13:15	13:30	-	-	-	-	-	-	-	-	-	-	-	-	-
13:30	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-
13:45	14:00	-	-	-	-	-	-	-	1	-	-	-	-	1
14:00	14:15	-	-	-	-	-	-	-	-	-	-	-	-	-
14:15	14:30	-	-	-	-	-	-	-	-	-	-	-	-	-
14:30	14:45	-	-	-	-	-	-	-	-	-	-	-	-	-
14:45	15:00	-	-	-	-	-	-	-	1	-	-	-	-	1
15:00	15:15	-	-	-	-	-	-	-	-	-	-	-	-	-
15:15	15:30	-	-	-	-	-	-	-	-	-	-	-	-	-
15:30	15:45	-	-	-	-	-	-	-	-	-	-	-	-	-
15:45	16:00	-	-	1	-	-	-	-	-	-	-	-	-	1
16:00	16:15	-	-	-	-	-	-	-	-	-	-	-	-	-
16:15	16:30	-	-	-	-	-	-	-	-	-	-	-	-	-
16:30	16:45	-	-	-	-	-	-	-	-	-	-	-	-	-
16:45	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-
17:00	17:15	-	-	-	-	-	-	-	-	-	-	-	-	-
17:15	17:30	-	2	-	-	-	-	-	-	-	-	-	-	2
17:30	17:45	-	-	-	-	-	-	-	-	-	-	-	-	-
17:45	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-
18:00	18:15	-	-	-	-	-	-	-	-	-	-	-	-	-
18:15	18:30	-	-	-	-	-	-	-	-	-	-	-	-	-
18:30	18:45	-	-	-	-	-	-	-	-	-	-	-	-	-
18:45	19:00	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	0	8	1	0	0	0	0	7	0	0	0	0	16

SURVEY DATA (HEAVY VEHICLES)

TRAFFIC SURVEYS

SURVEY DATE: Wednesday, 25 March 2026

TIME		MOVEMENT												
FROM	TO	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
06:00	06:15	-	6	-	-	-	-	-	2	-	-	-	-	8
06:15	06:30	-	3	-	-	-	-	-	2	-	-	-	-	5
06:30	06:45	-	3	-	-	-	-	-	13	-	-	-	-	16
06:45	07:00	-	1	-	-	-	-	-	2	-	-	-	-	3
07:00	07:15	-	2	-	-	-	-	-	1	-	-	-	-	3
07:15	07:30	-	1	-	-	-	-	-	1	-	-	-	-	2
07:30	07:45	-	2	-	-	-	-	3	8	-	-	-	-	13
07:45	08:00	-	2	-	-	-	-	-	-	-	-	-	-	2
08:00	08:15	-	-	-	-	-	-	-	22	-	-	-	-	22
08:15	08:30	-	2	-	-	-	1	-	4	-	-	-	-	7
08:30	08:45	-	-	-	-	-	-	-	7	-	-	-	-	7
08:45	09:00	-	1	-	-	-	-	-	6	-	-	-	-	7
09:00	09:15	-	4	-	-	-	-	-	4	-	-	-	-	8
09:15	09:30	-	6	-	-	-	-	-	1	-	-	-	-	7
09:30	09:45	-	1	-	-	-	-	-	1	-	-	-	-	2
09:45	10:00	-	2	-	-	-	-	-	-	-	-	-	-	2
10:00	10:15	-	2	-	-	-	-	1	7	-	-	-	-	10
10:15	10:30	-	-	-	-	-	2	-	3	-	-	-	-	5
10:30	10:45	-	2	-	-	-	-	1	3	-	-	-	-	6
10:45	11:00	-	-	-	-	-	-	-	1	-	-	-	-	1
11:00	11:15	-	1	-	-	-	-	-	4	-	-	-	-	5
11:15	11:30	-	3	-	-	-	-	-	3	-	-	-	-	6
11:30	11:45	-	2	-	-	-	-	-	1	-	-	-	-	3
11:45	12:00	-	2	-	-	-	-	1	2	-	-	-	-	5
12:00	12:15	-	1	-	-	-	-	1	2	-	-	-	-	4
12:15	12:30	-	3	-	-	-	1	1	4	-	-	-	-	9
12:30	12:45	-	1	-	-	-	-	2	1	-	-	-	-	4
12:45	13:00	-	2	-	-	-	1	-	5	-	-	-	-	8
13:00	13:15	-	2	-	-	-	-	-	1	-	-	-	-	3
13:15	13:30	-	1	-	1	-	-	-	6	-	-	-	-	8
13:30	13:45	-	1	-	-	-	-	-	4	-	-	-	-	5
13:45	14:00	-	3	-	-	-	-	-	3	-	-	-	-	6
14:00	14:15	-	1	-	-	-	-	-	-	-	-	-	-	1
14:15	14:30	-	3	-	-	-	-	-	1	-	-	-	-	4
14:30	14:45	-	2	-	-	-	2	-	4	-	-	-	-	8
14:45	15:00	-	4	-	-	-	-	-	2	-	-	-	-	6
15:00	15:15	-	3	-	-	-	-	-	5	-	-	-	-	8
15:15	15:30	-	2	-	-	-	-	-	3	-	-	-	-	5
15:30	15:45	-	1	-	-	-	1	-	1	-	-	-	-	3
15:45	16:00	-	3	-	-	-	-	-	2	-	-	-	-	5
16:00	16:15	-	2	-	-	-	-	-	4	-	-	-	-	6
16:15	16:30	-	2	-	-	-	-	-	3	-	-	-	-	5
16:30	16:45	-	1	-	-	-	-	-	4	-	-	-	-	5
16:45	17:00	-	2	-	-	-	-	-	5	-	-	-	-	7
17:00	17:15	-	1	-	-	-	-	-	1	-	-	-	-	2
17:15	17:30	-	3	-	-	-	-	-	2	-	-	-	-	5
17:30	17:45	-	1	-	-	-	-	-	5	-	-	-	-	6
17:45	18:00	-	1	-	-	-	-	-	3	-	-	-	-	4
18:00	18:15	-	-	-	-	-	-	-	-	-	-	-	-	-
18:15	18:30	-	-	-	-	-	-	-	-	-	-	-	-	-
18:30	18:45	-	-	-	-	-	-	-	-	-	-	-	-	-
18:45	19:00	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	0	94	0	1	0	8	10	169	0	0	0	0	282

ANNEXURE C

Detailed AutoJ Intersection Capacity Analyses Results

Annexure C1 → R510 / D2509 Intersection

Annexure C2 → R510 / Proposed Site Access Intersection

ANNEXURE C1

R510 / D2509 Intersection

AutoJ

R510 & D2509

Thabazimbi, Limpopo

&AutoJ 1910 makala

Xwe | **Stop street on west and east approaches**

Scenario 1: Existing 2026 Peak Hour Traffic

Volume (evu/hr)

	from North					from South					from West					from East					intersection	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R		total
AM		2	79	1	82		1	45	2	48		1	1	1	3		2	1	5	8		**141**
Off		3	41	1	45		1	59	2	62		1	1	1	3		2	1	3	6		**116**
PM		1	56	1	58		1	49	6	56		1	1	1	3		2	1	3	6		**123**

Lanes

(if lanes shared L:S or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)

	from North				from South				from West				from East			
	L~	L	S	R	L~	L	S	R	L~	L	S	R	L~	L	S	R
# lanes		1,0	0,5	0,5		0,5	1,0	0,5		0,3	0,4	0,3		0,3	0,4	0,3

Control

	from North				from South				from West				from East			
	peds	left	str	right	*peds*	left	str	right	*peds*	left	str	right	*peds*	left	str	right
									stop	stop	stop	stop	*stop*	stop	stop	stop

VOLUME to CAPACITY (V/C)

A-B | C-D | E | F

LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99

Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+

	V/C from North					V/C from South					V/C from West					V/C from East					V/C	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	overall
AM		0,00	0,04	0,04	**0,04**		0,01	0,01	0,01	**0,01**		0,00	0,00	0,00	**0,00**		0,01	0,01	0,01	**0,01**	0,04	0,03
Off		0,00	0,02	0,02	**0,02**		0,02	0,02	0,02	**0,02**		0,00	0,00	0,00	**0,00**		0,01	0,01	0,01	**0,01**	0,02	0,02
PM		0,00	0,03	0,03	**0,03**		0,01	0,01	0,01	**0,01**		0,00	0,00	0,00	**0,00**		0,01	0,01	0,01	**0,01**	0,03	0,02

Average DELAY per vehicle (secs)

A-B | C-D | E | F

LOS A<10, B<15, C<25, D<35, E<50

Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+

	delay from North					delay from South					delay from West					delay from East					delay / veh	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	overall
AM		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**
Off		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**
PM		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**

Average QUEUE length (veh)

(= total delay veh-hrs / hr)

OK | WARN | POOR

Q <4 = OK, <10 = WARN, 10+ = POOR

	Q from North					Q from South					Q from West					Q from East					Queue	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	total
AM		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**
Off		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**
PM		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**

AutoJ

R510 & D2509

Thabazimbi, Limpopo

&AutoJ 1910 makala

Xwe | **Stop street on west and east approaches**

Scenario 2: Estimated Future 2031 Background Peak Hour Traffic

Volume (evu/hr)

	from North					from South					from West					from East					intersection	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R		total
AM		2	92	1	95		1	52	2	56		1	1	1	3		2	1	6	9		**163**
Off		3	48	1	52		1	68	2	72		1	1	1	3		2	1	3	7		**134**
PM		1	65	1	67		1	57	7	65		1	1	1	3		2	1	3	7		**143**

Lanes

(if lanes shared L:S or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)

	from North				from South				from West				from East			
	L~	L	S	R	L~	L	S	R	L~	L	S	R	L~	L	S	R
# lanes		1,0	0,5	0,5		0,5	1,0	0,5		0,3	0,4	0,3		0,3	0,4	0,3

Control

	from North				from South				from West				from East			
	peds	left	str	right	*peds*	left	str	right	*peds*	left	str	right	*peds*	left	str	right
									stop	stop	stop	stop	*stop*	stop	stop	stop

VOLUME to CAPACITY (V/C)

A-B | C-D | E | F

LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99

Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+

	V/C from North					V/C from South					V/C from West					V/C from East					V/C	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	overall
AM		0,00	0,05	0,05	**0,05**		0,01	0,01	0,01	**0,01**		0,00	0,00	0,00	**0,00**		0,01	0,01	0,01	**0,01**	0,05	0,03
Off		0,00	0,02	0,02	**0,02**		0,02	0,02	0,02	**0,02**		0,00	0,00	0,00	**0,00**		0,01	0,01	0,01	**0,01**	0,02	0,02
PM		0,00	0,03	0,03	**0,03**		0,02	0,02	0,02	**0,02**		0,00	0,00	0,00	**0,00**		0,01	0,01	0,01	**0,01**	0,03	0,02

Average DELAY per vehicle (secs)

A-B | C-D | E | F

LOS A<10, B<15, C<25, D<35, E<50

Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+

	delay from North					delay from South					delay from West					delay from East					delay / veh	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	overall
AM		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**
Off		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**
PM		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**

Average QUEUE length (veh)

(= total delay veh-hrs / hr)

OK | WARN | POOR

Q <4 = OK, <10 = WARN, 10+ = POOR

	Q from North					Q from South					Q from West					Q from East					Queue	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	total
AM		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**
Off		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**
PM		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**

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Xwe | **Stop street on west and east approaches**

Scenario 3: Estimated Total Future 2031 Peak Hour Traffic Demand

Volume (evu/hr)

	from North					from South					from West					from East					intersection	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R		total
AM		4	104	1	109		1	99	2	103		1	1	1	3		2	1	15	18		**233**
Off		3	48	1	52		1	68	2	72		1	1	1	3		2	1	3	7		**134**
PM		10	112	1	123		1	69	7	77		1	1	1	3		2	1	5	9		**213**

Lanes

(if lanes shared L:S or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)

	from North				from South				from West				from East			
	L~	L	S	R	L~	L	S	R	L~	L	S	R	L~	L	S	R
# lanes		1,0	0,5	0,5		0,5	1,0	0,5		0,3	0,4	0,3		0,3	0,4	0,3

Control

	from North				from South				from West				from East			
	peds	left	str	right	*peds*	left	str	right	*peds*	left	str	right	*peds*	left	str	right
									stop	stop	stop	stop	*stop*	stop	stop	stop

VOLUME to CAPACITY (V/C)

A-B | C-D | E | F

LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99

Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+

	V/C from North					V/C from South					V/C from West					V/C from East					V/C	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	overall
AM		0,00	0,05	0,05	**0,05**		0,03	0,03	0,03	**0,03**		0,00	0,00	0,00	**0,00**		0,02	0,02	0,02	**0,02**	0,05	0,04
Off		0,00	0,02	0,02	**0,02**		0,02	0,02	0,02	**0,02**		0,00	0,00	0,00	**0,00**		0,01	0,01	0,01	**0,01**	0,02	0,02
PM		0,01	0,06	0,06	**0,05**		0,02	0,02	0,02	**0,02**		0,00	0,00	0,00	**0,00**		0,01	0,01	0,01	**0,01**	0,06	0,04

Average DELAY per vehicle (secs)

A-B | C-D | E | F

LOS A<10, B<15, C<25, D<35, E<50

Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+

	delay from North					delay from South					delay from West					delay from East					delay / veh	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	overall
AM		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**
Off		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**
PM		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**

Average QUEUE length (veh)

(= total delay veh-hrs / hr)

OK | WARN | POOR

Q <4 = OK, <10 = WARN, 10+ = POOR

	Q from North					Q from South					Q from West					Q from East					Queue	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	total
AM		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,1**
Off		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**
PM		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**

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ANNEXURE C2

R510 / Proposed Site Access Intersection

AutoJ

R510 & Proposed Site Access

Thabazimbi, Limpopo

&AutoJ 1910 makala

Xwe | **Stop street on west and east approaches**

Scenario 3: Estimated Total Future 2031 Peak Hour Traffic Demand

Volume (evu/hr)

	from North					from South					from West					from East					intersection	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R		total
AM		1	94	6	101		57	58	1	116		1	1	14	16		1	1	1	3		**236**
Off		1	1	1	3		1	1	1	3		1	1	1	3		1	1	1	3		**12**
PM		1	66	2	69		14	60	1	75		6	1	57	64		1	1	1	3		**211**

Lanes

(if lanes shared L:S or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)

	from North				from South				from West				from East			
	L~	L	S	R	L~	L	S	R	L~	L	S	R	L~	L	S	R
# lanes		0,5	0,5	1,0		0,5	0,5	1,0		0,3	0,4	0,3		0,3	0,4	0,3

Control

	from North				from South				from West				from East			
	peds	left	str	right	*peds*	left	str	right	*peds*	left	str	right	*peds*	left	str	right
									stop	stop	stop	stop	*stop*	stop	stop	stop

VOLUME to CAPACITY (V/C)

A-B | C-D | E | F

LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99

Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+

	V/C from North					V/C from South					V/C from West					V/C from East					V/C	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	overall
AM		0,05	0,05	0,00	**0,05**		0,06	0,06	0,00	**0,06**		0,02	0,02	0,02	**0,02**		0,00	0,00	0,00	**0,00**	0,06	0,05
Off		0,00	0,00	0,00	**0,00**		0,00	0,00	0,00	**0,00**		0,00	0,00	0,00	**0,00**		0,00	0,00	0,00	**0,00**	0,00	0,00
PM		0,03	0,03	0,00	**0,03**		0,04	0,04	0,00	**0,04**		0,08	0,08	0,08	**0,08**		0,00	0,00	0,00	**0,00**	0,08	0,05

Average DELAY per vehicle (secs)

A-B | C-D | E | F

LOS A<10, B<15, C<25, D<35, E<50

Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+

	delay from North					delay from South					delay from West					delay from East					delay / veh	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	overall
AM		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**1**
Off		0	0	0	**0**		0	0	0	**0**		8	9	9	**9**		8	9	9	**9**	9	**4**
PM		0	0	0	**0**		0	0	0	**0**		9	9	9	**9**		8	9	9	**9**	9	**3**

Average QUEUE length (veh)

(= total delay veh-hrs / hr)

OK | WARN | POOR

Q <4 = OK, <10 = WARN, 10+ = POOR

	Q from North					Q from South					Q from West					Q from East					Queue	
	peds	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	*peds*	left	str	right	L+S+R	max	total
AM		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,1**
Off		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**	0,0	**0,0**
PM		0,0	0,0	0,0	**0,0**		0,0	0,0	0,0	**0,0**		0,0	0,0	0,1	**0,2**		0,0	0,0	0,0	**0,0**	0,1	**0,2**

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