# TENBOSCH MINING (PTY) LTD

# DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR A MINING RIGHT APPLICATIONS FOR COAL ON PORTION 21, 55, 56, 64, 65, 68,69 & 213 OF THE FARM TENBOSCH 162 JU; PORTION 2, 5 & 6 OF THE FARM TURFBELT 593 JU AND THE REMAINING EXTENT OF THE FARM TECKLEBURGS RANCH 548 JU , MPUMALANGA PROVINCE

**AUGUST 2023**

**DMRE REF: MP30/5/1/2/2/10259 MR**

**KIM-MIN-2022-270**

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# DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR A MINING RIGHT APPLICATIONS FOR COAL ON PORTION 21, 55, 56, 64, 65, 68,69 & 213 OF THE FARM TENBOSCH 162 JU; PORTION 2, 5 & 6 OF THE FARM TURFBELT 593 JU AND THE REMAINING EXTENT OF THE FARM TECKLEBURGS RANCH 548 JU, MPUMALANGA PROVINCE

**Conducted on behalf of:**

Tenbosch Mining (Pty) Ltd

Compiled by:

______________________________

Lufuno Nengwani

**Reviewed by:**

______________________________

Simon Netshiozwi (Pr.Sci.Nat)

**Project Team:**

Lufuno Nengwani – EAP and Project Manager

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# Document History and Distribution List

| Project Number | Date | Revision Number |
|---|---|---|
| KIM-MIN-2022-270 | August 2023 | 01 |

| Name | Institution |
|---|---|
| Registry | Department of Mineral Resources and Energy |
| Phillip Mkhatshwa | Tenbosch Mining (Pty) Ltd |
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# 1 EXECUTIVE SUMMARY

## *1.1 Introduction*

The application falls within the Nkomazi Local Municipality under Ehlanzeni District Municipality in Mpumalanga Province. The original application was lodged by Manzolwandle Investments(Pty) Ltd and the name has subsequently changed to Tenbosch Mining (Pty) Ltd.

Tenbosch Mining (Pty) Ltd (Tenbosch) lodged a mining right application with the reference number SAMRAD: (MP) 30/5/1/2/3/2/1/ (10259) EM in terms of Mineral and Petroleum Resources Development Act ( Act 28 of 2002 as amended), for the proposed underground coal mining activities on portion 21, 55, 56, 64, 65, 68,69 & 213 of the farm Tenbosch 162 JU; portion 2, 5 & 6 of the farm Turfbelt 593 JU and the remaining extent of the farm Teckeburgs Ranch 548 JU.

As per legislative requirements, an Environmental Authorisation (EA) Application in terms of the National Environmental Management Act, 1998 (NEMA, Act No. 107 of 1998), Mining Right (MR) Application in terms of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA, Act No. 28 of 2002) as amended, Waste Management Licence (WML) in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM:WA) must be submitted simultaneously with the Department of Mineral Resources and Energy (DMRE), and Water Use Licence Application (WULA) in terms of the National Water Act, 1998 (Act 36 of 1998) (NWA), should be submitted to the Department of Water and Sanitation (DWS). Tenbosch Mining lodged an application for a MR, EA and WML to DMRE and it was accepted on 27th February 2020. A separate process for WULA will be conducted with DWS.

The project triggers activities listed in terms of Listing Notices 1 (Activities 12, 25, 27, and 56), Listing Notice 2 (Activities 6, 15, 17 and 16) and Listing Notice 3 (Activities 4, 10, 12 and 18) of the NEMA (as amended).

The proposed processing plant, stockpile and dump areas of hard and soft material will trigger activities listed in GNR 921 (Category B: Activities 7, 8, and 10) of the NEM: WA and therefore require a WML from the DMRE. A full Environmental Impact Assessment (EIA) including Scoping and Impact Assessment was be followed as stipulated in GNR 982 of the NEMA and GNR921 of the NEM: WA.

The proposed mine also requires a WUL for water uses as defined in Section 21 of the National Water Act, 1998 (Act 36 of 1998) (NWA). The proposed water uses to be applied for include Section 21 a, b, g and j.

The Mining Right area is located on portion 21, 55, 56, 64, 65, 68,69 & 213 of the farm Tenbosch 162 JU; portion 2, 5 & 6 of the farm Turfbelt 593 JU and the remaining extent of the farm Tecklenburg's Ranch 548 JU , in the Jurisdiction of Nkomazi Local Municipality in the Ehlanzeni District Municipality in Mpumalanga Province. The site is bound by three main roads which are R582 (Coorspedal), which is on the south and on the east is Strydom block road. The N4 to Komatipoort is situated to the north at approximately 4km from the site. It should be noted that the closest or the road that has access to the site is through R582 as there are sugar cane farms on the northern side of the farm.

When measured from the centre of the farm Tecklenburg ranch 548 JU, the proposed area is located about 15km west of Komatipoort Town and Lebombo. Iit is also located at approximately 28km east of Malelane, 11km south of Marloth park, 27km west of Guaza, 30km north west of Macungue and 22km north of Tonga.

### 1.1.1 Who is conducting the EIA?

Kimopax (Pty) Ltd ("Kimopax") has been appointed as an Independent Environmental Assessment Practitioner (EAP), to undertake the Mining Right Application with the associated applications for an EA, WML & WULA for the proposed Project. The reports and documentation for the integrated EA/WML application process will be compiled and finalised for submission to the DMRE for the EA/WML in terms of the NEMA for consideration and decision making. The DMRE will consult with other organs of state as required in terms of Section 24(K) of the NEMA.

### 1.1.2 Who will evaluate the EIA?

Before the proposed development can proceed, approval must be obtained from the regulatory authorities. The EIA Report will be submitted to the DMRE for review. The competent authorities will then advise the project team as to how the project should proceed for the impact assessment Phase of the project. The impact assessment phase will entail detailed specialist investigations, reporting and further stakeholder consultations. Only once a Final Environmental Impact Assessment Report (EIAR) and EMPr have been submitted to DMRE can a decision be taken by the Department as to whether the project may proceed or not.

## *1.2 Description of the Proposed Development*

The mine will be developed as follows:

i. Tenbosch Mining will be an underground mining operation. The approximate extent of the underground mining area is 6 521 ha, and the proposed coal mining will be by decline method. There is an alternative to use a single or twin decline shafts which will comprise of two parallel shafts, one dedicated to personnel and material movement and the other dedicated to coal conveying.
ii. These will be the up and down cast ventilation tunnels for the mine, but up-cast raise bore ventilation shafts will be developed once required and these two declines will both be downcast. Raise bore ventilation holes will be developed as part of ongoing capital as mining progresses.
iii. Bord-and-pillar mining method is proposed for dipping coal seams. This entails the mining of rooms (bords) leaving pillars intact as a primary support to support the immediate roof.
iv. Secondary support will be used in the form of roof bolts and any other support means as and when required into the immediate roof of the bords mined.

The infrastructure that will be required is the following:

- The shaft bank area (for the main and ventilation shafts and the immediate infrastructure associated therewith, including the winder houses, the ventilation fans, materials handling equipment etc.);
- The ROM ore storage areas and underground development waste rock areas;
- Crushing and screening plant;
- Sales product storage areas and load out areas;
- Tailings storage facility;
- Surface substations and the like;
- Main access road from the N4 to the mine site,
- Stormwater management infrastructure;

- A pollution control dam;
- Buildings including workshops, change house-lamp room, offices, and stores;
- Contractors' laydown area and parking;
- Power Supply infrastructure including a switching yard and electrical power-lines;
- Sewerage treatment package plant;
- Water Treatment Plant;
- Fuel storage; and
- Water Infrastructure including portable water tanker etc.

The Life of Mine (LOM) for Tenbosch Mining is approximately 30 years.

The potential environmental impacts associated with the mining activities will be identified through the EIA Report of the EIA Study, assessed and the significance of impacts determined through the Environmental Impact Report (EIR) and managed through a detailed Environmental Management Programme (EMPr).

The draft EIR and EMPr will be available for public review for 30 days, and details thereof will be communicated to I&APs.

### 1.2.1 Environmental Impact Assessment Process

An EIA seeks to identify the environmental consequences of a proposed project from the beginning, and helps to ensure that the project, over its life cycle, will be environmentally acceptable, and integrated into the surrounding environment in a sustainable way. The project triggers activities listed in GNR984 (Listing Notice 2) of the NEMA and requires that a full EIA (scoping and impact assessment phases) be conducted. Two parallel processes are followed during the Scoping Phase being the Environmental technical process and the Stakeholder Engagement process.

### 1.2.2 Stakeholder Engagement Process

Activities that have been undertaken for the public involvement process during the Scoping Phase are:

a) Development of a stakeholder database:

- The stakeholder database comprises a variety of stakeholders identified from the previous mining right application projects in the area, and newly identified stakeholders through the registering process of this project.

The opportunity to participate in the EIA and to register as an Interested and Affected Party (I&AP) was announced in August 2023 through the following means:

b) Advert was placed in the Lowvelder newspaper on 18 August 2023;

c) Letters of invitation to register and background information documents;

d) Placing of Site notices were erected at several places in and around the proposed study area;

e) Collation of comments received into a Comments and Responses Register (CRR); and

f) Obtaining and documenting registration and comment sheets.

The Draft Scoping Report is made available for a 30-day commenting period. All issues, comments and suggestions received from stakeholders will be reviewed and collated into a CRR. Where necessary, comments from stakeholders will also be incorporated into the Final Scoping Report that will be submitted to the DMRE for decision-making. A public meeting was held during the Scoping Phase of the project.

The EIA/ EMPr Report is available to the stakeholders for a 30-day review and comment period. A public meeting to discuss the findings from the specialist studies and impact assessment phase will be held. Comments received will be incorporated into the Final EIA/EMPr Report which will be submitted to the DMRE for decision making. The comments will also be collated into the CRR, which will form an Appendix to the EIA/EMPr Report.

The stakeholders will be notified about the Department's final decision on the project once it has been communicated to the EAP and applicant.

### 1.2.3 Profile of the receiving environment

The Scoping Report provides a general description of the status quo of the receiving environment in the project area. It serves to set the scene and provide context to the area within which the scoping exercise was conducted. This section also includes the main issues/impacts associated with each aspect and how the proposed project will affect the biophysical and social environment.

### 1.2.4 Anticipated Impacts

Risks and potential impacts will be categorised according to the type of activity undertaken and the relation to each environmental variable. Valid consultation outcomes and findings from the specialist studies will be incorporated into the EIA/EMPr Report. The following impacts as described below are anticipated because of the construction, operation and decommissioning Phases of the project:

a) Possible job opportunities during the construction and operation.
b) Changes in the topography in the area.
c) Possible groundwater and surface water contamination.
d) Possible impact on Air Quality in the area.
e) Possible impacts on private properties and fauna due to blasting and vibrations.
f) Possible contribution to climate change through emission of Green House Gases.
g) Possible generation of noise during construction and operation.
h) Visual impact associated with the mine infrastructure and operation.
i) Loss of soil resource and change in land capability and land use.
j) Disturbance and loss of biodiversity.
k) Potential safety issues due to the increased traffic.

### 1.2.5 Specialist Studies

The following specialist inputs are expected to be required for the proposed Mine:

a) Groundwater impact assessment;
b) Surface water assessment;
c) Heritage resources;
d) Air Quality assessment;
e) Biodiversity (Flora and Fauna);
f) Soils, Land Use and Land Capability assessment;
g) Socio-economic assessment;
h) Traffic Impact Assessment;

i) Visual assessment; and
j) Noise assessment;

All specialists will assess the impact (including cumulative) of each proposed activity/aspect in relation to the construction, operational, closure and decommissioning phases and develop appropriate mitigation measures that can be implemented to reduce or eliminate the potential impacts identified.

### 1.2.6 Quantification of Impacts

The anticipated impacts associated with the proposed project will be assessed according to Kimopax standardized impact assessment methodology which is presented in Section 11. This methodology has been utilized for the assessment of environmental impacts where the consequence (severity of impact, spatial scope of impact and duration of impact) and likelihood (frequency of activity and frequency of impact) have been considered in parallel to provide an impact rating and hence an interpretation in terms of the level of environmental management required for each impact.

## *1.3 Plan of Study for the EIA*

The Scoping Report is concluded with a Plan of Study for the EIA which explains how the EIA will be conducted for the project in accordance with the following:

a) Key environmental issues identified during the scoping phase to be investigated further in the EIA phase;

b) Feasible alternatives to be assessed further in the EIA phase;

c) Development of a Waste Management Plan as part of the EMPr;

d) Specialist investigations which need to be finalized;

e) The public participation process to be followed;

f) Contents of the EIA/EMPr Report; and

g) Consultation with the authorities.

## *1.4 Conclusion and Recommendation*

The Scoping Report has presented:

a) The environmental process undertaken so far;

b) A brief description of the proposed project;

c) A baseline description of the current environment;

d) The potential environmental and social impacts identified to date; and

e) The recommended environmental process to be followed to develop the EIA/EMPr Report.

A comprehensive public involvement process was implemented during scoping. The EIA process is however, iterative and therefore additional potential issues/impacts and alternatives may be identified during the impact assessment phase that may require further investigation/consideration.

It is anticipated that implementation of the Plan of Study (PoS) presented in this report will result in an adequate EIA process which will result in the formulation of a sound EMPr to be implemented throughout the LOM.

The process followed during the detailed impact assessment phase will meet the requirements of the legislation to ensure that the regulatory authorities receive enough information to enable informed decision-making.

# 2 LIST OF ABBREVIATIONS

| | |
|---|---|
| ABET: | Adult Basic Education and Training |
| BID: | Background Information Document |
| BoD: | Board of Directors |
| CA: | Competent Authority |
| CBAs: | Critical Biodiversity Areas |
| CPR: | Competent Persons Report |
| CRR: | Comments and Responses Register |
| DAFF: | Department of Agriculture, Forestry and Fisheries |
| DEA: | Department of Environmental Affairs |
| DEIAR: | Draft Environmental Impact Assessment Report |
| DEMP: | Draft Environmental Management Programme |
| DMRE: | Department of Mineral Resources and Energy |
| DMS: | Dense Media Separation |
| DSR: | Draft Scoping Report |
| DWS: | Department of Water and Sanitation |
| EA: | Environmental Authorisation |
| ECO: | Environmental Control Officer (ECO) |
| EAP: | Environmental Assessment Practitioner |
| EC: | Electrical Conductivity |
| EIA: | Environmental Impact Assessment |

| | |
|---|---|
| EIAR: | Environmental Impact Assessment Report |
| EMPR: | Environmental Management Programme |
| EIS: | Ecological Importance Status |
| ESAs: | Ecological Support Areas |
| EWR: | Ecological Water Requirements |
| FEL: | Front End Loader |
| FOB: | Free On Board |
| GDP: | Gross Domestic Product |
| GG: | Government Gazette |
| GNR: | Government Notice Regulation |
| GVA: | Gross Value Added |
| HDPE: | High-Density Polyethylene-Lined |
| HIA: | Heritage Impact Assessment |
| HRDP: | Human Development Resources Plan |
| I&APs: | Interested and Affected Parties |
| IDP: | Integrated Development Plan |
| IEM: | Integrated Environmental Management |
| IHI: | Index for Habitat Integrity |
| IWUL: | Integrated Water Use Licence |
| LED: | Local Economic Development |
| MHSA: | Mine Health and Safety Act (Act No. 29 of 1996) |

| | |
|---|---|
| MPRDA: | Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) |
| MQA: | Mining Qualifications Authority |
| MRA: | Mining Right Application |
| NEMA: | National Environmental Management Act, 1998 (Act 107 of 1998) |
| NEMBA: | National Environmental Management: Biodiversity Act (Act No. 10 of 2004) |
| NEMWA: | National Environmental Management: Waste Act, 2008 (Act 59 of 2008) |
| NFEPAs: | National Freshwater Ecosystem Priority Areas |
| NHRA: | National Heritage Resources (Act No. 25 of 1999) |
| NPV: | Net Present Value |
| NWA: | National Water Act, 1998 (Act 36 of 1998) |
| PPP: | Public Participation Process |
| PAIA: | Promotion of Access to Information Act (Act No. 2 of 2000) |
| PCD: | Pollution Control Dam |
| PES: | Present Ecological Status |
| PFC: | Power Factor Correction |
| POIs: | Points of Interest |
| PoS | Plan of Study |
| QDS: | Quarter Degree Square |
| RD: | Relative Density |

| | |
|---|---|
| ROM: | Run of Mine |
| SACNASP: | South African Council for Natural Scientific Profession |
| SAHRA: | South African Heritage Resource Agency |
| SAHRIS: | South African Heritage Resources Information System |
| S&EIR: | Scoping and Environmental Impact Reporting (S&EIR) |
| SAMREC: | South African Code for the Reporting of Exploration Results |
| SANBI: | South African National Biodiversity Institute |
| SANS: | South African National Standards |
| SARHP: | South African River Health Programme |
| SCC: | Species of Conservation Concern |
| SDP: | Skills Development Plan |
| SETA: | Sector Education and Training Authority |
| SR: | Scoping Report |
| TDS: | Total Dissolved Solids |
| VEGRAI: | Vegetation Response Assessment Index |
| WARMS: | Water Registration and Management Systems |
| WML: | Waste Management Licence |
| WMS: | Hydro Water Management system |

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mineral resources

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Mineral Resources
REPUBLIC OF SOUTH AFRICA

**ENVIRONMENTAL IMPACT ASSESMENT AND ENVIRONMENTAL MANAGEMENT REPORT**

**FOR LISTED ACTIVITIES ASSOCIATED WITH MINING RIGHT AND/OR BULK SAMPLING ACTIVITIES INCLUDING TRENCHING IN CASES OF COAL**

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:** TENBOSCH MINING (PTY) LTD

**TEL NO:** 013 691 1034

**FAX NO:** 011 312 9768

**POSTAL ADDRESS:** P.O. Box 13749, Leraatsfontein, 1038

**PHYSICAL ADDRESS:** 8 Victor Pohl St, Duvha Park, Emalahleni, 1034

**FILE REFERENCE NUMBER SAMRAD:** MP30/5/1/2/2/10259MR

# 4 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 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.

# 5 OBJECTIVE OF THE SCOPING PROCESS

1) The objective of the scoping process is to, through a consultative process—

(a) identify the relevant policies and legislation relevant to the activity;

(b) motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) identify and confirm the preferred activity and technology alternative through an impact and risk assessment, and ranking process;

(d) 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;

(e) identify the key issues to be addressed in the assessment phase;

(f) 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

(g) 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.

# 6 ENVIRONMENTAL IMPACT ASSESSMENT REPORT

## *6.1 Contact Person and Correspondence Address*

### 6.1.1 Details of the EAPs who prepared the report

The EAPs involved in the compilation of this EIA Report and their contact details are provided in Table 1 below.

**Table 1: EAPs Contact Details**

| Name of The Practitioner | Tel No | Fax No | E-mail address |
|---|---|---|---|
| | | | |
| Lufuno Nengwani | 082 832 9378 | 011 312 9768 | Lufuno@kimopax.com |

### 6.1.2 Expertise of the EAP

**i. The qualifications of the EAP**

(With evidence attached as Appendix 1).

- Diploma in Mining Engineering.
- BSc (Hons) Mining and Environmental Geology.

Completed the various Environmental Management modules such as Ecological Principles for Environmental Management, The Natural Environment as a System, Pollution and Environmental Quality; Environmental Geology and Mine Rehabilitation; Environmental Impact Assessment and Modelling; Resource Evaluation and Information System; GIS and Map Production; and Advanced Mining and Environmental Management

**ii. Summary of the EAP's past experience.**

( EAP's curriculum vitae attached as Appendix 2)

Mr Nengwani has over 7 years of working experience in the environmental management field obtained from Geoluken Consulting, Crysbol, and Multiview Investments which are environmental consulting companies. His expertise ranges from conducting applications for Environmental Authorisations (mining and developmental projects), Water Use License applications, Waste Management Applications, performance assessment reports for operational mines, and water sampling. Supervisory duties within the field, Environmental reports, progress report writing and proposals, including Environmental Management Plans/Programmes, and handling of the Department of Mineral Resources (DMR) documents in general.

## *6.2 Details of the Applicant*

**Table 2: Details of Applicant**

| | | | |
|---|---|---|---|
| Project applicant: | Tenbosch Mining (Pty) Ltd | | |
| Registration no (if any): | 2006/007599/07 | | |
| Trading name (if any): | Tenbosch Mining (Pty) Ltd | | |
| Responsible Person (e.g. Director, CEO, etc): | Raymond Zulu (Director) | | |
| Contact person: | Raymond Zulu | | |
| Physical address: | 8 Victor Pohl St, Duvha Park, Emalahleni, 1034 | | |
| Postal address: | P.O. Box 13749, Leraatsfontein, | | |
| Postal code: | 1038 | Cell: | +27 71 590 9366 |
| Telephone: | +27 13 691 1034 | Fax: | +27 86 716 5691 |
| E-mail: | gme@telkomsa.net;<br><br>admin@friday24.co.za | | |

## *6.3 Description of the Property*

**Table 3: Location details**

| | |
|---|---|
| **Farm Name:** | Tenbosch 162 JU and Teckleburgs Ranch 548 JU |
| **Application area (Ha)** | 6 521 ha |
| **Magisterial district:** | Ehlanzeni |
| **Distance and direction from nearest town** | Taken from the centre of Tecklenburg's ranch 548 JU, the proposed development is approximately 28km East of Malelane, 15km South of Marloth Park, 12km West of Komatipoort and 85km South-East of Hazyview. |
| **21 digit Surveyor General Code for each farm portion** | Tenbosch 162- T0JU00000000016200021<br>- T0JU00000000016200055<br>- T0JU00000000016200056<br>- T0JU00000000016200064<br>- T0JU00000000016200065<br>- T0JU00000000016200066<br>- T0JU00000000016200069<br>- T0JU00000000016200123<br>Teckleburgs ranch 548- T0JU00000000054800000<br>Turfbelt 593 JU - T0JU00000000059300002<br>- T0JU00000000059300005<br>- T0JU00000000059300006 |

## 6.4 Locality map

Figure 1 and 2 below show the locality map and the project location that shows the various nearest towns.

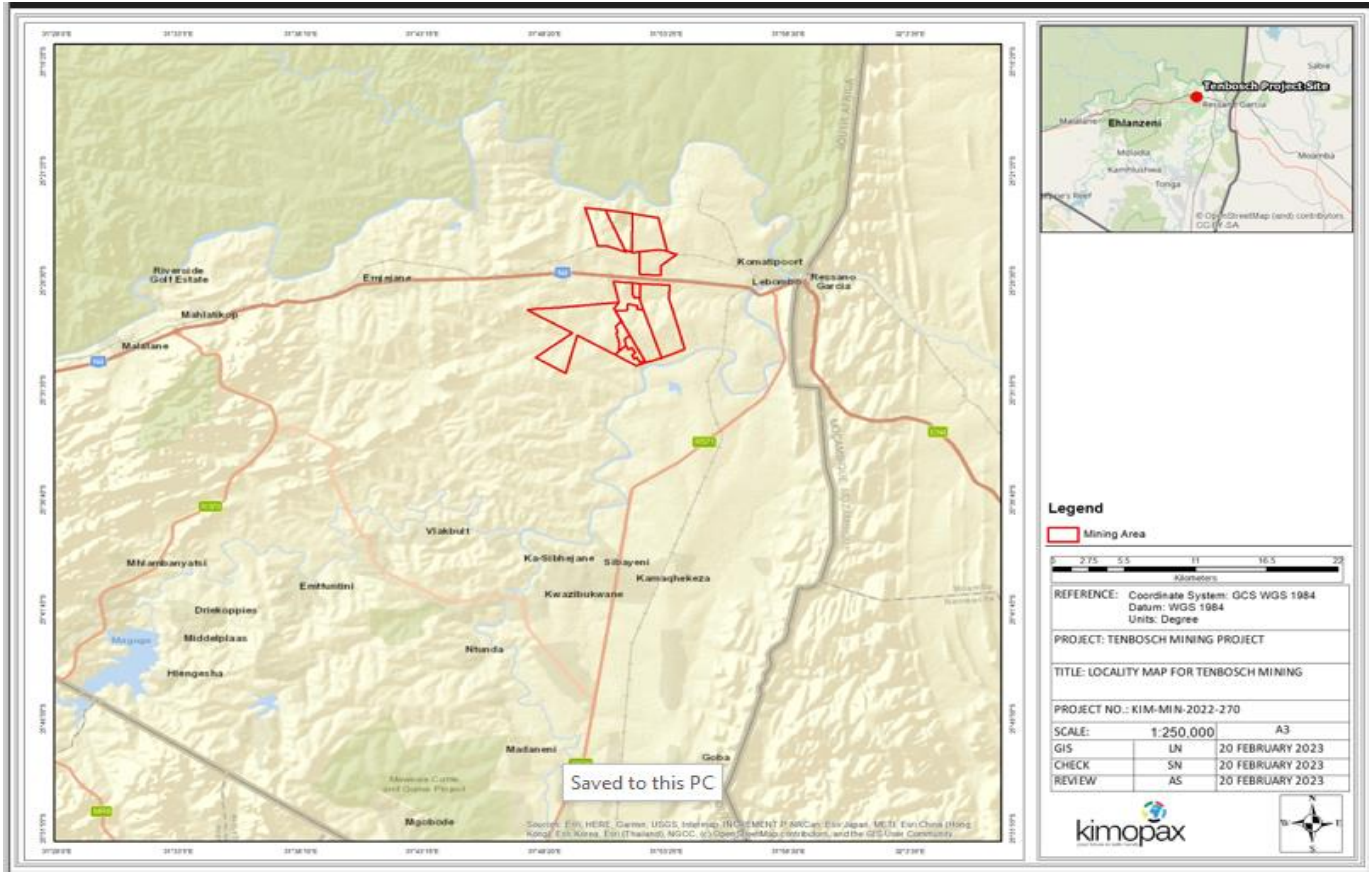



**Figure 1: Locality Map of the area**

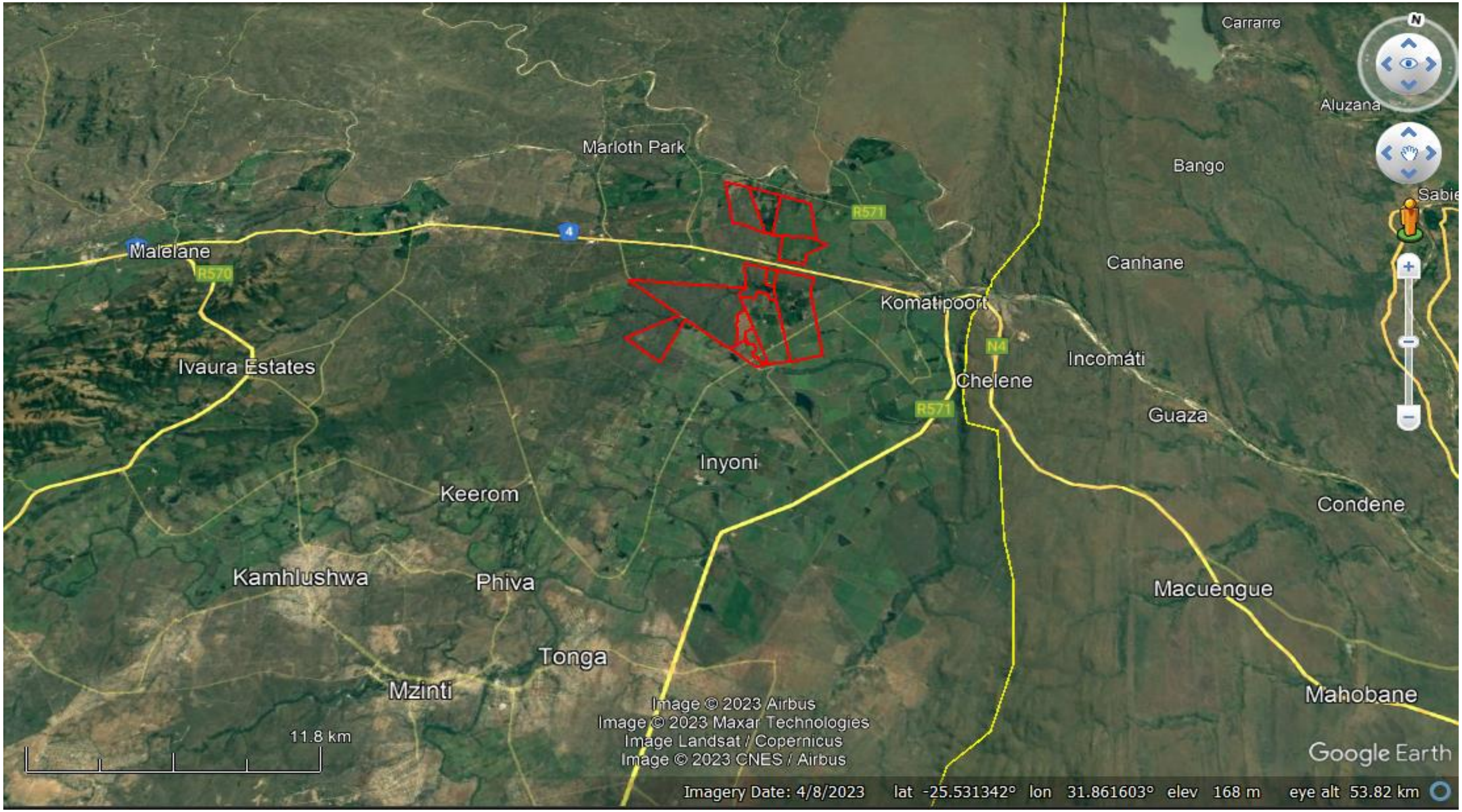



**Figure 2: Project location with regards to various towns**

## *6.5 Description of the scope of the proposed overall activity*

### 6.5.1 Listed and specified activities

A plan drawn to a scale that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site is attached as Appendix 2.

**Table 4: Listed activities applied for**

| **NAME OF ACTIVITY**<br><br>**E.g. For prospecting** - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc.<br>**E.g. For mining**,- excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc. | **AERIAL EXTENT OF THE ACTIVITY (HA OR M²)** | **LISTED ACTIVITY**<br>Mark with an **X** where applicable or affected | **APPLICABLE LISTING NOTICE**<br><br>*GNR 545, GNR 546 or NOT LISTED* | **WASTE MANAGEMENT AUTHORISATION**<br>Indicate whether an authorisation is required in terms of the Waste Management Act<br><br>Mark with an **X** where applicable |
|---|---|---|---|---|
| Mining Right Application] | 6 521 ha | ☒ | GNR 984 Activity 17 | ☐ |
| Vegetation clearance | 40 ha | ☒ | GN R 983 Activity 27<br>GN R 984 Activity 15<br>GNR 985 Activity 12 | ☐ |
| Excavations | 40 ha | ☒ | GNR 984 Activity 15<br>GNR 985 Activity 12 | ☐ |
| Trenches | 1 ha | ☒ | GNR 983 Activity 27<br>GNR 985 Activity 12 | ☐ |
| Processing plant | 1 ha | ☒ | GNR 984 Activity 17<br>GNR 921 Category B Activity 10 | ☒ |
| Fuel Storage | 500m$^3$ | ☒ | GNR 983 Activity 14<br>GNR 985 Activity 10 | ☐ |

| **NAME OF ACTIVITY**<br><br>**E.g. For prospecting** - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc.<br>**E.g. For mining,**- excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc. | **AERIAL EXTENT OF THE ACTIVITY (HA OR M²)** | **LISTED ACTIVITY**<br>Mark with an **X** where applicable or affected | **APPLICABLE LISTING NOTICE**<br><br>*GNR 545, GNR 546 or NOT LISTED* | **WASTE MANAGEMENT AUTHORISATION**<br>Indicate whether an authorisation is required in terms of the Waste Management Act<br><br>Mark with an **X** where applicable |
|---|---|---|---|---|
| Access roads | 12 ha | ☒ | GNR 983 Activity 27<br>GNR 983 Activity 56<br>GNR 985 Activity 4<br>GNR 985 Activity 12<br>GNR 985 Activity 18 | ☐ |
| Waste Dump Areas (softs, overburden and hards) | 60 ha | ☒ | GNR 984 Activity 15<br>GNR 985 Activity 12<br>GNR 921 Category A Activity 10<br>GNR 921 Category A Activity 12 | ☒ |
| Offices, Workshops and Change Houses | 0.18 ha | ☒ | GNR 983 Activity 27<br>GNR 985 Activity 12 | ☐ |
| Ablution | <1 ha | ☒ | GNR 985 Activity 12 | ☐ |
| Contractors laydown area | 0.5 ha | ☒ | GNR 983 Activity 27<br>GNR 985 Activity 12 | ☐ |
| Stockpiles | 5 ha | ☒ | GNR 921 Category B Activity 10 | ☒ |
| Pollution Control Dam | 2 ha | ☒ | GNR 983 Activity 12<br>GNR 984 Activity 6<br>GNR 984 Activity 16<br>GNR 985 Activity 12<br>GNR 921 Category B Activity 10 | ☒ |
| Conveyer | 5 ha | ☒ | GN R 983 Activity 27 | ☐ |

| **NAME OF ACTIVITY**<br><br>**E.g. For prospecting** - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc.<br>**E.g. For mining,**- excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc. | **AERIAL EXTENT OF THE ACTIVITY (HA OR M²)** | **LISTED ACTIVITY**<br>Mark with an **X** where applicable or affected | **APPLICABLE LISTING NOTICE**<br><br>*GNR 545, GNR 546 or NOT LISTED* | **WASTE MANAGEMENT AUTHORISATION**<br>Indicate whether an authorisation is required in terms of the Waste Management Act<br><br>Mark with an **X** where applicable |
|---|---|---|---|---|
| Blasting | | ☐ | Not Listed | ☐ |
| Rehabilitation | | ☐ | Not Listed | ☐ |
| Dust Suppression | | ☐ | Not Listed | ☐ |
| Fencing | 20 ha | ☒ | GN R 983 Activity 27<br>GNR 985 Activity 12 | ☐ |

### 6.5.2 Description of the activities to be undertaken

(Describe Methodology or technology to be employed, and for a linear activity, a description of the route of the activity)

#### *6.5.2.1 Underground mining*

- Tenbosch Mining will be an underground mining operation. The approximate extent of the underground mining area is 6 521 ha, and the proposed coal mining will be by decline method. There is an alternative to use a single or twin decline shafts which will comprise of two parallel shafts, one dedicated to personnel and material movement and the other dedicated to coal conveying.

These will be the up and down cast ventilation tunnels for the mine, but up-cast raise bore ventilation shafts will be developed once required and the these two declines will both be downcast. Raise bore ventilation holes will be developed as part of on-going capital as mining progresses.

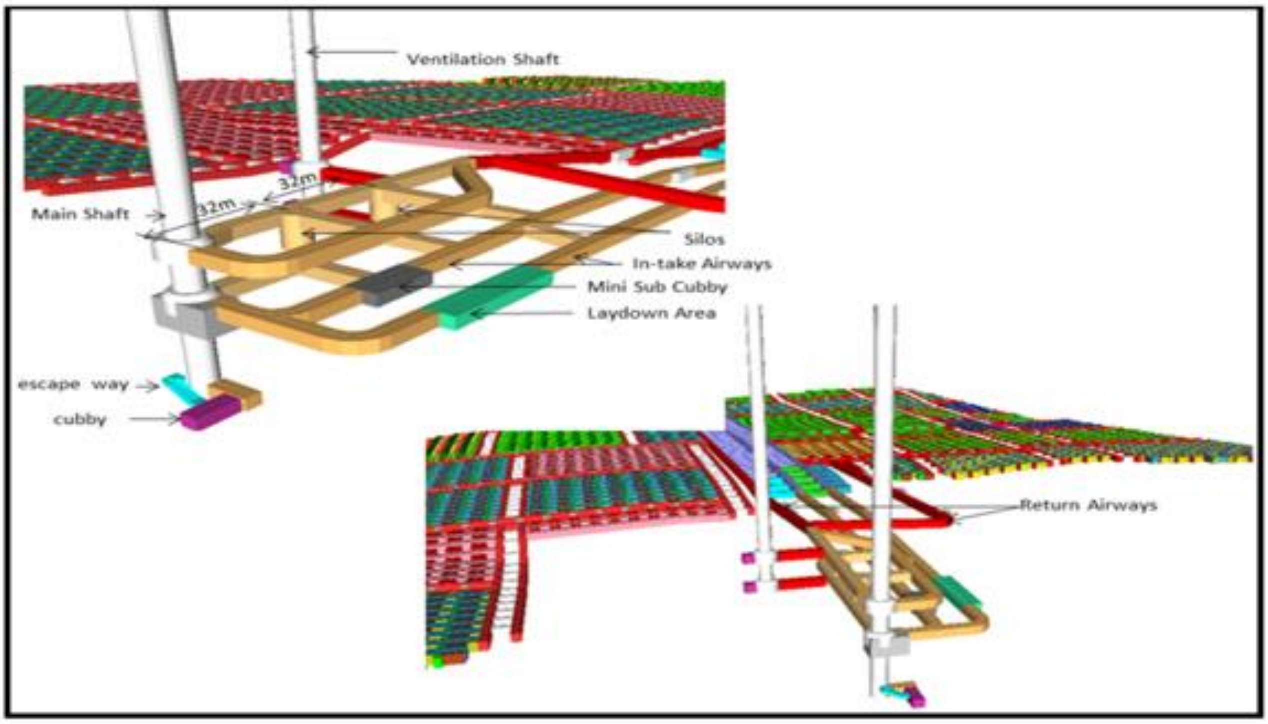



**Figure 3: Typical Underground Mining operation showing ventilation and shaft systems**

The proposed coal mining will be by decline method. The twin decline shafts will comprise of two parallel shafts, one dedicated to personnel and material movement and one dedicated to coal conveying.

These will be the up and down cast ventilation tunnels for the mine, but up-cast raise bore ventilation shafts will be developed once required and then these two declines will both be downcast. Raise Bore ventilation holes will be developed as part of on-going capital as mining progresses.

Bord-and-pillar mining method is proposed for dipping coal seams. This entails the mining of rooms (bords) leaving pillars intact as a primary support to support the immediate roof. Secondary support will be used in the form of roof bolts and any other support means as and when required into the immediate roof of the bords mined. The width of the pillars to be left intact is dictated mainly by the following factors:

- The depth below surface;
- Immediate roof competency (inputs from a geotechnical specialist);
- The mining height; and
- Width of the bord

To maintain optimal extraction of the resource, pillars left behind could be partially extracted towards the end of a panel being mined or towards the end of the Life of Mine ("LOM") following specialized geotechnical guidelines. Due to the thickness of the parting between the three seams designated to be mined, it is envisaged that the three seams can be super imposed. This implies that the layout of the lower seam is to be as close as practically possible to the layout of the upper seam. This layout will also be dependent on specialized recommendations from a geotechnical engineer with further studies and will mainly rely on the thickness and the competency of the parting in between.

Coal will be extracted through a mechanized mining method. This entails a mining cycle of cutting and loading the coal by means of a continuous miner and supporting the roof. Coal will then be conveyed by means of electrical shuttle cars to a feeder breaker from where it will be crushed in order to convey it to the processing plant.

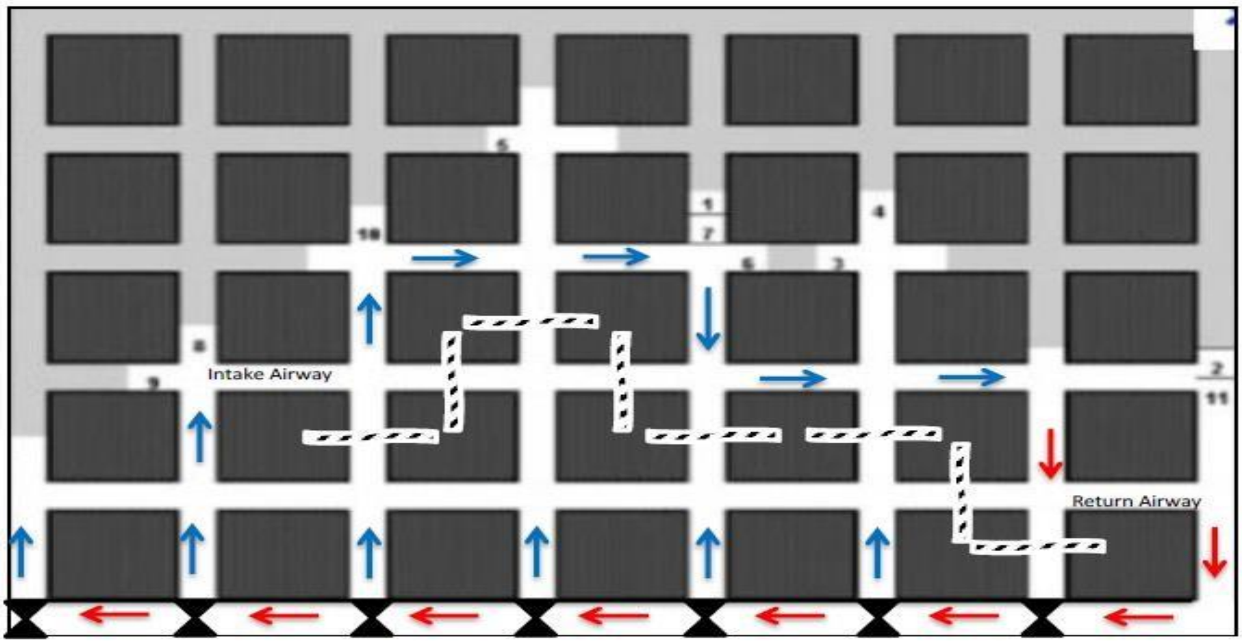



**Figure 4: Typical Bord-and-Pillar Layout.**

#### 6.5.2.2 *Infrastructure Required*

The proposed infrastructure includes:

- Mineral Processing Plant;
- Stormwater management infrastructure;
- A pollution control dam;
- Buildings including workshops, change house-lamp room, offices, and stores;
- Contractors' laydown area and parking;
- Access roads and rails which will be constructed;
- Power Supply infrastructure including a switching yard and electrical power-lines;
- Sewerage treatment package plant;
- Water Treatment Plant;
- Fuel storage; and
- Water Infrastructure including portable water tanker etc.

## 6.6 *Policy and Legislative Context*

**Table 5: Policy and Legislative Context of proposed project**

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT | REFERENCE WHERE APPLIED |
|---|---|
| The Constitution of South Africa (No. 108 of 1996) | Chapter 2 – Bill of rights<br><br>Section 24 – Environmental Rights<br><br>The proposed activities shall be conducted in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together be avoided, be minimised and mitigated in order to protect the environmental rights of South Africans. |
| National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended | Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment) |

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT | REFERENCE WHERE APPLIED |
|---|---|
| | Section 28 – Duty of care and remediation of environmental damage<br><br>Environmental management principles will be incorporated into the EIA and EMPr, which the applicant will be required to comply with to ensure that negative impacts on the environment are avoided or kept to a minimum and that positive impacts are enhanced. |
| The Environmental Impact Assessment Regulations of 2014 (Government Notice (GN) 984), as amended | The EIA Regulations (GNR 982) were promulgated in terms of Sections 24 of the NEMA, to manage the process, methodologies and requirements for the undertaking of an EIA. The GNR 982 stipulates that the applicant for activities listed under GNR 983, 984 or 985 must appoint an independent EAP to manage the EIA process. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental impact on the environment, and which may not commence without an EA from the Competent Authority (CA). EA required for Listed Activities is subject to the completion of either a Basic Assessment (BA) process or full Scoping and Environmental Impact Assessment (S&EIA) with applicable timeframes associated with each process. The EA must be obtained prior to the commencement of those listed activities.<br><br>**The project triggers activities listed in GNR 983, 984 and GNR 985 and will require an EA from the DMRE. According to GNR 982 of the NEMA, activities listed in GNR 984 require that a full S&EIA be undertaken. The** |

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT | REFERENCE WHERE APPLIED |
|---|---|
| | **applicable listed activities that will be triggered by the project is provided in Table 4 above.** |
| National Water Act, 1998 (Act No. 36 of 1998) (NWA) | The project will require a Section 21 (a, b, g and j) IWUL<br><br>**Section 21 (a): Taking water from a water resource: Groundwater will be required for the project (potable and industrial use).**<br><br>**Section 21 (b): Storing of water: Water containing waste will be stored on a PCD.**<br><br>**21(g): Disposing of waste in a manner which may detrimentally impact on a water resource: Due to the proposed mining activities, dust suppression activities will be undertaken using process water.**<br><br>**The project also includes Pollution Control Dams which constitute a Section 21 (g) water use.**<br><br>**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: For the removal of rainfall and groundwater ingress into the shaft for safety reasons.** |
| Minerals and Petroleum Resources Development Act (No. 28 of 2002) | The Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) makes provision for equitable access to and sustainable development of South Africa's mineral resources. The MPRDA requires that the environmental management principles set out in NEMA shall apply to all mining operations and serves as a guideline for the interpretation, administration and |

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT | REFERENCE WHERE APPLIED |
|---|---|
| | implementation of the environmental requirements of NEMA.<br><br>The MPRDA requires that a reconnaissance permission, prospecting right, mining right, mining permit, retention permit, technical corporation permit, reconnaissance permit, exploration right, production right, prospecting work programme, exploration work programme, production work programme, mining work programme environmental management programme or an environmental authorisation issued in terms of the National Environmental Management Act, 1998, as the case may be, may not be amended or varied (including by extension of the area covered by it or by the additional of minerals or a shares or seams, mineralised bodies or strata, which are not at the time the subject thereof) without the written consent of the Minister.<br><br>**The proposed mining project requires an Environmental Authorisation from DMRE.** |
| National Environmental Management: Waste Act, 2008 (Act 59 of 2008)(NEMWA) | **It is expected that activities listed in GNR921 (Category B) will be triggered by the proposed project and will require a waste management licence.** |
| National Environmental Management Biodiversity Act (No. 10 of 2004) | The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) provides for the management and conservation of South Africa's biodiversity within the framework of NEMA, as well as the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological |

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT | REFERENCE WHERE APPLIED |
|---|---|
| | resources. The Act provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected.<br><br>**During the EIA process, biodiversity hotspots and bioregions were investigated to determine the potential impacts that the project may have on the receiving environment. The management and control of alien invasive species on the impacted areas during all the phases of the project will be governed by the NEM: BA. The NEM: BA ensures that provision is made by the site developer to remove any alien species, which have been introduced to the site or are present on the site.** |
| National Heritage Resources Act (No. 25 of 1999) | Heritage Permit for structures 60 years or older.<br><br>**A Phase 1 Heritage assessment was conducted for the proposed project to identify heritage and/or cultural sites affected by the mining infrastructure and activities, if any.** |
| National Environmental Management: Air Quality Act, Act 39 of 2004, National Dust Control Regulations (GN 827) | Air quality management<br><br>Section 32 – Dust control.<br><br>Section 34 – Noise control.<br><br>Section 35 – Control of offensive odours.<br><br>**An Air Quality assessment was conducted as part of the EIA, which will determine the requirement for an Air Emissions Licence (AEL). The principles of the NEM:** |

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT | REFERENCE WHERE APPLIED |
|---|---|
| | **AQA, focusing on minimisation of pollutant emissions will also be taken cognisance of in the development of the EMPr.** |
| Restitution of Land Rights Act, 1994 (Act No. 22 of 1994), as amended in 2014 | Land Claims<br><br>**The land claim inquiry will be made to Land Commissioner in the Department of Rural Development and Land Reform regarding any claims associated with the proposed property where mining will take place.** |
| **Municipal Plans and Policies** | |
| Ehlanzeni District Municipality and Nkomazi Local Municipality IDP | The Integrated Development Plan (IDP) was used to identify relevant socio-economic background information as well as spatial development information.<br><br>**It is expected that Tenbosch Mine will contribute significantly to the local, regional, and national economy. The extent to which the project will contribute to the economy will be assessed during the impact assessment phase of the project.** |

## *6.7 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).

The mining project forms part of a larger scheme for the alleviation of poverty within the local municipality, which will not only improve the living standards of several previously disadvantaged communities, but also potentially allow for the future development of this area.

The project will provide positive impacts in the form of employment opportunities and skills development, skills transfer and ultimately resulting to Gross Domestic Product (GDP) growth, therefore eradicating povertyand as such, stimulating Local Economic Development.

The need and desirability of a proposed development involve the consideration of various spatial planning tools and applicable policy relevant to the project area. To achieve the desired objectives, information used in this section is largely derived from:

- Mpumalanga Spatial Development Framework, 2019
- Ehlazeni District Municipality 2021 -2022 IDP
- Nkomazi Local Municipality 2022-2027 IDP

For years, mining has been the driving force behind South African economy and continues to make a valuable contribution to the country's economy contributing about 8.7% to GDP in 2021 up from 7.1% (Minerals Council South Africa, 2022). The Mpumalanga Province is an important region in terms of energy production and it forms part of the Maputo Development Corridor and is positively influencing business and sustainability in the region.

Opportunities that exist within mining are as follows:

a) Constant demand on the market for commodities;

b) Establishment of a permanent working group between the Municipality and the mine managers responsible for developing Local Economic Development initiatives;

c) Encourage local SMMEs and entrepreneurs to take advantage of procurement;

d) Develop a database of available labour and skills to encourage the employment of local people;

e) Provide skills training and support programmes; and

f) Instigate mining procurement opportunities in consultation with the mines, develop a database of such opportunities and ensure that this information is made available to local businesses and communities.

## *6.8 Period for which the environmental authorisation is required*

The EA/WML will be required for a period of 34 years.

## *6.9 Description of the process followed to reach the proposed preferred site*

*NB!! – This section is not about the impact assessment itself; It is about the determination of the specific site layout having taken into consideration (1) the comparison of the originally proposed site plan, the comparison of that plan with the plan of environmental features and current land uses, the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout as a result.*

## *6.10 Details of all alternatives considered.*

*With reference to the site plan provided as Appendix 2 and the location of the individual activities on site, provide details of the alternatives considered with respect to:*

### 6.10.1 The property on which or location where it is proposed to undertake the activity

The location of the proposed project components is constrained to the location of the existing mineral resource. As such, no property alternatives were considered for the location of the underground mining area.

### 6.10.2 The type of activity to be undertaken

The proposed and preferred option to mine the minerals applied for is thus far, the most preferred activity owing to the presence of these minerals within the proposed site. The mining opportunity will by far economically and socially empower and uplift the local communities. The land is presently utilised for agricultural purpose including grazing activities.

Furthermore, underground mining method is the preferred option in comparison to opencast mining.

There is also a potential for Opencast mining while developing the underground mining plan. The Boxcut can be developed around the area of borehole P02 where the first coal seam contact is at 36.02m deep. The coal mined can be sold to other local mining companies. This will allow generation of capital to alleviate capital expenditure burden while developing the underground mine.

### 6.10.3 The design or layout of the activity

The design or layout of the activity entails the consideration of the different options to place the mine project. The site was selected based on the geographic location of the potentially underling required mineral reserves. The layout of the site was however selected based on considerations made for the surrounding environment where possible, ease of operations and mining activities on site as well as minimal disturbance to the community near the site. The site/land area for run of activity was selected based on the size (according to the geology of the area), and the position of the mineral reserves to be exploited. The preferred layout was considered more importantly owing to the availability of coal mineral, the land ownership, the geo-hydrological impacts and the ease and available transport modes and routes. The proposed layout is therefore the most suitable and economically/environmentally viable option for the underground mining.

For this alternative waste dumps (burden, softs and topsoil), PCD and trenches, mine access roads, stormwater management infrastructure and buildings (parking, laydown areas, stores, offices, change house/lamp room and workshops) will be located on the same property where mining is going to take place.

### 6.10.4 The technology to be used in the activity

The proposed coal mining will be through a decline method. The twin decline shafts will compromise of two parallel shafts, one dedicated to personnel and material movement and the other dedicated to coal conveying. These will be the up and down cast ventilation tunnels for the mine, but up-cast raise bore ventilation shafts will be developed once required and these two declines will both be downcast. Raise bore ventilation holes will be developed as part of on-going capital as mining progresses.

### 6.10.5 The operational aspects of the activity

Water from natural groundwater resources: It has been indicated that water for the wash plant would be abstracted from boreholes. Water obtained from dirty water containment facilities: Water would be obtained from dirty water containment facilities such as the PCD. For example, water for dust suppression will be sourced from the PCD. A Section 21(a) water use for abstraction of groundwater will form part of the IWULA. The operation and maintenance of the processing plant will be outsourced to a contractor. However, Tenbosch Mining will appoint a Plant Manager whose responsibility will be to ensure the efficient and effective operation of the processing plant. An Engineer will also be appointed whose responsibility will be to ensure that all legal requirements of the MPRDA and the Mine Health and Safety Act (MHSA) are complied with.

The operations of the proposed mine involve the underground mining, the processing plant, pollution control dams, workshops, material stockpiles, storage, excavations, access roads diesel area, and wash bays etc. No feasible alternative operational aspect methods currently exist.

### 6.10.6 The option of not implementing the activity

Should the proposed mining development not take place, it implies that the land will continuously be used for agricultural activities, depending on the landowner's needs and desirability for the future. Agriculture is undoubtedly one of the most important sectors in South Africa, with agriculture contributing to Mpumalanga GDP, but not nearly as much as the mining sector. The socio-economic impacts of not implementing the project include local, regional, and more than likely national impacts:

a) Local and regional: planned socio-economic initiatives within the surrounding communities will not be realised; and
b) National: Lost opportunities in foreign exchange for South Africa will be incurred as the potential to sell the minerals internationally will be lost.

The environmental, social and economic impacts have been assessed in detail during this EIA phase to identify and address all negative impacts, where possible. Whether the No-Go alternative is viable cannot be addressed at this time and will be discussed in more detail during the EIA phase.

Should the mining right application be rejected, there will be a significant loss of valuable information regarding the mineral status present on these properties. In addition to this, should economical reserves be present, and the applicant does not have the opportunity to mine, the opportunity to utilize these reserves for future phases will be lost and the agricultural activities currently undertaken will still continue.

## *6.11 Details of the Public Participation Process Followed*

*Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must* *include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.*

The stakeholder engagement process forms an important part of the Scoping and Environmental Impact Assessment Phases of the project. The stakeholder engagement process is primarily aimed at affording Interested and Affected Parties (I&APs) the opportunity to gain an understanding of the proposed project. In addition, the purpose of consultation with the landowners, key stakeholders, and I&AP's is to provide them with the necessary information about the proposed project so that they can make informed decisions as to whether the project will affect them and provide the EIA team with local knowledge of the area and raise concerns relating to the biophysical, socio-economic and cultural impacts that may arise.

The stakeholder engagement process is conducted in terms of NEMA, which provides clear guidelines for stakeholder engagement during an EIA. Chapter 1 of the NEMA outlines the principles of environmental management, several pertaining to public consultation (e.g. Chapter 1, subsections (2), (3), (4) (f), (g), (h), (k), (q) and (r). Chapter 6, Regulations 39 – 44 of the amended EIA Regulations GNR) 982, promulgated on 8 December 2014, specify the minimum requirements for stakeholder engagement in an EIA process conducted under the NEMA. In 2017, the Minister of Environmental Affairs published, in terms of Section 24J of the NEMA, Public Participation Guidelines which guide the Public Participation Process (PPP) to give effect to Section (2)(4)(f), (o) and 24 (1A)(C) of the NEMA.

The application will be submitted to the DMRE for authorisation as the competent authority. Identified commenting authorities on this application include:

a) Department of Water and Sanitation;
b) Mpumalanga Heritage Resource Agency;
c) Department of Environmental Affairs (DEA);
d) Department of Forestry, Fisheries and Environment (DFFE);
e) Department of Rural Development and Land Reform (DRDLR);
f) Mpumalanga DEDET (Department of Economic Development, Environment and Tourism);
g) Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA);
h) Department of Agriculture and Land Administration;

i) Department of Agriculture, Rural Development and Land Reform;
j) Department of Energy;
k) Ehlanzeni District Municipality, and
l) Nkomazi Local Municipality.
m) Mpumalanga Tourism & Parks Agency (MTPA)

## 6.11.1 Details of the Public Participation Process Followed

### *6.11.1.1 Stakeholder Identification Interested and Affected Parties*

An I&APs database was developed using existing database for Prospecting Right Application which is located on same properties being applied for. Registered I&AP's were further sourced from responses to the advertisements, site notices and written notification to I&APs associated with this specific project. The I&APs register will be maintained for the duration of the study where the details of stakeholders are captured and automatically updated upon communication to the EAP. The identification, registration, and comments from I&APs will be an on-going activity. Kimopax also conducted deeds search to identify the landowners adjacent to and in the immediate surroundings of the area. Notification letters were sent to all landowners via email to notify them about the proposed project.

### *6.11.1.2 Confirmation of Land Claims*

Kimopax approached the Office of the Mpumalanga Regional Land Claims Commissioner to verify whether any possible land claims existed on the affected properties. Kimopax is still awaiting the Department's response.

### *6.11.1.3 Notification and Registration of the I&APs*

Kimopax made use of various methods to inform stakeholders of Tenbosch's intention to undertake the required EA/WML and water use authorisation processes. Stakeholders were provided with the opportunity to participate and register as I&APs during the announcement phase of the project. This was done by placing an advert in the newspaper and distributing BIDs via email and by hand to the I&APs.

### *6.11.1.4 Distribution of Notification Letters*

Notification letters were sent via email to identified I&APs informing them of the proposed project.

#### *6.11.1.5 Site Notice Placements*

Sites notice boards (Size A3: 297 mm X 420 mm) (English) notifying stakeholders and I&APs of the proposed activity were placed at wards 6, 7, and 29 conspicuous places in the project area.

#### *6.11.1.6 Newspaper Advertisement*

Newspaper advertisements in English notifying stakeholders about the proposed project and the opportunity to participate in the EIA process was placed in the Lowvelder newspaper on 18 August 2023.

#### *6.11.1.7 Public Meeting*

Stakeholders are invited to a public meeting where the contents of the Draft Environmental Impact Assessment Report and Plan of the Study will be presented. The public meeting will be held at Mdladla Community Hall on 23rd September 2023 at 10H00am. The stakeholders have the opportunity to comment on the report and plan of the study and raise issues that may need to be included in the impact assessment phase. All comments received will be incorporated into the Comments and Response Report.

### 6.11.2 Notification of the Availability of the Draft Environmental Impact Assessment Report

Draft Environmental Impact Assessment report was distributed to all registered I&APs as well as state organs for review and comments from 22nd of August to 21st of September 2023.

### 6.11.3 Stakeholder Commenting Period

The Environmental Impact Assessment Report is made available for a 30-day commenting period. Copies of the Draft Environmental Impact Assessment Report will be placed at public venues such as Local and District Municipality, and community library. The Environmental Impact Assessment Report will also be made available to the competent and commenting authorities during the 30-day stakeholder review and commenting period. All comments received will be incorporated into the Environmental Impact Assessment Report. All comments raised by stakeholders will be recorded and will be included in the Final Environmental Impact Assessment Report. The comments will also be collated into the Comments and Responses Register (CRR) which will form an Appendix to the final Environmental Impact Assessment Report.

### 6.11.4 Comment and Response Report

A summary of comments received will be included in the CRR, which will form an Appendix to the Final Environmental Impact Assessment Report.

### 6.11.5 Public Participation process going forward

The Public Participation Process will be ongoing throughout all the project phases. The stakeholder engagement proposed for the Impact Assessment Phase is presented below.

#### *6.11.5.1 Stakeholder engagement during Impact Assessment Phase*

Stakeholder engagement during the Impact Assessment phase will focus on providing information and opportunity for public comment on the findings and recommendations of the impact assessment and management programme/plan. The draft findings will be presented in the Draft EIA / EMPr Report to be reviewed and commented on by the public.

The availability of the Draft EIA and EMPr Report for public comment was announced in the same newspaper as for project announcement.

Registered I&APs were informed through letters distributed by email in advance of the report being made available. Stakeholders are invited to a public meeting where the contents of the Draft EIA/EMPr will be presented, and stakeholders are given the opportunity to comment. The public meeting will be held at Mdladla Community Hall on 23rd September 2023 at 10H00am. Stakeholders are invited to comment on the Draft EMPr Report in any of the following ways:

a) By raising comments during meetings where the content of the Draft EIA/EMPr Report will be presented;
b) By completing comments forms available with the report at public places, and by submitting additional written comments, by email or fax, or by telephone, to the Stakeholder Engagement Office; and
c) The draft EIA/EMPr Report is available for comment for a period of 30 days at public places in the project area as per the announcement and scoping phase;

All comments and issues raised during the comment period will be added to the Comments and Response Report (CRR) that will accompany the Final EIA/EMPr Report.

#### 6.11.5.2 Notification of Authority Decision

Registered stakeholders were advised in writing of the authority decision on the EIA/EMPr, and details on the procedure to appeal the decision. Notification to registered stakeholders will summarise the authorities' decision and provide information according to legal requirements on how to lodge an appeal should they so wish.

### 6.11.6 Summary of issues raised by I&APs

**(Complete the table summarising comments and issues raised, and reaction to those responses)**

| Interested and Affected Parties<br><br>List the names of persons consulted inthis column, and<br><br>Mark with an X where those who must be consulted were in fact consulted. | | Date Comments Received | Issues raised | EAPs response issues raised |
|---|---|---|---|---|
| **AFFECTED PARTIES** | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# 7 The Environmental attributes associated with the sites

## *7.1 Baseline Environment*

### 7.1.1 Type of environment affected by the proposed activity

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

#### *7.1.1.1 Noise*

This section is summary of the Noise Impact Assessment Report of the final report. The purpose of the environmental noise study was to determine the environmental baseline noise levels at the mine establishment area and abutting noise receptors. The noise baseline information was used to calculate the potential noise intrusion levels from the mine activities at the noise receptors to the north, east, west and south of the Tenbosch mining area (Sikhosana, 2023)

##### *7.1.1.1.1 Current Noise Sources*

Noise is part of our daily exposure to different sources which is part of daily living and some of these physical attributes which may at times be intrusive, form part of the ambient levels that people get used to without noticing the higher levels.

One baseline measurement (Points 1) was conducted at the identified noise sensitive site (Farmstead). The noise measurements were analysed to compile a subjective and objective determination of the Rating levels (LReq) based on the LAIeq measurements.

One Svantek 979 SANAS calibrated type 1 sound level meter was used to perform the noise measurements. The sound level meter was calibrated before and after the noise measurements with a 01dB sound calibrator.

L(A)eq values of ambient noise levels were calculated for the measurement point from the readings. The L(A)eq value is an A-weighted noise level integrated over the period of measurement.

#### *7.1.1.1.2 Atmospheric Conditions During Noise Survey*

Field assessments in and around the site were undertaken from the 27th and 28th of July 2023. This included the identification of the noise sensitive stakeholders, existing noise sources and other baseline noise contributors. Viable and alternative measurement localities at the identified monitoring localities were further investigated to ensure measurements were not influenced by extraneous noise sources (e.g. an air-conditioning condenser unit near measured locality).

**Daytime**

a) Average Wind Speeds = 7 km/h
b) Comparative Rating Level = 45dBA
c) Recorded Ambient Noise Level = 39.6

**Night-time**

a) Comparative Rating Level = 45dBA
b) Recorded Ambient Noise Level = 33.8

#### *7.1.1.1.3 Baseline Noise Measurement*

The noise survey was conducted in terms of the provisions of the Noise Control Regulations, 1994 and the SANS 10103 of 2008 (The measurement and rating of environmental noise with respect to annoyance and to speech communication) using a digital Larson Davis 831 – Class 1 meter with Logging, Environmental 1/1, 1/3 Octave Band and percentiles Sound Level Meter (Class 1). On taking measurements the device-meter scale was set to the “A” weighed measurement scale which enables the device to respond in the same manner as the human ear. The Survey was conducted from the 27th and 28th of July 2023 at the identified noise sensitive site (Farmstead). During construction and operational, low to medium environmental significance- Impact is of a low order and therefore likely to have little real effect. Project can be authorised with low risk of environmental degradation. Mitigation is either easily achieved or little mitigation is required. After mitigation, the impact will receive a low environmental significance - Zero impact (High Confidence) (Sikhosana, 2023).

#### *7.1.1.2 Traffic*

According to the Traffic Impact Assessment Specialist report, there are four access roads that are usable by the proposed mine; the N4, and Coopersal. Traffic count was conducted in three intersections; the Olifant drive – N4, the Coopersal – N4 and the Olifant Drive – R571. The traffic count was relatively the same except for the Olifant Drive – R571 intersection which recorded the fewest vehicles on the road. However, the main road to be used by the mine will be the Coopersal Road from the N4 as it provides access to the remainder portion of Farm Tecklenburg's Ranch 548 JU where the mining activities will take place and where the surface infrastructure is located (Mielelani, 2019).

The road network that is likely to be used by Tenbosch Mining project worker, for the transportation of materials and equipment, and for the transportation of the bulk coal, is expected to be mainly towards the Komatipoort and Malelane town and the surrounding areas, using the major access roads like Coopersal RD, and N4, as per Figure 5.

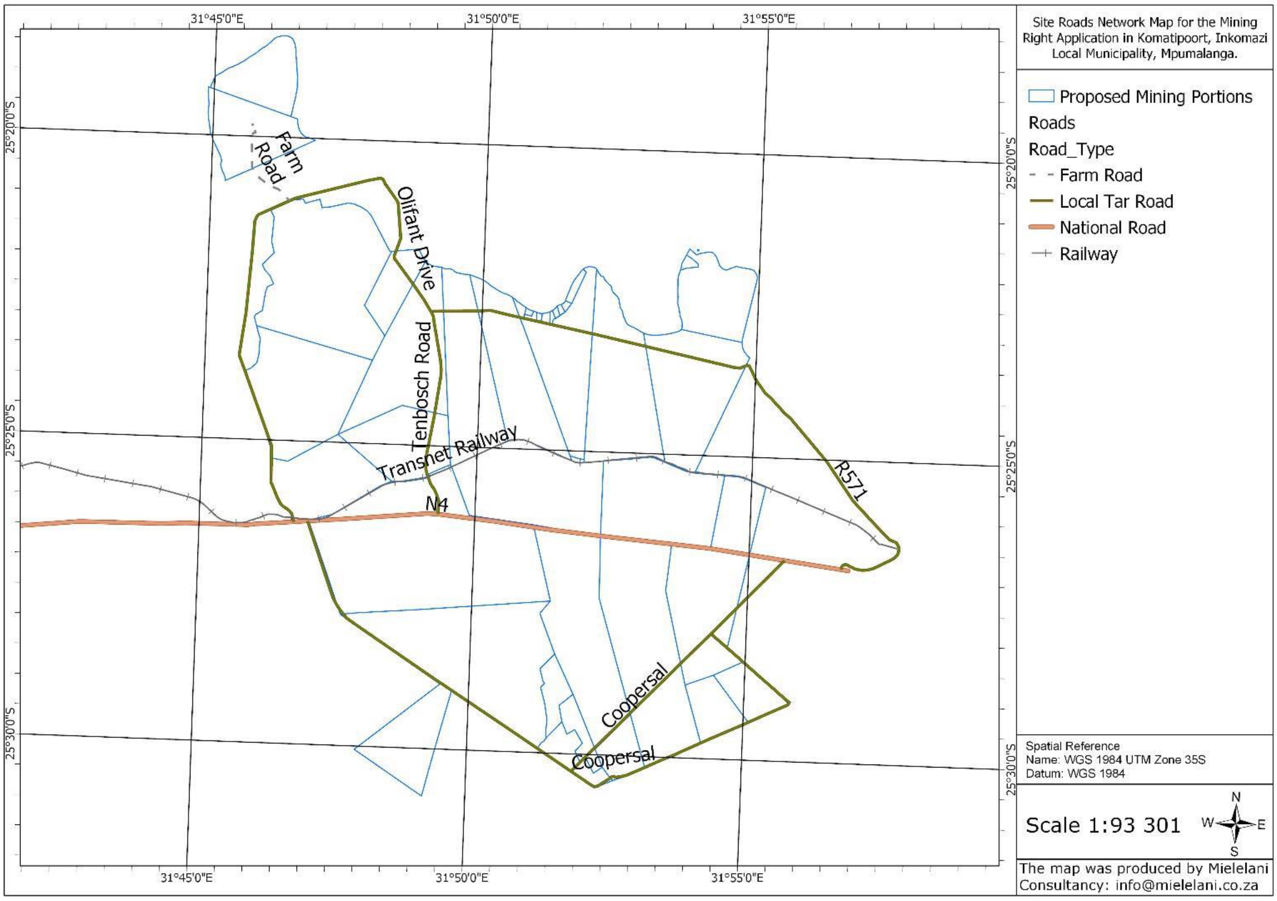


**Figure 5: Surrounding road network and site location**

### *7.1.1.3 Groundwater Setting*

According to the Groundwater Specialist Report, the aquifer underlying 80% of the proposed site area is classified as fractured aquifer with average yield potential of 0.1 – 0.5 l/s. 20% of the proposed site area is underlain by intergranular and fractured aquifer with average yield potential of 0.5 – 2.0 l/s (see Figure 6). Groundwater occurrences are generally associated with aquifers, confined to fractures, faults and contact zones with intrusive dykes, dolerites etc., and areas of deeper weathering. Typically, these aquifers are characterised by high yielding boreholes.

Intergranular and fracture aquifer is very common in South Africa. It is the type of groundwater aquifer in which the intergranular void spaces (rocks that have been weathered to an extent where its primary structure is that of loose or only partly consolidated material, also known as secondary aquifer) serve primarily as a storage and water is transmitted mainly through both fracture (type of groundwater aquifer which is associated with hard rock formation such as intrusive rocks in which fractures or joints occur and allow storage and supply of groundwater) and intergranular void spaces.

The study area falls within the b2 and d3 that indicates that the hydraulic conductivities are moderate to high which suggests that the aquifers are vulnerable to contamination and or pollutants especially along fractured zones caused by faults and dyke intrusions. This also suggests that should Tenbosch require groundwater sources for its mining operations, the potential is good (Maluleke, 2023).

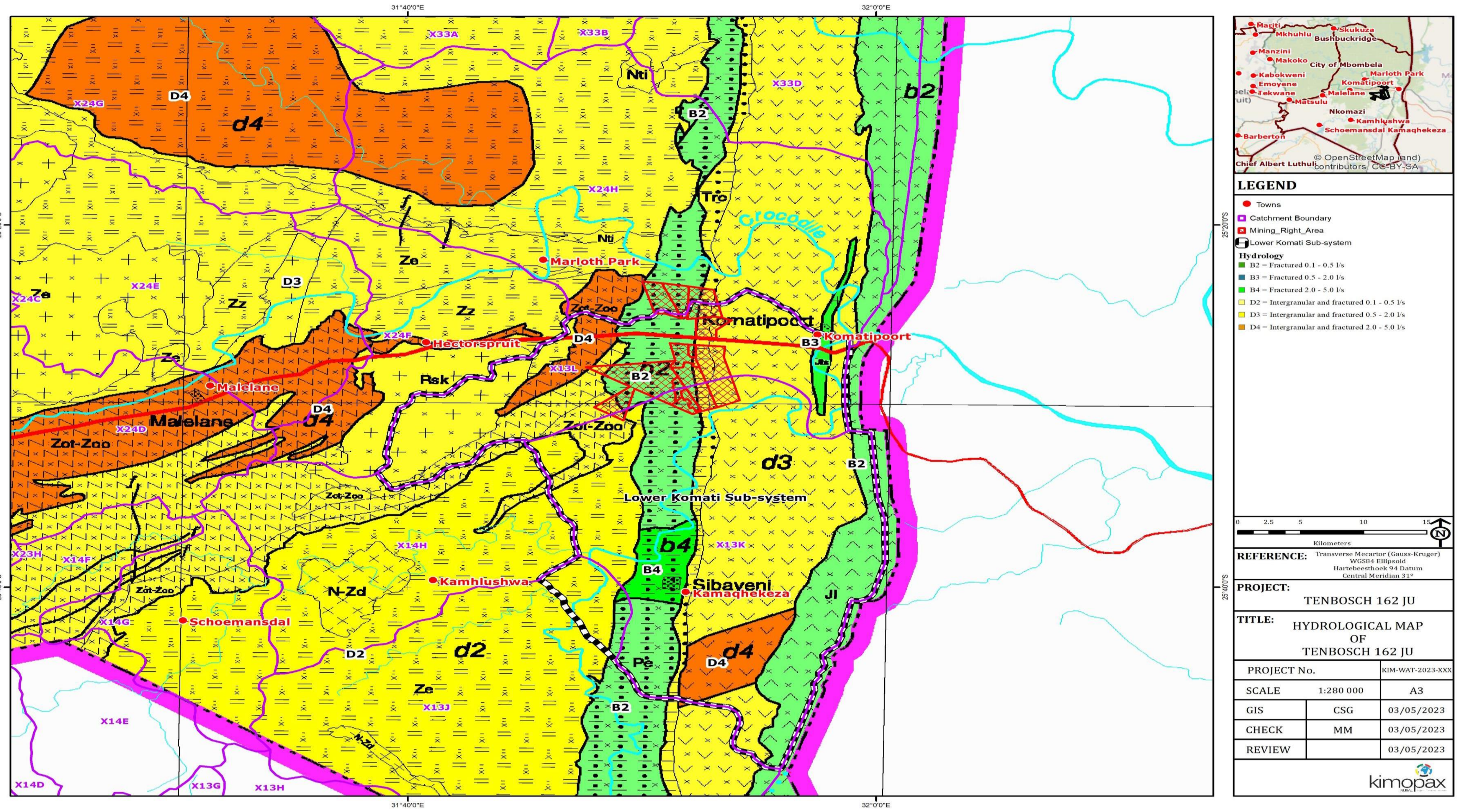



**Figure 6: Geohydrological map**

#### *7.1.1.3.1 Hydrocensus*

Kimopax conducted a visit on 19 April 2023 to assess groundwater use within the study area. The results of the field visit investigation are presented in Table 8. The summary of the collected data listed in Table 8 indicates that the area is assumed to be characterized by shallow water level with a recorded geometric mean value of 15,9 mbgl, although spatial data is needed to quantify regional water level within the study area. This indicates that some areas are more vulnerable to contamination from onsite activities such as pit-latrines, cattle kraal, etc. Therefore, it is necessary to model groundwater vulnerability within the proposed area, as well as to clearly define the possible natural attenuation of non-point and point sources of contamination before reaching the groundwater, as supported by the DRASTIC methodology.

D- Depth to groundwater
R- Recharge rate
A- Aquifer
S-Soil
T-Topography
I-Vadose zone
C-Aquifer hydraulic conductivity

The results of the hydrocensus are shown in Table 6

**Table 6: Chemistry Results: Hydrocensus**

| Borehole ID | Latitude | Longitude | Elevation | Date Surveyed | Measured WL (mbgl) | Borehole depth | Sampled | Comments |
|---|---|---|---|---|---|---|---|---|
| BH01 | -25.47350 | 31.85195 | 169 | 19/04/2023 | 21 ,5 | 74,3 | Yes | Borehole drilled for core drilling, but water was found and alternatively used for water supply (however submersible |

| Borehole ID | Latitude | Longitude | Elevation | Date Surveyed | Measured WL (mbgl) | Borehole depth | Sampled | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | pump/pipes are removed) |
| BH02 | -25.46930 | 31.82802 | 223 | 19/04/2023 | 51,7 | 84,6 | Yes | Core drilling borehole (groundwater was intercepted) |
| BH03 | -25.46910 | 31.83466 | ?? | 19/04/2023 | 14,8 | 58,9 | Yes | Core drilling borehole (groundwater was intercepted) |
| BH04 | -25.46126 | 31.84484 | 199 | 19/04/2023 | 6,6 | 45,54 | Yes | Core drilling borehole (groundwater was intercepted) |
| BH05 | -25.46045 | 31.83319 | 209 | 19/04/2023 | 9,5 | 67,8 | Yes | Core drilling borehole (groundwater was intercepted) |
| **GEOMEN** | | | | | **15,9** | **64,8** | | |

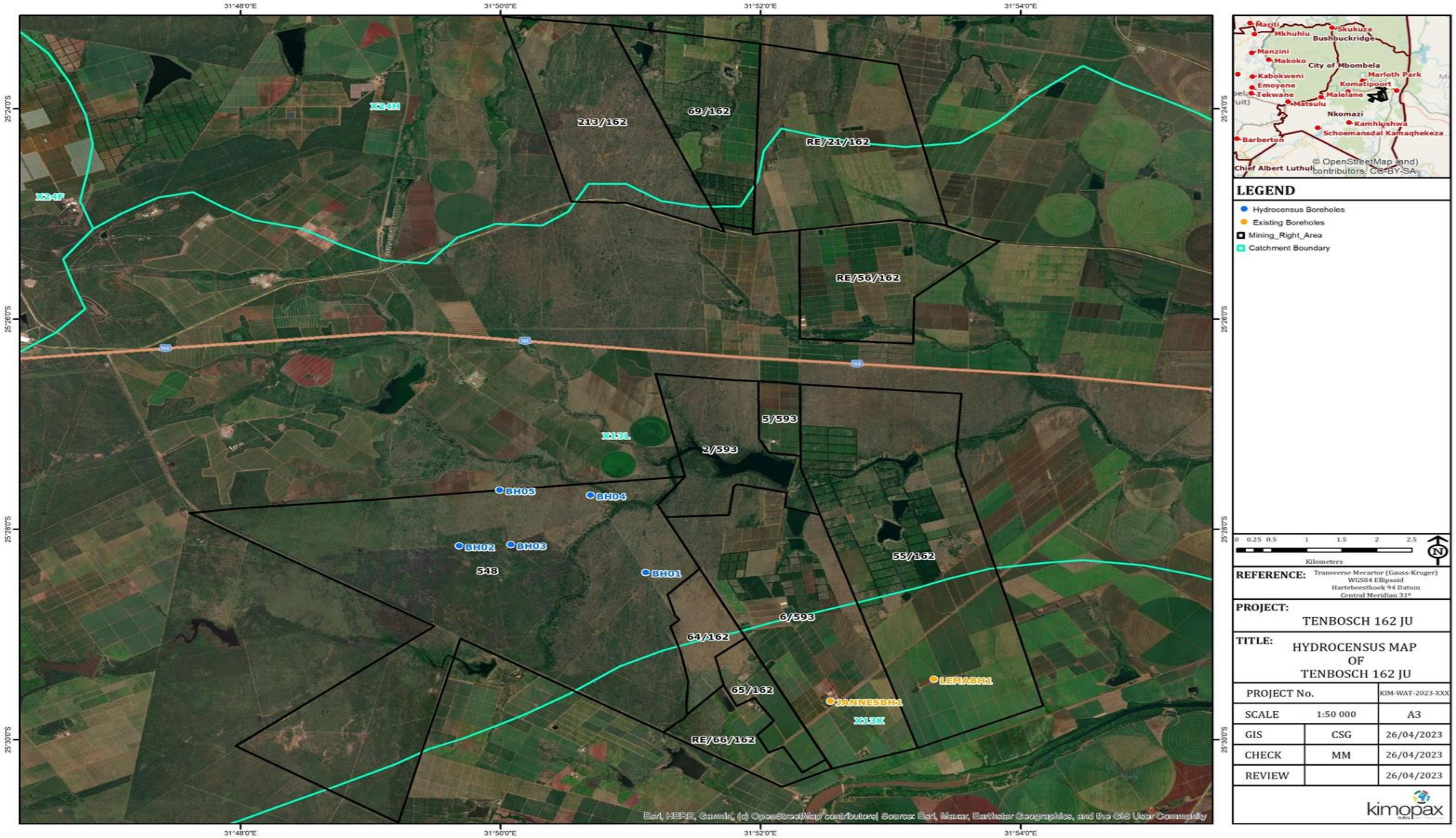



**Figure 7: Hydrocensus map**

### *7.1.1.4 Soil, Land Use, Land Capability and Hydropedology*

The objective of the Soil, Land Use and Land Capability study was to fulfill the requirements of the most recent South African Environmental Legislation with reference to the assessment and management of these natural resource aspects. The key components of the assessment are to determine and describe the baseline soil properties, the land capabilities and land uses associated with it within the proposed project's direct and indirect areas of influence from on-site investigations and data currently available. It also assists with the identification of gaps in information. Once these conditions were established, the anticipated impacts of the project on these properties were determined.

#### *7.1.1.4.1 Soil*

Soil is a significant component of most ecosystems. As an ecological driver, soil is the medium in which most vegetation grow, and a variety of vertebrates and invertebrates exist. In the context of mining operations, soil is even more significant if one considers that mining is a temporary land use where-after rehabilitation (using soil) is the key to re-establishing post-closure land capability that will support post-closure of land uses. The concentration of natural salts and stores of nutrients within soil is a sensitive balance due to the extremes of rainfall, wind and temperature. The ability of soil to retain moisture and nutrients and in turn influence the sustainability of vegetative growth and dependence of animal life is determined by the consistency and degree of soil moisture retention within the profile but out of the influence of evaporation. These conditions and the sensitivity of these variables must be noted, and their importance to the overall bio-diversity balance understood if the sustainability equation is to be managed and mitigated.

Mining projects have the potential to damage the soil resource through physical loss of soil and/or the contamination of soil, thereby impacting on the soil's ability to sustain natural vegetation thereby altering land capability. Contamination of soil may, in turn contribute to the contamination of surface and groundwater resources. Loss of the topsoil resource reduces the chances of successful rehabilitation and restoration. Responsive shallow soil 'responds' quickly to rainfall and typically generate overland flow. This soil can be shallow and overlie relatively impermeable bedrock, with limited storage capacity which is quickly exceeded following rainfall .
Lighter coloured soil or leached soil is usually associated with lateral movement of water which leaches soil minerals from the soil through the process of eluviation. Lateral flow occurs due to differences in

the conductivity of soil horizons or due to the presence of an impermeable subsurface layer. This soil is termed interflow soil. Lateral flow occurs at the A/B horizon interface and/or bedrock interfaces due to the reduced permeability, which therefore prevents vertical movement (Munyai, 2019).

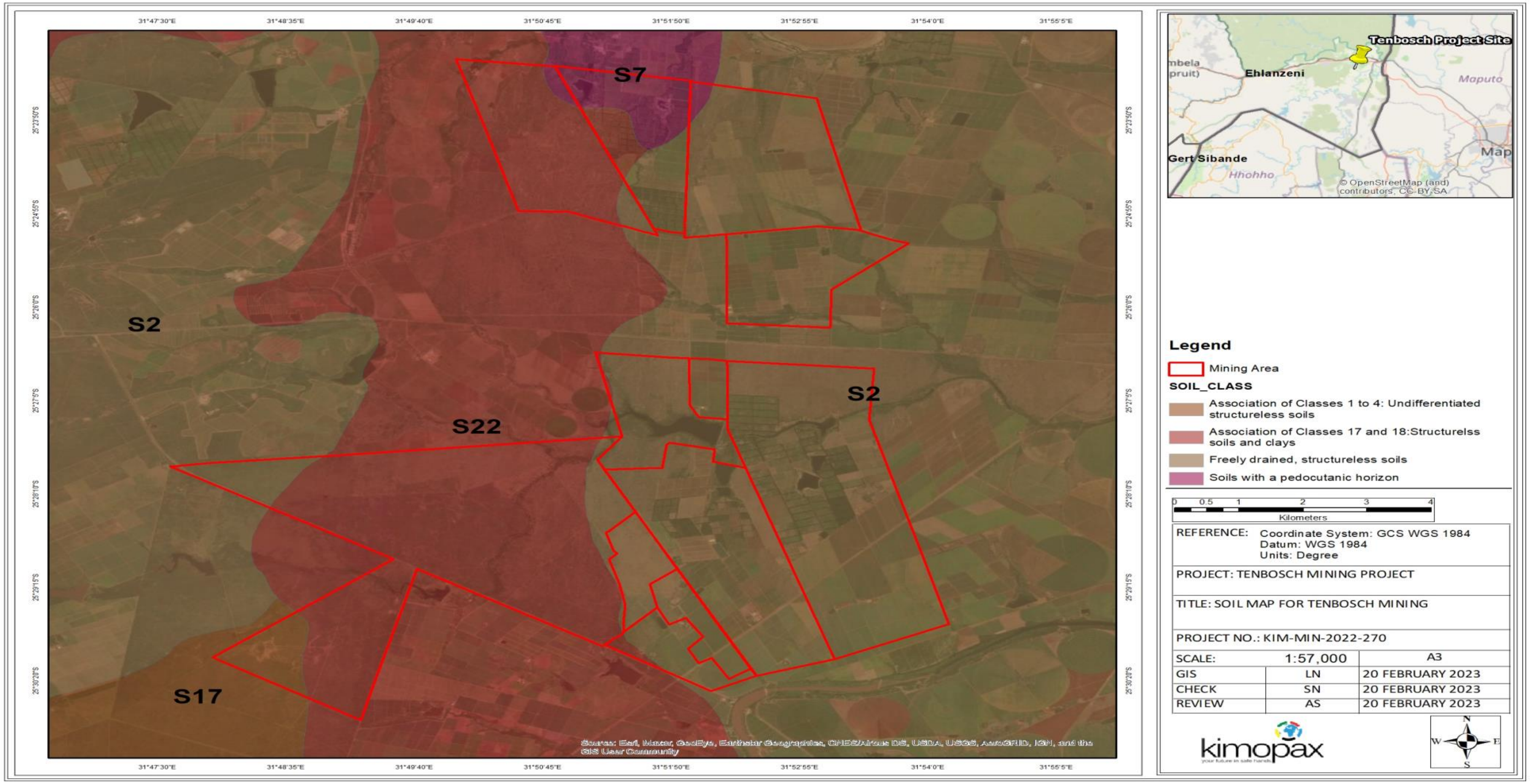



**Figure 8: Soil map of the areas of proposed**

###### *7.1.1.4.1.1 Moisture Availability*

Soil moisture is "the total amount of water, including the water vapor, in an unsaturated soil." The term "soil moisture," which is also referred to as "soil water," refers to the water present on land surfaces but not in groundwater, rivers, or lakes. Instead, it is found in the pores of the soil. In addition to weather, a variety of other factors such as the kind of soil and nearby plants, affect the amount of soil moisture. In turn, different dynamics of the soil and plants are impacted by soil moisture levels. While root zone soil moisture is the water that is available to plants and is typically thought to be in the upper 200 cm of soil, surface soil moisture is the water that is in the top 10 cm of soil . The moisture availability of the project area is classified as Slight and medium. (Guduvheni, 2023)

##### *7.1.1.4.2 Hydropedology*

The traversed catenas within the study`area were dominated by Carbonate, Apedal, Soft Plinthic and G Horizons . Plinthic soils within the study area can be divided into soft and hard plinthic soil types, where in plinthic soils the Orthic A grades directly into a plinthic horizon. Additionally, hard plinthic soils can also be moderately deep where the Orthic A horizon grades into a red or yellow brown apedal horizon. Soft plinthic soils are generally wetter than the overlying horizon and have a high water storage capacity attributed to their cla yey and less permeable nature, which results in prolonged wetness after rainfall events. The Vertic A Horizon has strongly developed structure , clearly visible, regularly occurring slickensides in some part of the horizon or in the transition to an underly ing layer, a plasticity index greater than 32 (using the SA Standard Casagrande cup to determine liquid limit) or greater than 36 (using the British Standard cone to determine liquid limit The G Horizon, shows Gleying, with the reduction of ferric oxides and hydrated oxides, is the essential process to which the G horizon has been subject. Usually, but not always, marked clay illuviation has taken place, especially in the upper part of the horizon. Many E horizons have also been subject to gleying. However, these, unlike the G horizon, have also undergone loss of colloidal matter to the extent that the horizon has a more or less uniform "grey" or bleached colour (some mottling may be present) and sandy texture. When the G horizon occurs immediately b eneath an orthic A, the latter normally has the low chroma colours associated with wetness. The interface of the G horizon with the soft plinthic B is defined under the description of the latter. The interface with the pedocutanic B is defined in terms of gleying. The G horizon interfaces more directly with the prismacutanic B. Distinction is easy when the prismacutanic B has strongly developed prismatic or columnar structure with little or no evidence of wetness in the B. However, prismacutanic

B horizons often have marked evidence of wetness in the form of mottles in ped interiors and low chroma colouring of clayskins on ped exteriors (Guduvheni, 2023).

These soils, amongst others, discourage vertical movement of water and promote lateral flow, thus potentially important in terms of the wetland functioning. Soft plinthic soils largely occur in hillslope seeps as well as in pan/depression wetlands. Furthermore, the presence of a possible G horizon on Katspruit (Ka) and Rensburg soils indicates greater susceptibility to wetnes s, and these soils are typically saturated with water, at least seasonally. These soils are largely associated with valley bottom wetlands (Guduvheni, 2023).

#### *7.1.1.4.3 Land Capability Classification*

The lithology classes associated with the study area include the Barbeton along the western portion, the Beaufort in the mid sections and the Drakensberg along the eastern portion of the study area.

The southwestern corner of the study area is characterised by clay content less than 15%. The lower clay content indicates that these soils will allow root penetration and water infiltration and these soils tend allow for easy use of tillage implements. However, these soils tend to have low fertility status and low water holding capacity which may necessitate additional input costs to cultivate successfully. The western portion of the study area is characterised by is characterised by clay content between 15% and 35%, which is considered to be within the ideal range for successful cultivation of most crops. The eastern portion of the study area is characterised by clay contents greater than 35% which may not be ideal for most cultivated crops due to limited root penetration and highly prone to waterlogging conditions during the rainy season.

The soil pH associated with the soils of the study area is between 6.5 to 7.4 which is slightly acidic to neutral. This pH range is considered ideal for most cultivated crops and majority of plant nutrients can be available for uptake by plants.

The study area is characterised the Dc34, Ea75, Ea76, Ea78 and the Fb65 landtype classes. The Ea landtypes dominate much of the study area and these landtypes are characterised by dark and red coloured, structured and high base status soils. The Dc34 landtype situated north of the study area is characterised by one or more of: vertic, melanic, red structured diagnostic horizons; undifferentiated. High clay content, cracking soils are dominant. Cultivation on these soils can be difficult due to the high clay content which may impede root penetration. The Fb landtype situated along the southwestern portion of the study area and are characterised by pedologically young and shallow/rocky soils with lime rare or absent in upland soils but generally present in the low-lying soils. These soils are shallow and usually left intentionally for grazing and wilderness land uses (Setsipane, T. 2023).

##### *7.1.1.4.4 Land Use*

The identified land uses within the study area include the plantations of sugarcane, bananas and citrus, livestock farming and commercial accommodation establishments which include guest houses and lodges (Setsipane, T. 2023).

##### *7.1.1.4.5 Agricultural Potential and Sensitivity*

For this assessment, agricultural sensitivity was inferred in consideration of observed limitations to land use due to physical soil properties and prevailing climatic conditions (Setsipane, T. 2023).

#### *7.1.1.5 Heritage and Paleontology*

The SAHRA database for archaeological and historical impact assessments was consulted and revealed a few reports for the Komatipoort region, which are listed below. One report for Bushbuckridge (Van Schalkwyk, 2008), and one for Acornhoek (Celliers, 2012) revealed no archaeological sites of significance close to the proposed development site. Two reports by Dr. J. Van Schalkwyk carried out in (2012) revealed only historical sites close to the Komatipoort – Mozambique border. There has been very little recent research on prehistoric African settlements in the study region. Pottery and microlith stone tools have been found at locations in the Kruger National Park dating back to the last 2500 years. Apart from those in the Kruger National Park, the Plaston site to the west, which dates from around 900 AD, is the only professionally excavated Early Iron Age site in the nearby vicinity. The broader region also offers a critical piece of South African coal mining history. However, the proposed development site did not yield any cultural heritage resources during the field survey (Muroyi, 2020).

#### *7.1.1.6 Terrestrial Biodiversity*

In the broadest sense, biodiversity provides value for ecosystem functionality, aesthetic, spiritual, cultural, and recreational reasons. The known value of biodiversity and ecosystems is as follows:

a) Soil formation and fertility maintenance;
b) Primary production through photosynthesis, as the supportive foundation for all life;
c) Provision of food and fuel;
d) Provision of shelter and building materials;

e) Regulation of water flows and water quality;
f) Regulation and purification of atmospheric gases;
g) Moderation of climate and weather;
h) Control of pests and diseases; and
i) Maintenance of genetic resources.

An impact statement is required as per the NEMA regulations with regards to the proposed development. Considering the above-mentioned conclusions, it is the opinion of the specialist that the proposed development will have a significant impact on the area. The sensitivity map should be considered vital regarding any development plans as the moderate and highly sensitive areas should be avoided during any future development. The mitigation measures should be strictly adhered to and enforced. With the understanding that mining will unlock economic opportunities in the area, the project can be allowed to proceed , if the developer is willing to adhere to the mitigation measures as outlined in this report and commit to rehabilitating the affected areas.

#### *7.1.1.6.1 Vegetation*

As a baseline, this section provides an outline of the type of vegetation occurring in the study area and the status of the vegetation, highlights the occurrence of sensitive ecological environments including sensitive/endangered species (if present) that require protection and/or additional mitigation should they be disturbed.

According to the SANBIGIS database the shaft site consists of the SVl 4 Delagoa Lowveld vegetation type. This vegetation is characterized by Dense tree or tall shrub layer dominated by Acacia elwitschia, often forming thickets. Herb layer has in addition to grass species a wide variety of forbs. Areas are often heavily grazed which sometimes drastically reduces the grass cover (Mucina & Rutherford, 2006).

The entire properties consist of a number of the Deloga Lowveld, Tshokwane-Hlane Basalt Lowveld, Granite Lowveld and the Kaalrug Mountain Bushveld vegetation units.

The mining right area also consists of the SVl 5 Tshokwane-Hlane Basalt Lowveld vegetation type. This vegetation type is characterized by fairly flat plains with open tree savanna, often dominated by tall Sclerocarya birrea and Acacia nigrescens with a moderately developed shrub layer and a dense herbaceous layer. On some sloping areas with shallower soils, trees are stunted (e.g. A. nigrescens).

While National level vegetation maps have described broad vegetation types, local conditions, and micro-habitats (rainfall, soil structure, rocky outcrops, etc.) can result in variations in plant composition.

As such, site surveys are critical for the verification of desktop findings and establishing the baseline ecological conditions of a site. The site visit conducted on the 09th of July 2022 confirmed that the vegetation of the project area is SVl 4 Delagoa Lowveld. The SVL 4 Delagoa Lowveld is classified as Vulnerable. A target of 19% has been set as a conservation target. About 18% statutorily conserved in the Kruger National Park. Some 33% transformed, almost all by cultivation. The SVl 5 Tshokwane-Hlane Basalt Lowveld is classified as Least threatened, about 64% statutorily conserved mainly in the Kruger National Park, but also in the Mlawula Nature Reserve. In addition, over 3% conserved mainly in the Hlane Game Sanctuary. About 17% transformed, almost all by cultivation (Maluleke, 2023).

**Table 7: Plant species observed in study area**

| | |
|---|---|
| All Species Of Tree Ferns, Excluding The Bracken Fern | All Species Of The Genus: *Cyathea Capensis* And *Cyathea Dregei* |
| All Species Of Cycads In Republic Of South Africa And The Seedlings Of The Species Of Cycads Referred To In Schedule 12 | All Species Of The Family Zamiaceae Occurring In The Republic Of South Africa And The Seedlings Of The Species Of Encephalartos Referred To In Schedule 12 |
| All Species Of Yellow Wood | *Podocarpus* Spp. |
| All Species Of Arum Lilies | *Zantedeschia* Spp. |
| "Volstruiskos" | *Schizobasis Intricata* |
| | |
| "Knolklimop" | *Bowiea Volubilis* |
| All Species Of Red-Hot Pokers | *Kniphofia* Spp. |
| | |
| All Species Of Aloes, Excluding: | *Aloe* Spp., Excluding: |
| (A) All Species Not Occurring In Mpumalanga And | (A) All Species Not Occurring In Mpumalanga And |
| (B) The Following Species: | (B) The Following Species: |
| All Species Of Haworthias | *Haworthia* Spp. |
| All Species Of Agapanthus | *Agapanthus* Spp. |
| All Species Of Squill | *Scilla* Spp. |
| All Species Of Pineapple Flower | *Eucomis* Spp. |
| All Species Of Dracaena | *Dracaena* Spp. |
| All Species Of Paint Brush | *Haemanthus* Spp. And *Scadoxis* Spp. |
| Cape Poison Bulb | *Boophane Disticha* |
| All Species Of Clivia | *Clivia* Spp. |
| All Species Of Brunsvigia | Brunsvigia Spp. |
| All Species Of Crinum | *Crinum* Spp |
| Ground Lily | *Ammocharis Coranica* |
| All Species Of Fire Lily | *Cyrtanthus* Spp. |
| All Species Of Elephantsfoot | *Dioscorea* Spp. |
| River Lily | *Hesperantha Coccinea* |
| All Species Of Gladioli | *Gladiolus* Spp. |
| All Species Of Watsonia | *Watsonia* Spp. |
| Wild Ginger | *Siphonochilus Aethiopicus* |
| All Species Of Orchids | All Species Of The Family Orchidacaea |
| All Species Of The Family Proteaceae | All Species Of The Family Proteacea |
| All Species Of Black Stinkwood | *Ocotea* Spp. |

| | |
|---|---|
| Kiaat | *Pterocarpus Angolensis* |
| Tamboti | *Spirostachys Africana* |
| The Following Species Of Euphorbias: Euphorbia Bernardii And Euphorbia Grandialata | The Following Species Of Euphorbias: *Euphorbia Bernardii* And *Euphorbia Grandialata* |
| Common Bersama | *Bersama Tysoniana* |
| Red Ivory | *Berchemia Zeyheri* |
| Pepperbark Tree | *Warburgia Salutaris* |
| All Species Of Adenia | Adenia Spp. |
| Bastard Onion Wood | *Cassipourea Gerrardii* |
| Assegai Tree | Curtisia Dentata |
| All Species Of Olive Trees | All Species Of The Genus Olea |
| All Species Of Impala Lilies | All Species Of The Genus Adenium |
| Kudu Lily | *Pachypodium Saundersii* |
| All Species Of Brachystelma | *Brachystelma* Spp. |
| All Species Of Ceropegia | *Ceropegia* Spp. |
| All Species Of Huerniopsis And Huernia | *Huerniopsis* And *Huernia* Spp. |
| All Species Of Duvalia | Duvalia Spp. |
| All Species Of Stapeliads | *Stapelia* Spp. |
| All Species Of Orbeanthus | *Orbeanthus* Spp. |
| All Species Of Orbeas | Orbea Spp. |
| All Species Of Orbeopsis | Orbeopsis Spp. |

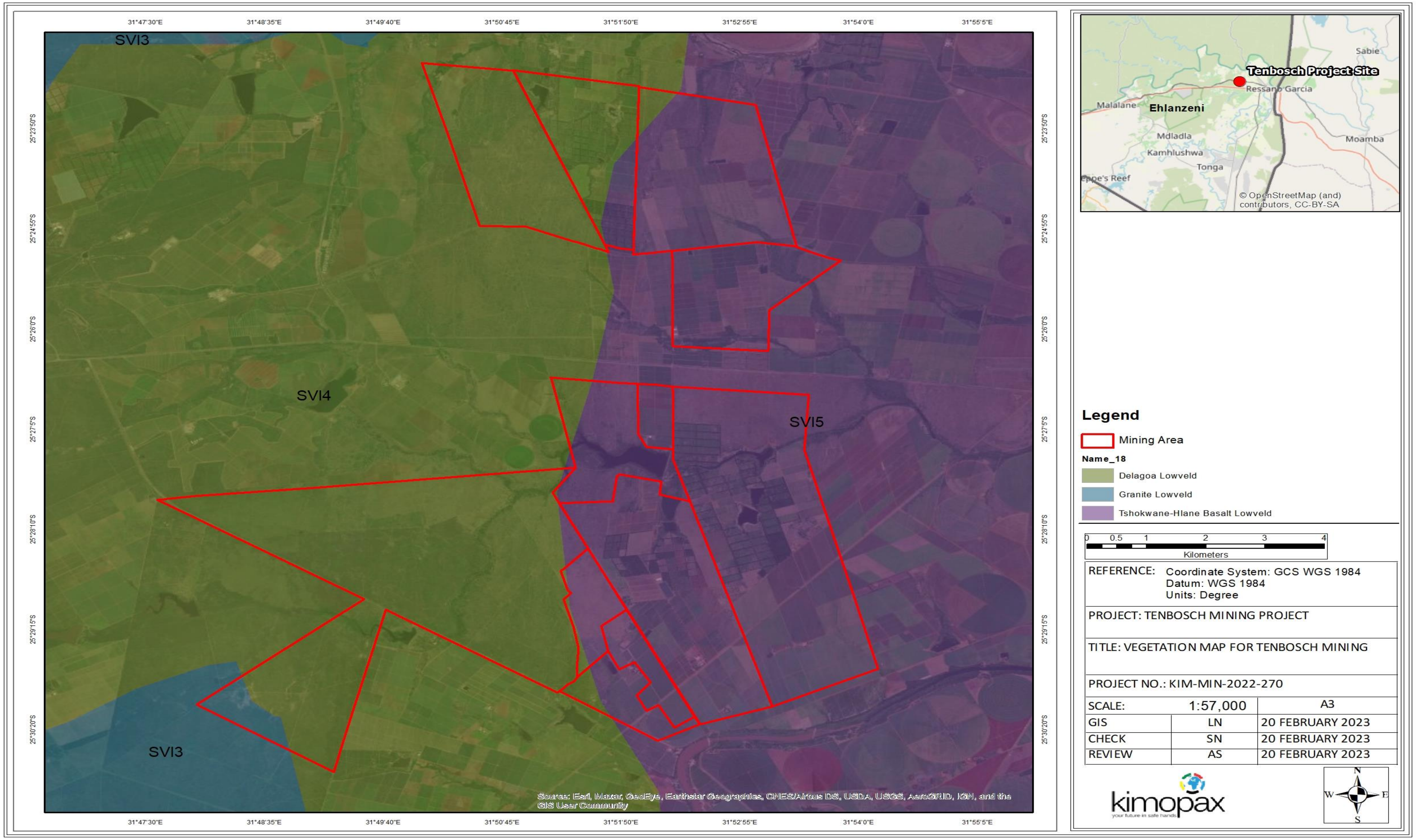



**Figure 9: Vegetation Map**

#### *7.1.1.6.2 Critical Biodiversity Areas*

The National Biodiversity Assessment identified and classified ecosystem areas in terms of their level of threat owing to decline and degradation. The proposed mining right area traverses through an Ecological Support Area (ESA). Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic. Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. The overall mining right area is located within close proximity to the protected areas. The Farm Tecklenburg 548 JU is classified as natural.

#### *7.1.1.6.3 Mammals*

The IUCN Red List Spatial Data (IUCN, 2017) lists 81 mammal species that could be expected to occur within the project area. Of these species, 9 are medium to large conservation dependant species, such as Tragelaphus oryx (Common Eland) that, in South Africa, is generally restricted to protected areas such as game reserves. These species are not expected to occur in the project area and are removed from the expected SCC list. They are however still included (common name in red). Of the remaining 72 small to medium sized mammal species, fourteen (14) (19.4%) are listed as being of conservation concern on a regional or global basis.

The assessment for mammal species was conducted at desktop level and field Investigation to determine the probability of occurrence of faunal species. During the site visit, no mammals were observed along the proposed mining area, except for the droppings of livestock.

#### *7.1.1.6.4 Herpetofauna*

The herpetofauna survey consisted of a desktop study and the field investigation. None of the expected reptiles were observed on site during the site visit.

#### *7.1.1.6.5 Avifauna*

Birds are generally regarded as good ecological indicators, because their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological conditions are directly linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species. It is important to note that the study site is classified as an important Bird Area. Important Bird and Biodiversity Areas (IBAs), as defined by BirdLife International, constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified nationally through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria. Essentially, these are the most important sites for conserving.

According to the South African Bird Atlas Project (SABAP2), almost 300 species of birds have been identified in the Manyeleti area.

A few avifaunal species were spotted onsite during the site visit. A desktop assessment was conducted to survey the site in relation to the important Bird Areas. The site is not located within the Important Bird Areas. According to Birdlife South Africa, the mining right boundary falls outside of and are not near any Important Bird Areas (IBA), which have been identified within South Africa . All of the avifaunal species observed within the area are considered to be of Least Concern by the IUCN and are common and widespread species.

### *7.1.1.7 Hydrology*

#### *7.1.1.7.1 Regional Hydrology*

The application area falls within the primary catchment (X) and quaternary catchments X24H, X13K, and X13L. The proposed coal mining project fall within the quaternary catchment X13L of the Inkomati Water Management Area (WMA 5) found in the eastern part of South Africa. The regional topography is considered gentle with elevation that varies between 250 and 180 meters above mean sea level (mamsl).

#### *7.1.1.7.2 Drainage*

Drainage within the proposed mining area occurs from the Ngweti River which cuts across the Application Area in the south. The Ngweti River is a perennial river that originate from the mountains west of the study area. It flows in an easterly direction where it joins the Komati River. The Komati River continues to flow eastwards and confluence with the Crocodile River after the Komati town to form the Inkomati River which flows into Mozambique.

Water quality assessment was conducted from the Komati River and the Ngweti River with its tributaries on the 11th of April 2022 to determine the baseline water quality of the area before proposed mining activity commences as well for the understanding of the general characterisation of the site. Water samples were collected from eight sampling points, namely Ngweti (NG) 01 and NG 02, Ngweti tributaries 01 to 03 (IGMT 01 to 03), and After Confluence (AC). The water quality results outlined that the Ngweti River and Its tributaries are not suitable for domestic use due to the exceedance of the domestic water quality guideline by TDS, Ca, Mg, and Na. Although the Ngweti system has poor water quality in terms of domestic use, it can be used for other activities such as irrigation and livestock. The Komati system showed good water quality (Makola, 2023).

#### *7.1.1.7.3 Stormwater Management*

The proposed infrastructure was assessed in terms of clean and dirty nature. All the surface dirty infrastructure such as waste rock, overburden and coal (product) stockpiles will be grouped to form the dirty water catchment. A system of vegetated berms will be placed around the dirty catchment to prevent the mixing of clean and dirty runoff.

#### *7.1.1.7.4 Floodlines*

Floodlines were delineated to check compliance with Condition 4 of the GN 704 and to assess the risk of flooding to the proposed mine infrastructures. The proposed surface infrastructure are outside the 1:100-year inundation boundary and the 100m watercourse buffer. Therefore, according to Condition 4 of the GN 704, the mine is permitted to mine at the proposed Tenbosch mining area.

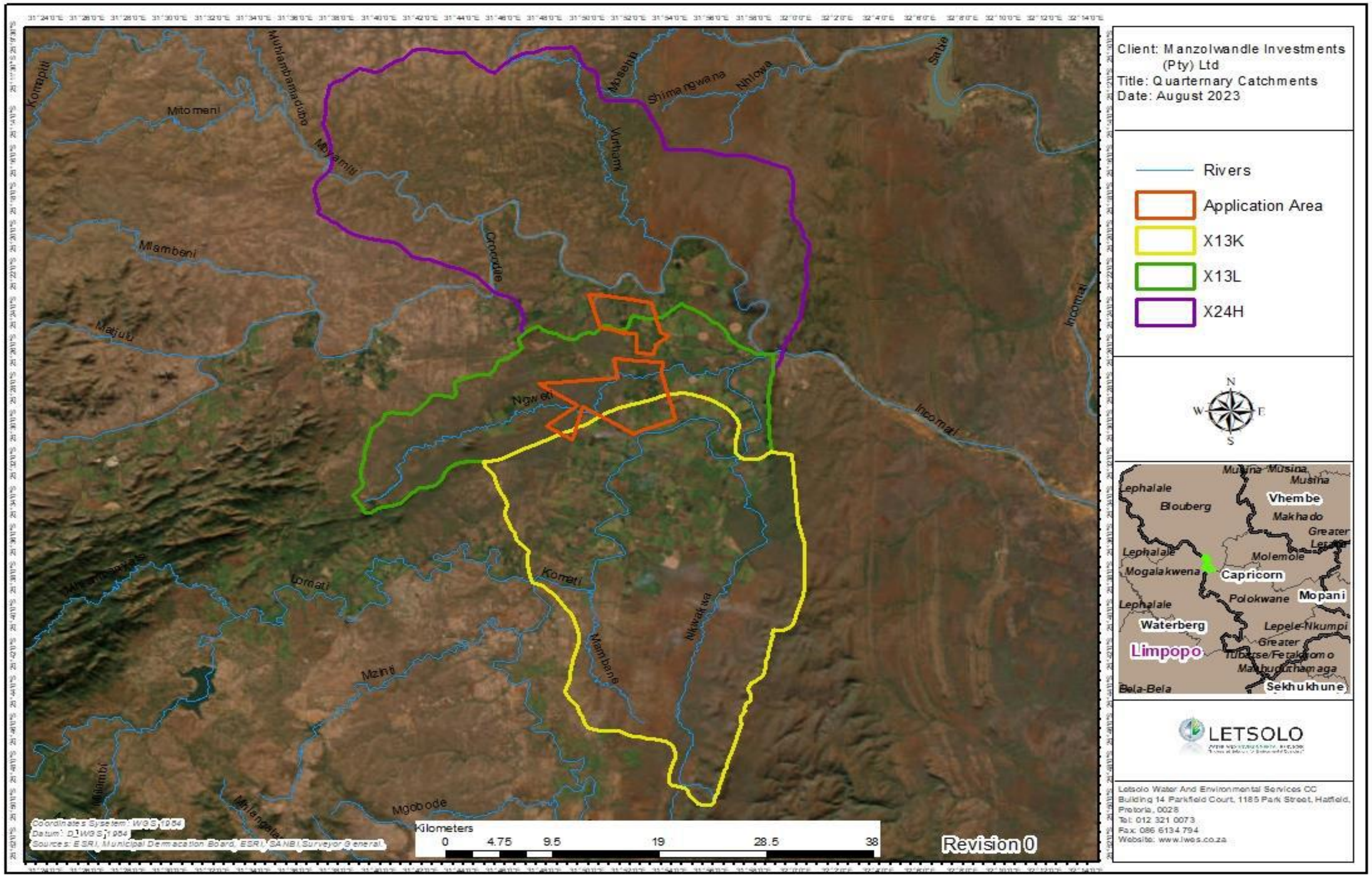



**Figure 10: Hydrological Setting**

#### *7.1.1.8 Aquatic Ecology*

The freshwater habitats (watercourses) onsite consist mainly of terrestrial plant species. It is important to note that plants such as algae, water lilies, and willow trees help keep the water clean by using their root systems to filter pollution and excess nutrients from the water. The watercourses have hydrophytes such as Typha capensis During the site inspection there was evidence of avifaunal species within the watercourses.

No invertebrates were observed in the freshwater ecosystems onsite. In order to get accurate results, invertebrate traps should be placed along the watercourses for a number of days (Maluleke, 2023).

#### *7.1.1.9 Visual*

An initial desktop site assessment was conducted to determine suitable locations regarding the visual impact assessment.

The result of the desktop study was the identification of areas or activities which could possibly contribute to the deterioration of the visual characteristics of the area.

Site baseline characterisation (and subsequent fieldwork) occurred on the 25$^{th}$ and 26$^{th}$ of July 2023 for the visual assessment. The site baseline characterisation was conducted to undertake the visual assessment of the current characteristics of the receiving environment. The field survey included photographic evidence at the various viewpoints which were used as a basis for determining the potential visual ability and visual impacts of the proposed development.

Various viewpoints were identified based on the sensitivity and visual impact of the area.

The VIA was conducted following the methodology:

- Site visit and orientation.
- Describing the landscape character or visual baseline based on:
- Photographs of the project site and larger study area were taken during a field visit conducted on the 25$^{th}$ and 26$^{th}$ of July 2023.
- A review of available aerial photography and topographical maps, in relation to:
    - Natural elements; and

    - Human-made elements.
- Determining the area/s where the project will be visible from.
- Determining the visual resource value of the landscape in terms of:
    - The topographical character of the site and its surroundings and potential occurrence of landform features of interest;
    - The presence of water bodies within the study area;
    - The general nature and level of disturbance of existing vegetation cover within the study area; and
    - The nature and level of human disturbance and transformation evident.
- Determine the visual absorption capacity of the receiving visual landscape.
- Determining the receptor sensitivity to the proposed project.
- Determine the magnitude of the impact, by considering the proposed project in terms of aspects of VIA, namely:
    - Visibility.
    - Visual intrusion; and
    - Visual exposure.
- Assessing the impact significance by relating the magnitude of the visual impact to its:
    - Duration.
    - Severity; and
    - Geographical extent.
- To recommend mitigation measures to reduce the potential visual impacts of the project.

##### *7.1.1.9.1 Visual Intrusion*

Given that the study area has a moderate VAC (due to vegetation and gently to moderately undulating landscape) and moderate visual resource value, the proposed mining project will have a high (without mitigation measures) visual intrusion on surrounding sensitive receptors. Ensuring that vegetation is retained on the periphery of these areas, and wherever possible, lights be directed downwards as to avoid illuminating the sky, the visual impact on the surrounding environment will be moderate depending on the proximity to the sensitive receptors (Buys, 2023).

The altered visual environment during the construction, operational and decommissioning phases will lead to moderate/high (without mitigation measures) levels of visual intrusion, with moderate levels of compatibility with the surrounding land uses as well as limited visual contrast. The level of visual intrusion as a result of the proposed mining project, with specific mention of vegetation clearing, removal of topsoil, mine infrastructure, overburden and discard dumps, is considered to be high (without mitigation measures) during the construction and operational phases, in line with the low VAC. The perceived visual impacts associated with the construction, operational and decommissioning phases are considered to be moderately/highly (without mitigation measures) intrusive to the receiving environment (Buys, 2023).

#### *7.1.1.9.2 Visual Exposure*

Close-range views (equating to a high level of visual exposure) are views over a distance of 500 m or less, medium-range views (equating to a moderate level of visual exposure) are views of 500 m to 2 km, and long-range views are over distances greater than 2 km (low levels of visual exposure). Sensitive receptors within 2 km of the site were limited to people working in the area, local residents, tourists visiting the area and the number of farms surrounding the site. The main Sensitive Receptors identified were the residents of the private farms surrounding the infrastructure layout area as indicated in Figure 69 below within a 5 km radius. For the purposes of this assessment, visual exposure in terms of all identified impacts has therefore been rated as high as high sensitivity, sensitive receptors, are located within five (5) km from the site (Buys, 2023).

### 7.1.2 Socio- Economic Profile

Tenbosch Mining operates in Ehlanzeni District Municipality and is situated in the Nkomazi Local Municipality located within the Mpumalanga Province . Ehlanzeni District Municipality (EDM) is one of the three district municipalities located in the north eastern part of Mpumalanga Province. It is bordered by Mozambique and Swaziland in the east, Gert Sibande District in the south, Mopani and Sekhukhune Districts of Limpopo in the north and Nkangala District Municipality in the west.

Nkomazi Local Municipality is divided into 33 (thirty-three) municipal wards as determined by the Municipal Demarcation Board. Urban Areas, include Malelane, Hectorspruit, KaMaqhekeza, Tonga, Kaapmuiden, Komatipoort and Kamhlushwa.

### *7.1.2.1 Demographic Profile*

#### *7.1.2.1.1 Population*

According to Stats SA (2016 Community Survey - CS), Nkomazi's population increased from 393 030 in 2011 to 410 907 people in 2016 and it was sitting at 410 830 in 2021. It is said to be the 4th largest population in the province and 23% of total Ehlanzeni population in 2016. Between 2011 & 2016, the population grew by 17 877 and recorded a growth rate of 1.0% per annum – the average annual economic growth rate was higher than the population growth rate, which is positive. The population number for 2019 is estimated at 423 358 and for 2030 it is estimated at 472 327 people given the historic population growth per annum – which will put pressure on the infrastructure, service delivery and employment opportunities to the Municipality.

**Table 8: Population size and growth**

| Age groups | Census 2011 | | | Community Survey 2016 | | |
|---|---|---|---|---|---|---|
| | Male | Female | Grand Total | male | Female | Grand Total |
| 0 – 4 | 24460 | 24607 | 49067 | 29368 | 28916 | 58284 |
| 5 – 9 | 21690 | 22077 | 43767 | 24671 | 24894 | 49565 |
| 10 – 14 | 23267 | 23178 | 46445 | 23371 | 25015 | 48386 |
| 15 – 19 | 24406 | 24564 | 48971 | 22862 | 22904 | 45766 |
| 20 – 24 | 21460 | 22642 | 44102 | 20124 | 20430 | 40554 |
| 25 – 29 | 17594 | 19718 | 37312 | 19752 | 20690 | 40442 |
| 30 – 34 | 12510 | 14667 | 27177 | 13187 | 16138 | 29325 |
| 35 – 39 | 9784 | 12105 | 21889 | 11039 | 12485 | 23523 |

| Age groups | Census 2011 | | | Community Survey 2016 | | |
|---|---|---|---|---|---|---|
| | Male | Female | Grand Total | male | Female | Grand Total |
| 40 – 44 | 7364 | 10216 | 17580 | 7633 | 9664 | 17297 |
| 45 – 49 | 6452 | 8200 | 14652 | 6250 | 9329 | 15579 |
| 50 – 54 | 4606 | 5832 | 10438 | 5688 | 6125 | 11813 |
| 55 – 59 | 3864 | 5022 | 8887 | 3650 | 4336 | 7986 |
| 60 – 64 | 2856 | 3813 | 6669 | 3064 | 4383 | 7447 |
| 65 – 69 | 1846 | 2681 | 4528 | 2147 | 3063 | 5210 |
| 70 – 74 | 1716 | 2874 | 4591 | 1293 | 2575 | 3868 |
| 75 – 79 | 886 | 1953 | 2839 | 937 | 1783 | 2720 |
| 80 – 84 | 718 | 1756 | 2474 | 406 | 1126 | 1531 |
| 85 + | 594 | 1049 | 1643 | 364 | 1247 | 1611 |

Source: Stats SA Community profiles (2011 & 2016)

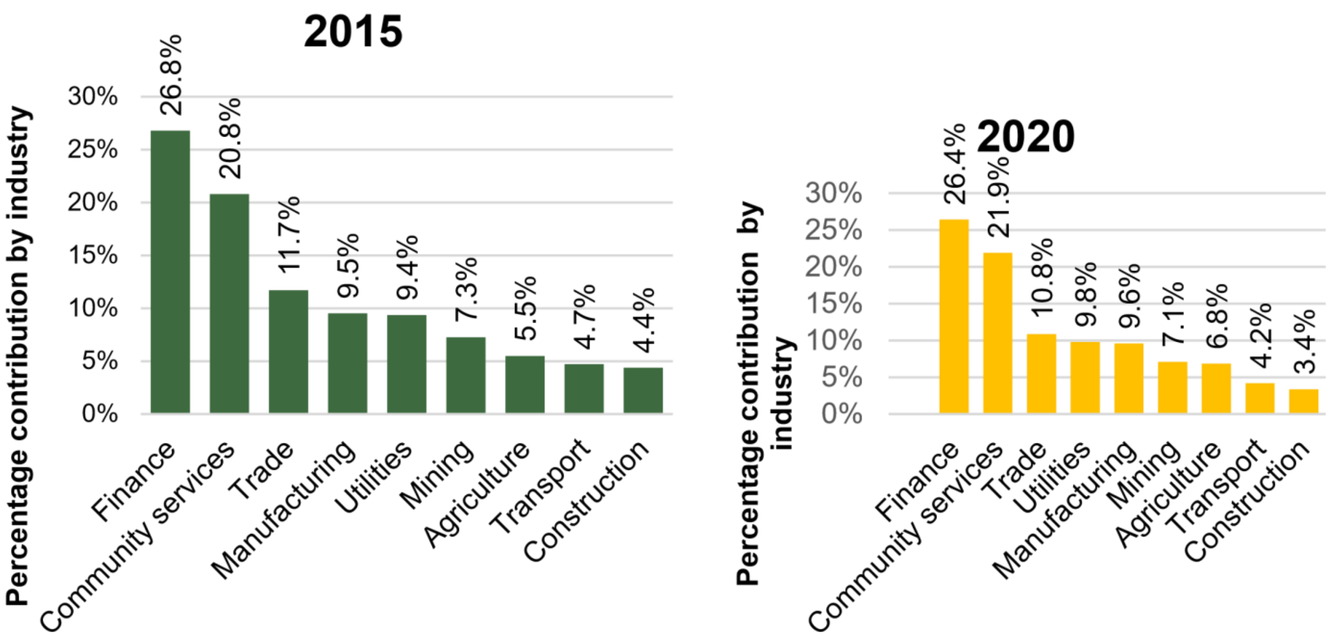
##### *7.1.2.1.2 Economic Indicators*

Contribution to the Mpumalanga economy in 2020 was 3.8% – 8th largest economy in the province. Contribution of 11.1% to the district economy – 3rd largest economy in Ehlanzeni. Dominant large contributions to Ehlanzeni's mining, utilities and agriculture industries.

Average annual economic growth rate for Nkomazi was only 1.7% p.a. over the period 1996 to 2020 and Contraction in 2020 due to the COVID-19 and lockdown of only between -1% & -2%. Unique structure of the local economy: Construction, transport and trade (including tourism) most negatively affected industries. Growth of about 14% in agriculture.

Estimated growth in 2021 of about 5% from a low base due to Covid 19 lockdown, the estimated average annual GDP growth for Nkomazi between 2020 and 2025 is 2.2% p.a. In 2020, the size of the economy was estimated at R14.8 billion in current prices. Finance, community services, trade (including tourism) and utilities were the largest industries in Nkomazi in 2020. Together, these four industries contributed two thirds to the local economy.

Nkomazi holds a comparative advantage in industries such as agriculture and tourism. In 2015, tourism spent totalled R911.2 million or equal to 8.1% of the local GDP. In 2020, due to COVID-19 related factors, it decreased to only R489.3 million, which was equal to only 3.3% of the local GDP. Figure 6 shows comparative percentage contribution per industry between 2015 and 2020.




**Source: SEP (Socio Economic Profile) & Department of Economic development and tourism**

**Figure 11: Economic Indicators**

The municipality has established a municipal entity known as “Nkomazi Development Agency NPO” in order to address the above challenges. Primarily, the objectives of the entity are to take part in income generating activities which will enable it to be self-sufficient and fulfil the following objectives:

- To provide economic and entrepreneurial advantages through alliances, associations and the sourcing and provision of opportunities for natural and juristic persons existing for the benefit of individuals from historically disadvantaged backgrounds within Nkomazi Local Municipality;
- To offer financial assistance and bursaries to matriculants who completed their matric certificates from schools situated within Nkomazi Local Municipality who wish to pursue studies in tertiary education;
- Offer skills development courses programmes targeting the unemployed youth residents within the jurisdiction of Nkomazi Local Municipality, and in fulfilling this objective the company may apply for accreditation as a training service provider with any recognized statutory body.

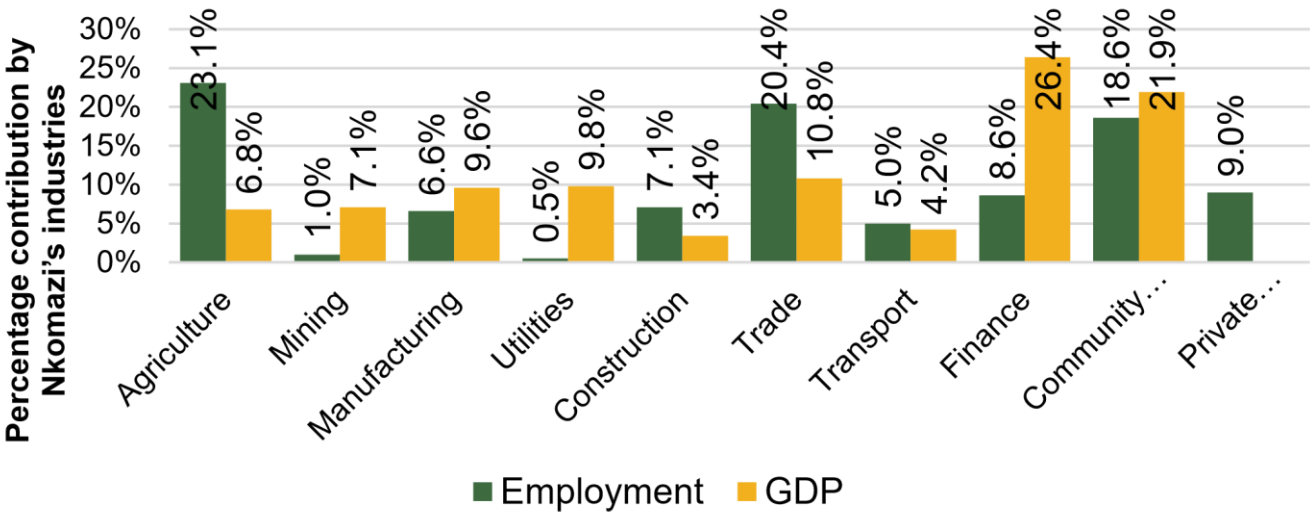



**Figure 12: Economic Contribution by Industry**

#### *7.1.2.1.3 Educational attainment*

Nkomazi's grade 12 pass rate deteriorated from 86.0% in 2014 to 75.5% in 2021, which was the 8th highest/best out of 17 municipal areas in the province. Nkomazi's pass rate improved slightly by 1.4 percentage points between 2020 and 2021. The area also improved its admission rate to university/degree studies to 30.3% in 2021. It is important that key interventions be aimed at low performing schools to improve the grade 12 pass rate. Nkomazi was always one of the top performing areas in the province in the past and setting the example for the rest. There was some deterioration in a number of previous years (especially between 2019 and 2020 which can be attributed to Covid-19 related factors) and important to identify and address the relevant challenges. The challenge is also to accommodate the educated young people in the area with adequate economic opportunities, provision of adequate educational, recreational infrastructure and skills development activities to meet the needs of the community. Nkomazi's functional literacy is lowest in the province, but improving.

**Table 9: Basic educational data and performance**

| Grade 12 pass rate | | | Admission to B Degree studies in 2021 |
|---|---|---|---|
| 2014 | 2020 | 2021 | 30.3% |
| 86.0% | 74.1% | 75.5% | |

Source SEP and DEDT

There were major improvements in educational attainment within the municipality between 2001 and 2011. In 1996 47% had no schooling and this decreased to 26% in 2011 which indicates favorable improvements in educational attainment over a period of 15 years. Although there has been improvements in the attainment of matric as well as post matric qualifications, this will not translate into employment if the types of education and training does not match the needs in the labour market. According to Community Survey 2016, the results are superlative as they show that improvement in the education attainment of matric is above 60% and no schooling tends to increase in 2016 by above 40% while highest education also seems to be increasing between 2011 and 2016 by above 10%, which has led to the Municipality prioritizing provision of classrooms, working hand in hand with Department of Education.

#### *7.1.2.1.4 Employment*

South Africa's unemployment rate eased to 34.5% in the first quarter of 2022, the first decline in seven quarters, down from a record high of 35,3% in the prior period. The municipality faces a challenge with regard to a marketable and skilled work force, thereby creating a gap in productivity, which in turn has a negative impact on the economic growth path. Limited efforts to encourage development of green economy and development of infrastructure to support economic development will in future stifle opportunities to reduce the high level of unemployment.

Both the high level of unemployment and high household dependency ratio leads to an increased number of communities living in abject poverty. Current welfare systems and packages are unsustainable and the Municipality is compelled to direct more resources towards supporting its citizens. A strategic approach by the Municipality should be encouraged to ensure that more job opportunities are made available, economic development programmes are enhanced and basic services are provided to uplift citizens out of poverty and to enable households' to be able to pay for municipal services to increase revenue generation.

### 7.1.3 Regional and Local Geology

With regards to geology, the site is underlaid by the rocks from the Basement complex, which are the oldest rocks, (Swazian Erathem) to the Karoo Supergroup which are mainly sediments such as shale, sandstones (undifferentiated). The main formation deemed to host the coal seam is the Ecca Group which is comprised mainly of undifferentiated sediments.

Based on the 1: 250 000 Barberton 2530 Geological Sheet published by Council of Geoscience, the site is underlaid by the rocks from Swazian Erathem to Karoo Sediments. On the west the area, is bound by the oldest rock in the country, the Barbeton Sequence. According to South African Committee of Stratigraphy the rocks are described from the youngest to the oldest.

Karoo Dolerite (“Jd”)

Basic dyke formation of the late Karoo magmatic period is found throughout the area. Due to their relatively high resistance to weathering and erosion the dolerite dykes appear more dominant in areas.

The dolerite dykes are generally fine grained, dark grey to black in color with massive structure. These dykes consist of plagioclase (labradorite to bytownite) with augite and other minerals. Intrusions of dolerite dykes are due to weaknesses in the older rock formations and a definite north to south orientation may be identified (Note that this is represented by the letter “Jd”.

Komatipoort Suite

These are intrusive rocks or volcanic which are mainly comprised of granophyre, gabbro, olivine gabbro and feldspathic gabbro. These rocks are presented in the map by the letters (“Jkg &Jk”).

Karoo Sequence

This sequences comprises mainly of sedimentary rocks. In the area there are numerous rock formation which are:

- Jozini formation (“**Jl**”) which has the lithology of fine-grained mafic lava, interlayered with rhyolite and having amygdales in places.
- Clarens Formation comprises of undifferentiated Karoo Sediments (“**PŔ**”) and the lithologies are mainly cream coloured fine grained massive sandstone (“**Ŕł**”). Furthermore, the undifferentiated Karoo Sediments have quartzitic, Sandstone , gritty sandstone and shale. The latter form part of the Vryheid formation which is part of the Ecca Group.

The Karoo Sequence is underlained by the Mokolian Timbavati gabbro represented by the letter (“**Mt**”).

The Basement Complex

These are the oldest rocks in the country which are mainly granite and metamorphic rocks in the form of gneiss. The basemen Complex is made of the Nelspruit Suite.

The Nelspruit Suite consists of granite, porphyritic and magmatic granite. The granite is a grey to white biotite granite characterized by its colour and grain size that varies from medium to coarse grained. Magmatic and gneiss-like variants of this granite are found along east to west dykes running through Marloth Park and Lionspruit Game Reserve.

Characteristic of the Nelspruit Suite is the general presence of coarse-grained pegmatite. Pegmatite being an igneous rock, with interlocking crystals, resembles granite in composition. The granite forms a coarse topography in contrast to the biotite gneiss and migmatite. The Nelspruit Suite consists of granite containing potassium feldspars, plagioclase, quartz, biotite and other minerals. Although the central granite area is mafic with no exfoliation, it may be found where contact is made with the surrounding rock formations. This exfoliation is accentuated by the parallel orientation of feldspar crystals for the lithological representation (map legend).

Barberton Sequence

The rock formations of this area are among the oldest on earth and are collectively grouped as the Barberton Sequence, and exceed a total thickness of 16 km. This group consists as a succession of volcanic layers, overlaid by sedimentary rocks. The oldest rocks of the Barberton Sequence are the ultra-basic to basic igneous rocks of the Onverwacht Group. This includes ultra-basic high-Magnesium lavas, periodic komatite, intermediate to basaltic metamorphic rock, intermediate to acid volcanic rocks and a large variety of pyroclastic rocks.

A succession of rocks, mainly pelitic, follows on the Onverwacht Group and is collectively known as the Fig Tree Group. A striking layer of Chert and striped iron-containing Chert, the Ulundi layer, is found about halfway in the Fig Tree Group. The top formation in this group consists of pyroclastic rock, mainly tuff and agglomerate. The beginning of the Fig Tree Group is recognized by the exposure of shale interlayered with Chert, a hard, extremely compact, semivitreous cryptocristalline rock.

Granite and Gneiss of the Swazian Complex

The geology of the area is biotite-tonalite. Tonalite exhibits a wide range in texture varying from non-exfoliated to lightly exfoliated, medium grained granite to gneiss and migmatite. The rocks are light grey when fresh but weather to a light brown colour. In the veld a low relief and relatively high degree of weathering characterize the rocks. Abrupt changes between textural variants and the presence of pegmatite veins are characteristic of this formation. Biotite is the only mafic mineral in gneiss that otherwise consists of plagioclase, quartz and potassium (K) feldspars.

Tonalitic Granite and Gneiss

A section of tonalitic biotite-trondhjemite granite and gneiss is found on the area. This rock is elliptic and is found to terminate the layered effect of the surrounding rock formation rather abruptly. The granite gneiss formations are usually lower than the surrounding rock formations. Many dykes traverse the granite gneiss formation and are found to protrude above this formation due to the difference in resistance to weathering. Although the tonalite exhibits a central massive structure, a strongly exfoliated edge is found parallel to the point of contact with the surrounding rock formations. Tonalites consist of plagioclase and quartz with subservient biotite and hornblende. Tonalites are characterized by a relative homogeneity and restricted variation in chemical composition.

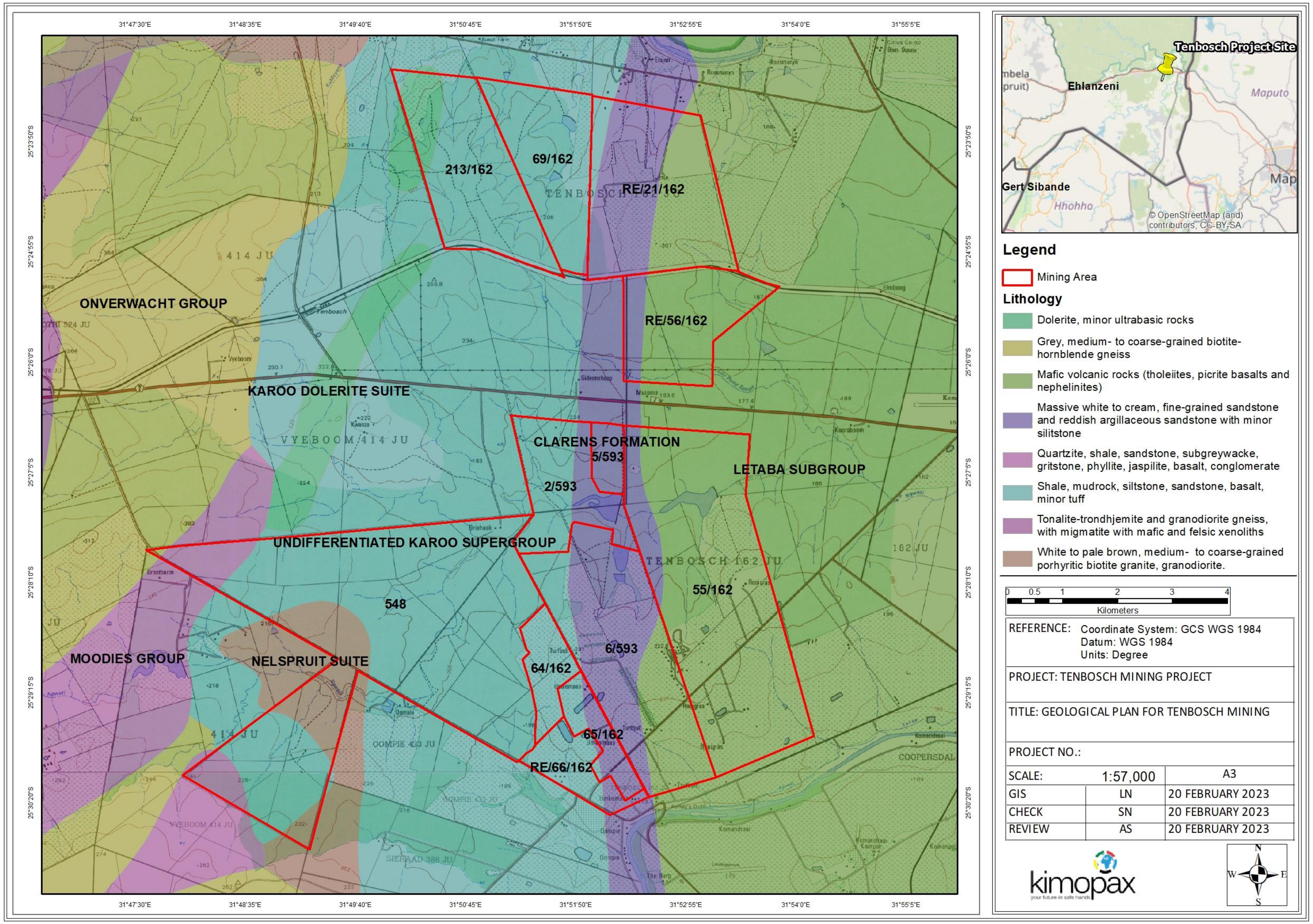



**Figure 13: Geological map of the area**

### a) Climate and Precipitation

The Climate is described in terms of Temperature and Rainfall. The area is characterised by high temperature during summer averaging from 18OC to 36 OC. The winter is normally warm and dry, hence high rainfall with average of 120mm is normally experienced in Summer.

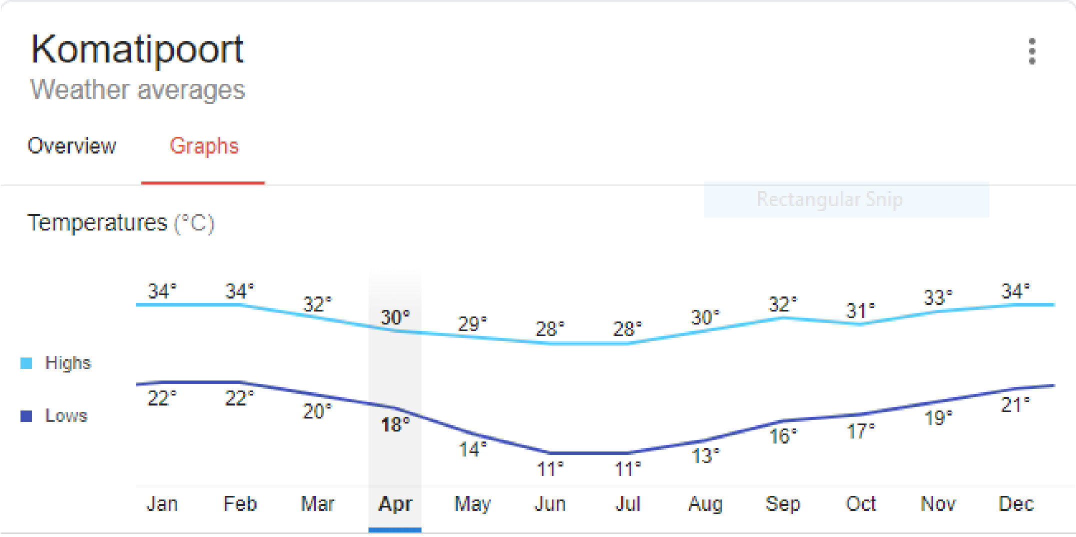



**Figure 14: Average temperatures in Komatipoort area. (Source, NOOA)**

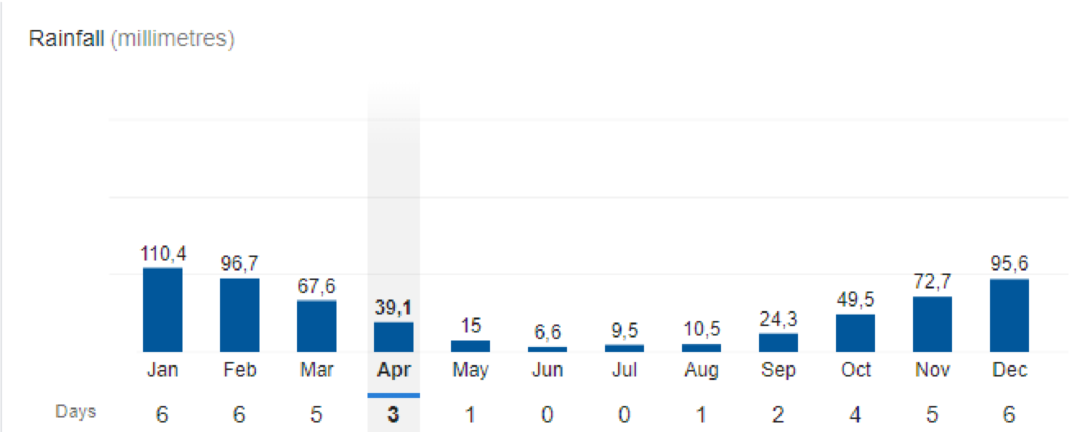



**Figure 15: Average annual rainfall in Komatipoort area.**

### b) Topography and Drainage

The Kaalrug Mountain range is to be found to the west forming part of the Barberton Mountain lands and the Lebombo Mountain range is located along the eastern boundary. The Lebombo Plains, located between the Komati River and the Lebombo Mountains to .the east, are characterized by flat to undulating landscapes.

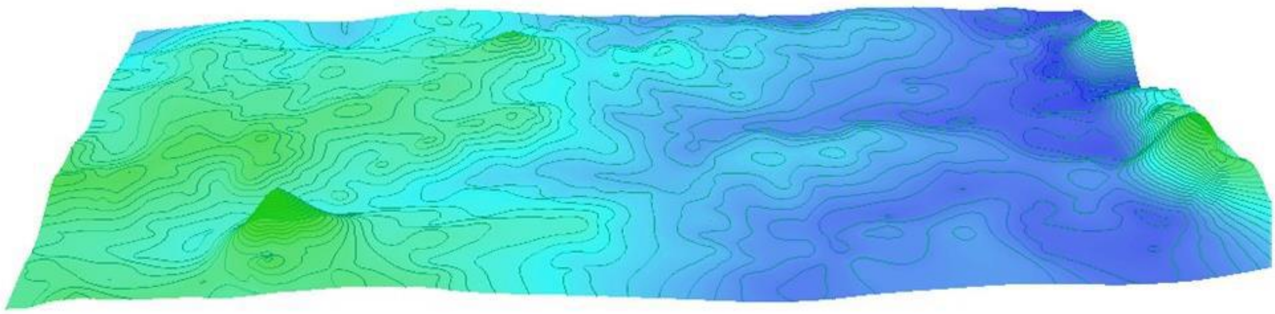


**Figure 16: Digital Elevation Model showing the elevation levels (Mountaneous in the east)**

The central part between the Komati River and the mountainous western areas where the project area is located is flat however steeper slopes occur to the south towards Swaziland border.

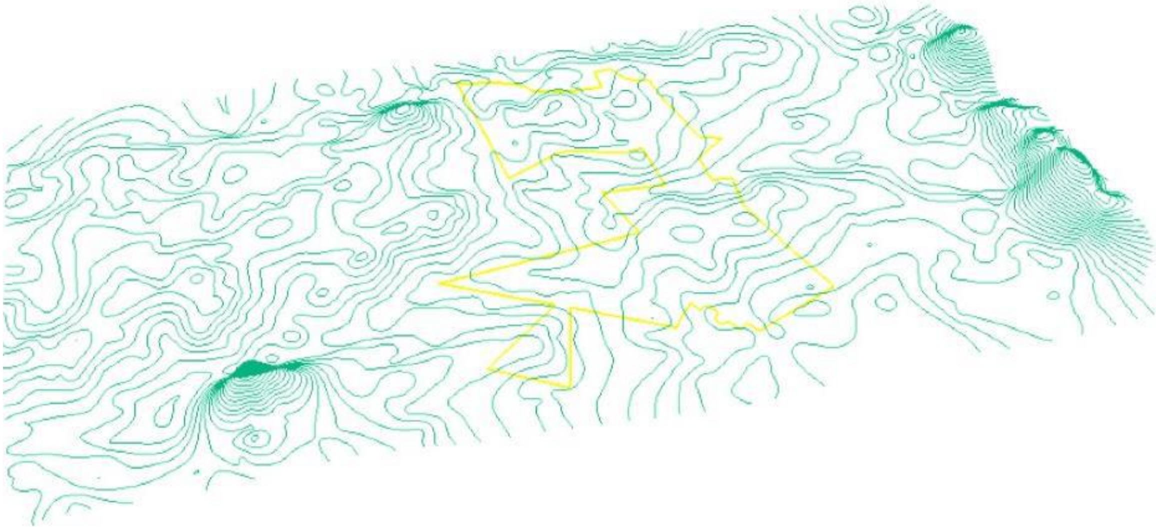


**Figure 17: Contour elevation 3D model, showing the study area at the center**

The area is situated in the lowveld region, where the altitude is approximately from 150 to 450 meters above sea level (masl). Toposheet 2531BD indicates the highest elevation within the affected areas or farm as 250masl.

With regards to drainage, the site is well drained. There are two major rivers that flow to the east and merge after Komati Town. The one flowing on the north from the site is Crocodile River whereas the other flowing on the south from the site is Komati River.

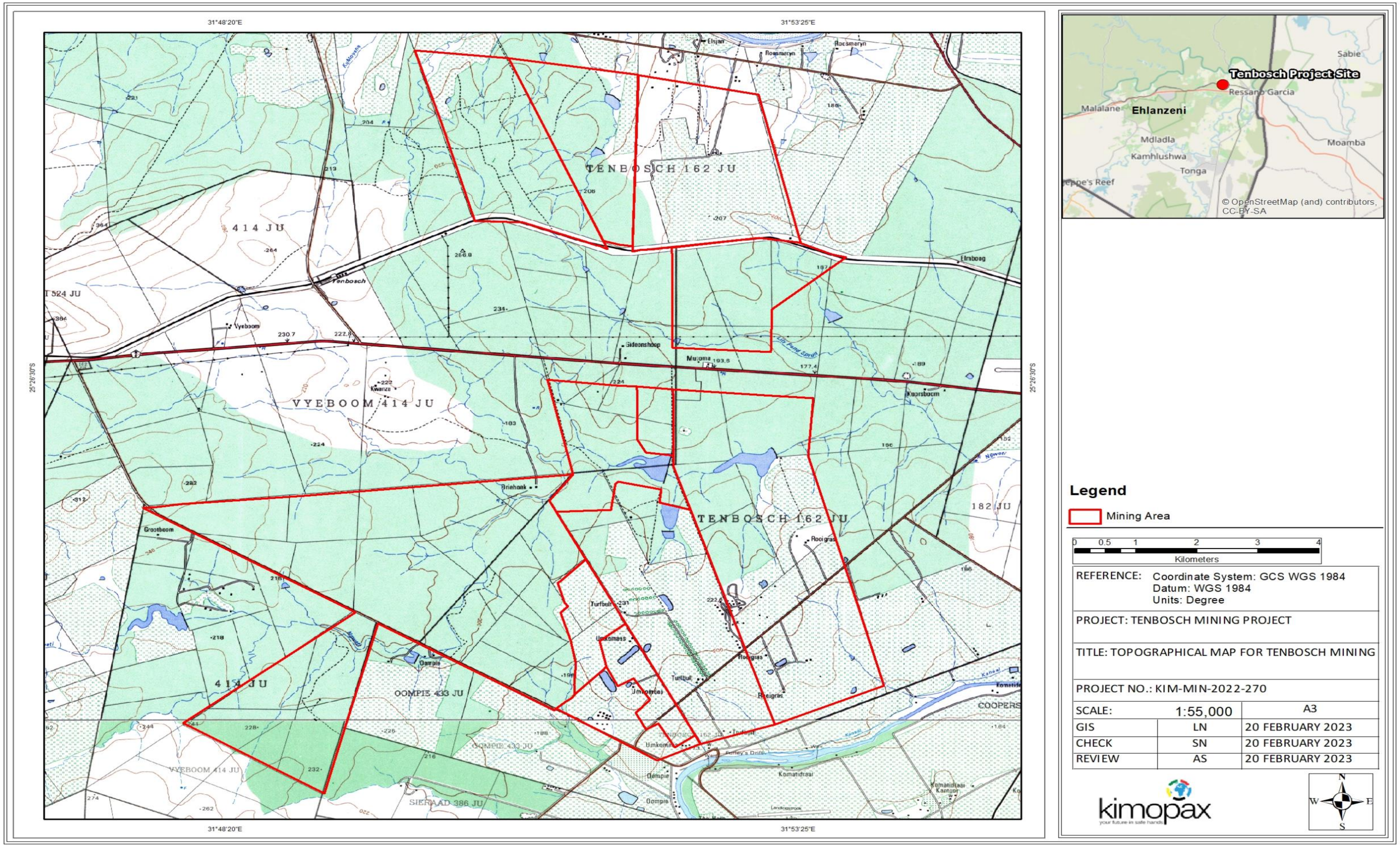



**Figure 18:Topographic Map of the study area**

### 7.1.4 Local Economic Development

At the core of Local Economic Development (LED) is the need to involve local people and institutions in the development of local economies by focusing on opportunities for economic growth, employment creation, through empowerment as well as social and economic transformation. LED is most importantly about people working together to achieve sustainable economic growth that brings economic benefits and quality of life improvements for all in the local community.

Each local municipality has its own LED goals and objectives which aim to address the needs of unemployment, poverty alleviation, improved investment, and business climate in the municipal area.

Since Tenbosch Mine will mainly operate within the Nkomazi Local Municipality, their objectives will guide the roll-out of LED projects for the receiving communities. The Nkomazi Local Municipality objectives for LED are summarised below.

a) Through consultation with partners (government stakeholders, organized labour, industry associations and business chambers), develop long term master plans that promote external investors.

b) Maximise the job creation potential of key sectors, through a partnership of local, provincial and national role-players.

c) Retention of current investment and solicit future investment and growth through incentive packages (flexible tariff and rate structure, serviced land, stable supply of water and electricity, etc).

d) Diversify and broadening key local sectors (steel manufacturing) through downstream beneficiation programs.

e) Strengthening government-supported entities, increasing their capacity with a view of stimulating opportunities for small and medium enterprises in the manufacturing industry, particularly steel manufacturing.

f) Make more land available for small and medium enterprises at the HEDC centre, show ground, and other available areas.

g) Creating secondary industries out of the mining sector, e.g. recycling, cement manufacturing through mining bi-products or waste, processing of coal waste into secondary products (pellets, briquettes), identifying opportunities for quarrying, etc.

h) Develop a coordination program (culminating into a structure) to facilitate the development of industry specific opportunities in conjunction with industry associations and business bodies.

i) Continuous alignment of LED strategy to economic trends through the establishment of a panel of economic advisors to the Council.

j) Coordinate all developmental issues as initiated by various government sector departments in the local municipality.

k) Continuous improvement and updating of the investor guide incorporating new developments and economic opportunities.

Tenbosch Mining will be guided by these objectives to promote LED within the community surrounding and in proximity to its operations. Tenbosch Mining LED strategy will focus on creating enterprising opportunities for local communities that will eventually lead to the creation of sustainable livelihoods and social upliftment.

It is anticipated that Tenbosch Mining activities will lead to an increase in social welfare and infrastructure in the Nkomazi Local Municipality. In close liaison with the Integrated Development Planning and LED Departments of the Nkomazi Local Municipality, Tenbosch Mining will identify and invest in a number of LED projects as indicated in their SLP.

## *7.2 Description of the current land uses*

The land uses in the proposed site consist of crop farming and livestock farming and residential area on the surroundings of the project boundary.

### 7.2.1 Description of specific environmental features and infrastructure on the site

The Ngweti river cuts across the site in the northern part of the Tecklenburg Farm on the area flowing in a north to south direction. Eskom electrical lines also traverse in the far western portion of the area in a north-south direction, with the railway lines following the same pattern.

### 7.2.2 Environmental and current land use map.

(Show all environmental, and current land use features)

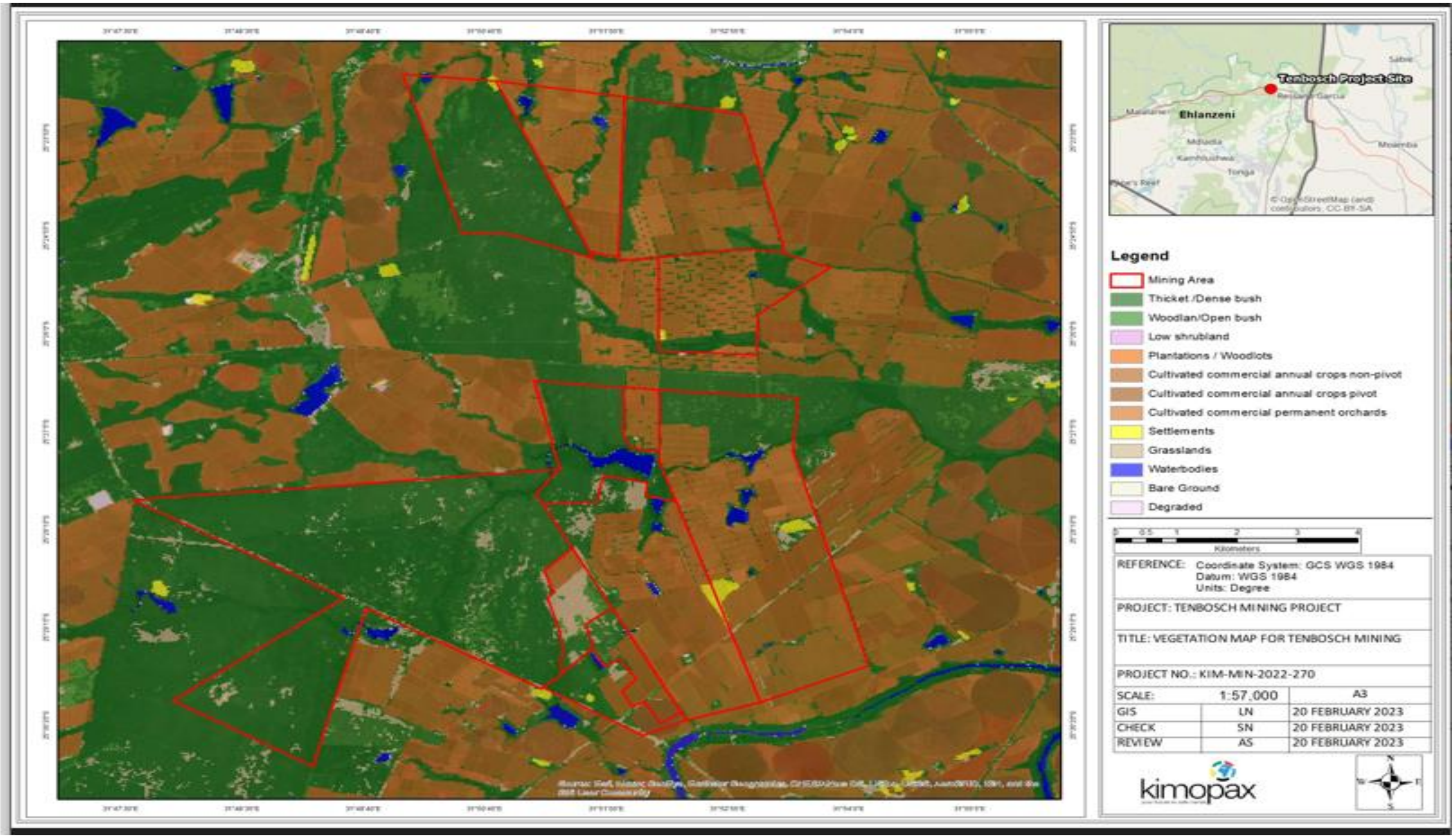



**Figure 19: Land Use Map**

# 8 Impacts Identified

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability and duration of the impacts

The Environmental Impact Assessment phase aims to identify the potential positive and negative biophysical, socio-economic and cultural impacts for the proposed project. Anticipated impacts that have been identified by the project team are indicated below. All impacts in terms of construction, operation and decommissioning together with their recommended mitigation measures will be addressed in detail during the EIA/EMPr phase of the project.

a) Geology;
b) Topography;
c) Air quality;
d) Soil, land use and land capability;
e) Biodiversity;
f) Surface water;
g) Noise;
h) Climate Change;
i) Hydrogeology;
j) Blasting and Vibrations;
k) Visual;
l) Heritage;
m) Socio-economic; and
n) Traffic.

The potential impacts anticipated for the Project are discusses below.

**Visual**

The visual impacts will be due to the placement of temporary equipment and facilities on site as listed above in 6.5.2.1.2. However, the impacts of these structures/activities relative to mining (and the others) are likely to have minimal impact. All trees surrounding mining area will be left *in situ*.

**Topography**

The operation of construction machinery and vehicles together with the storage of construction and hazardous materials is expected to have a minor negative impact on the topography. The addition or removal of any feature will impact on the surrounding topography. Vehicular activity to transport construction material could damage the surface of roads and impact on the topography. Piles of construction material will temporarily change the topography of the study area. The construction of surface infrastructure will add features to the topography thereby changing it.

**Geology**

The geology has been altered to a great extent due to historic mining activities in the surrounding area.

**Soil**

When topsoil is removed from a soil profile, the profile loses effective rooting depth which is one of the main criteria regarding capability classification. This area is already impacted upon; however some topsoil may be removed for the development of the infrastructure. During the construction of infrastructure and roads as well as vehicular activity, soil compaction could occur. This could lead to soil degradation and erosion. Hazardous materials used in the construction of infrastructure could cause soil pollution, should such materials be spilled.

Activities in the project area during the construction phase could lead to the following impacts on soil:

a) Loss of topsoil as a resource;
b) Soil compaction and erosion; and
c) Hydrocarbon pollution.

**Land capability**

There will be no impacts during the construction phase of the project on the land capability of the project area. The mining activity will be undertaken underground.

**Land use**

The land Use of the project area will change from agricultural area to mining area.

**Fauna and Flora**

The removal of vegetation will have impact on the animals found in the area because one of the land uses in the project area is for grazing; there are cows that belong to the neighbouring community that feeds on the vegetation. During the site visit, no mammals were observed along the proposed mining area, except for the droppings of livestock. None of the expected reptiles were observed on site during the site visit. A limited number of butterflies were observed during the site visit. The butterflies may be attributed to seasonality constraints. The site had a number of spider webs which is an indication of the presence of archanids.

**Surface water**

There may be increased erosion potential and dust generation due to vegetation removal for construction of infrastructure and vehicular activity. This may cause siltation that would reduce the quality of the surface water runoff. There may also be consequent contamination of water by the mining material that could be introduced into the water. This will however be minimised by clean and dirty water separation implemented by Tenbosch Mining (Pty) Ltd as required by law. Spillages of hazardous material on site could contaminate the storm water run-off thereby reducing the quality of clean water reporting to the catchment. This needs to be captured and not allowed offsite.

**Ground water**

Spillage of diesel, oil and lubricants from the vehicles used for construction can occur should there be any breakdowns or accidents. Infiltration of the spilled substances may reach the groundwater table, thus polluting the shallow aquifer. No significant impact on the groundwater during the construction. The study area falls within the b2 and d3 that indicates that the hydraulic conductivities are moderate to high which suggests that the aquifers are vulnerable to contamination and or pollutants especially along fractured zones caused by faults and dyke intrusions. This also suggests that should Tenbosch requires groundwater sources for its mining operations, and the potential is good.

**Noise**

Noise will be generated due to construction activities. The construction vehicles moving to and from the site may impact on the ambient noise levels at the surrounding residential areas, but the duration thereof will be short term.

**Air quality**

Removal of the vegetation from the mining site will result in potential increase in dust emissions in the surrounding areas as a consequence of soil disturbance as well as when wind blows over the area that has been stripped of vegetation. Movement of construction vehicles, combined with the removal of vegetation, will result in an increase in dust levels on and around the site.

**Socio-economic**

**Employment/Job creation**

There is likely to be local job opportunities that are expected to result from the commissioning of other operations in the area, due to the presence of the mining activities. It is anticipated that a fairly large proportion of the construction workforce will be derived from within the borders of the Ehlanzeni District, dependant on the availability of necessary skills. Limited employment opportunities will be created, slightly increasing the level of income which could result in a positive impact on the local economy. This is likely to be short-term employment. There is the potential for a slight increase in local population due to the influx of jobseekers which could put more pressure on local infrastructure and services.

**Improved road facilities and accessibility**

During construction, surrounding roads are likely to be upgraded (dependent on the requirements of the construction activities) to provide access to the mine site for construction vehicles and machinery. Although not an intended purpose, this may result in improved access routes for local residents. This impact will only be prevalent where the placement of these roads is deemed beneficial to local residents. Similarly, if these roads are deemed to be beneficial to residents, the impact will only be realised if access to these roads is allowed. Should access be permitted (assuming safety considerations have been taken into account), and dependent on the routing of the roads, neighbouring residents may benefit from reduced travelling time, shorter distances, lower transport costs and better access to services such as schools, shops and other amenities.

**Health and Safety**

Construction and operation activities are likely to result in an increase in traffic volumes on certain roads in the vicinity. This could lead to damage of roads and increased speeding through residential areas, thereby impacting on the safety of residents in surrounding communities.

Other safety-related risks associated with the proposed project include the following:

a) ***Noise impacts:*** Those living in the vicinity of the project may be affected by noise levels associated with traffic and the reclamation activities;
b) ***Unauthorised access:*** If members of surrounding communities gain unauthorised access to the project site, they could be at risk of injury;

c) ***Hazardous material:*** If hazardous material is stored on site there is a risk of this being stolen and could be exposed to the greater community.

d) ***Air quality and dust:*** The mining activities could temporarily increase the amount of dust in the environment which could negatively affect respiratory health to those who inhale the dust. This will be mitigated by the fact that the mining method is a wet process; additional mitigation methods should be added.

# 9 EIA PROCESS AND METHODOLOGY

The EIA process and methodology that was followed during the scoping phase was based on the best practise guidelines and the requirements of the NEMA and MPRDA. The approach used comprised of the following:

a) A gap analysis of existing studies that were done in the same area by different consultants;

b) Project definition and the analysis of alternatives which involved data review and sensitivity mapping as well as the analysis of identified alternatives;

c) Screening which involved the review of identified environmental, water and mining legislation applicable to the study;

d) Site visit to collect baseline information on the environmental conditions that could be affected by the mine;

e) Public Participation was done throughout the whole scoping phase to capture comments that were raised by different communities. Issues raised were also used to formulate terms of references for other specialist studies.

During the EIA phase, the following activities were done:

a) Integrating of specialist reports into the EIA focusing mainly on the specialist findings, identified impacts, mitigatory measures and recommendations.

b) Preparation of the EIR/EMPr Report which will present all the findings of the impact assessment. Report will be distributed for public participation.

c) Public participation will continue throughout the EIA phase to ensure that comments and issues raised by communities are addressed.

## 9.1 Scoping Methodology

Scoping phase methodology comprised of the following:

a) Pre-application meetings were held with communities;
b) Submission of EA application form after pre-application public participation;
c) Site visit to establish baseline environmental conditions on site;
d) Literature review of previous studies done in the study area;
e) Public participation to capture and address comments and issues raised by the community;
f) Distribution of the draft report for public to review;
g) Compilation and submission of the final scoping report.

## 9.2 Impact Assessment Methodology

Impact significance of each identified impact was determined using the methodology explained in **Table 10**

**Table 10: Methodology to determine the extent of the impact**

| PARAMETERS | DESCRIPTIONS |
|---|---|
| Extent | Refers to the physical or geographical size that is affected by the impact. It can be categorised into the following ranges:<br><br>a) Onsite – Within specific site boundary (weight value – 1)<br>b) Local – Within municipal boundary (weight value – 2)<br>c) Regional – Outside municipal boundary (weight value – 3) |
| Duration | Time span associated with impact:<br><br>a) Short term – 1 Year or less (weight value – 1)<br>b) Medium term – 1-5 Years (weight value –2)<br>c) Long term – Longer than 5 Years (weight value – 3 |

| PARAMETERS | DESCRIPTIONS |
|---|---|
| Intensity and reversibility | The severity of an impact on the receiving environment:<br><br>**a)** Low – Natural and/or cultural processes continue in a modified way and is reversible (weight value – 1)<br>**b)** Medium – Natural and/or cultural processes stop and is partially reversible (weight value – 2)<br>**c)** High – Natural and/or cultural processes disturbed to an irreversible state (weight value – 3) |
| Impact Significance/Consequence | Adding the extent, duration and intensity together provides the significance of the impact (High, Medium or Low). Extent + Duration + Intensity = High/Medium/Low Impact |
| Probability | The likelihood of an impact occurring:<br><br>**a)** Unlikely – 0% - 45% chance of the potential impact occurring (weight value – 1)<br>**b)** Possible – 46% - 75% chance of the potential impact occurring (weight value – 2)<br>**c)** Likely - >75% chance of the potential impact occurring (weight value – 3) |
| Environmental Risk: Refer to table below | Multiplication of the significance of the impact by the probability of the impact occurring produces a final conclusion of the overall risk that an impact poses to the surrounding environment. High/Medium/Low Impact X Probability = High/Medium/Low Environmental Risk |

| | **Risk Assessment Matrix** | | | |
|---|---|---|---|---|
| | Low Impact<br><br>(1 -5) | Medium<br><br>(6-8) | High Impact<br><br>(9) | |
| **Probability** | Definite/Very Likely (3) | 9 - 15 L-M | 18-24 M-H | 27 H |
| | Possible (2) | 6-10 L-M | 12-16 M | 18 M-H |
| | Unlikely (1) | 3-5 L | 6-8 L | 9 L |

| **ENVIRONMENTAL RISK** | **Guidelines for Control Strategies** |
|---|---|
| (H)-High | Proactively reduced risk level, short term response |

| PARAMETERS | DESCRIPTIONS |
| --- | --- |
| (M-H) -Medium High | Proactively reduce risk level, short term response |
| (M)-Medium | Management strategies to reduce risk level, short to medium term response |
| (L-M) Low -Medium | Management strategies to reduce risk level, short to medium term response, operational control and housekeeping |
| (L) Low | Operational Control |

## *9.3 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 advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)***

**Table 11: Positive and Negative impact of the proposed activity**

| Alternative | | Advantages | Disadvantages |
|---|---|---|---|
| Activity alternatives (mining method alternatives) | Preferred Alternative<br><br>(Underground mining methods) | The deep nature of Coal Seam deposit can be mined by means of Underground mining.<br><br>Economically and socially empowerment of the local communities | Underground mining has greater safety risk to the miners as compared to the opencast mining method. Owing to the shallow nature of the proposed minerals, it is not feasible to undertake underground mining. |
| | Alternative 1<br><br>(Opencast mining method) | In comparison to the preferred alternative, if underground mining would not be feasible, there could be an easy method to utilise. | Opencast mining methods may result in direct and indirect impacts on several aspects of the environment including: Soil (compaction), flora (clearance and dust), fauna (habitat destruction, noise), air quality (dust, vehicle emissions), noise (animal life and surrounding communities), and surface- and groundwater (spillages, inadequate separation of clean and dirty water, potential leaching of water) |
| No-go versus Underground mining | Underground Mining | Mining activity was preferred on the proposed site based on the availability of Coal reserves within the area. The Underground mining is preferred such that the deep nature of the mineral deposit can easily be mined by means of Underground mining.<br><br>If the mining right is granted local communities will be positively impacted through employment | **Visual impacts**<br><br>The development of the mine will have a visual impact on the proposed area due to the dust generation and construction activities resulting from the development of shaft. During Mining phase, the impact will be very low because mining activities will be undertaken underground. |

| Alternative | | Advantages | Disadvantages |
|---|---|---|---|
| | | opportunities that will arise and the proposed area's economy will grow through trading activities associated with mining activities like transport, increase in health facilities as well as an increased turnover in hospitality and tourism sectors.<br><br>Most importantly, the proposed mining project will create skills development and community building opportunities to the local community, therefore, eradicating poverty and as such stimulating Local Economic Development.<br><br>Not only that, the business opportunities will be encouraged through infrastructural development as roads will be constructed, this will assist in increasing the demand of goods and services in the affected area/s in the long term.<br><br>The project will contribute directly and indirectly to the Country's GDP. | **Dust**<br><br>The excavation activities and the use of the access dusty roads will result in the emission of dust into the surrounding atmosphere. This will not only impact on the surrounding communities but also the plants surrounding the shaft area as the dust is deposited on the leaves. This interferes with the photosynthesis process of the plants. Furthermore, animals that feed on the plants will be impacted upon as this will affect their forage.<br><br>**Noise**<br><br>Noise pollution will be generated from the mining activities, namely through the movement of trucks and vehicles, machinery operations and trenching activities during shaft sinking. Depending on the size, noise levels of the trucks and excavators may cause the noise to be localised in the specific site.<br><br>**Soil contamination**<br><br>Soil pollution due to the leakages of oil and other industrial liquids from the trucks and machinery. This is a potential risk of soil |

| Alternative | | Advantages | Disadvantages |
|---|---|---|---|
| | | Moreover, the development will encourage income generation in the area as well as the development of BEE opportunities during construction, operation and eventual closure and rehabilitation | contamination, which will change the soil chemistry and soil nutrients of the affected soil. Ultimately this could also potentially affect the vegetation growth in the contaminated areas.<br><br>**Impact on heritage resources**<br><br>The mining activity could result in danger of negatively impacting on unidentified heritage resources during site assessment, however, the possibility of the impact is very minimal as education and training on heritage resources will be given to mine employees.<br><br>**Fauna disruption**<br><br>Due to the impacts of noise, dust, movement and operation of trucks and vehicles, the potential loitering of the employees and the trenching itself will disrupt the surrounding animals. This disruption can further lead to injury or death in cases where animals fall into the trenches.<br><br>**Stripping (Removal of vegetation)**<br><br>While all means will be applied to minimise disturbance, removal of vegetation cannot be avoided altogether. Deforestation will occur to |

| Alternative | | Advantages | Disadvantages |
| --- | --- | --- | --- |
| | | | clear the land for the shaft sinking, and this will leave the ground bare and prone to erosion.<br><br>**Soil erosion**<br><br>Erosion of the soil will occur through runoff and wind.<br><br>**Habitat destruction**<br><br>The habitat that supports the animals within the project site will be disturbed and destructed by the movement and operations during the mining activities. This could possibly cause the relocation of some of the animals and result in habitat fragmentation.<br><br>**Waste generation**<br><br>Waste rock, litter and other solid waste will be generated and deposited in and around the site. This could potentially attract nuisance and affect the natural scenery of the site. Waste rock will be used to backfill the trenches. This will be undertaken in a concurrent rehabilitation manner. |

| Alternative | | Advantages | Disadvantages |
|---|---|---|---|
| | | | **Surface and groundwater impacts**<br><br>The hazardous chemical spills may lead to surface water contamination and groundwater due to the leakages. |
| | No-go Alternative | The implementation of the no-go option would result in the continuation of the current land uses (farming). Therefore, no additional impacts on the bio-physical environment will occur, besides those that are currently occurring, and / or which may potentially occur if the areas are not managed appropriately. | It is also very important to note that the implementation of the no-go option may not necessarily prevent the mining of these resources on the property, as other companies may apply to mine the resources, unless the DMR sterilizes the reserves. |
| Preferred Layout<br><br>(No Layout Alternative was identified) | The Layout plan presented in Figure 20. | The site was selected based on the geographic position of the potential underlying Coal reserves, ease of operations and mining activities on site as well as minimal disturbance to the community near the site. | No disadvantages have been identified currently. |
| Technology Preferred (No technology Alternative was identified). | Excavators, apron feeders, bulldozers, trucks, bowl scraper, crushers, conveyors and shovels | The technologies have long-term success in terms of mining history. According to Mclanahan (2018), due to their long service life with low-maintenance applications, apron feeders are a popular feeder choice | No disadvantages have been identified currently. |

| Alternative | | Advantages | Disadvantages |
|---|---|---|---|
| Operation Preferred (No Operation Alternative was identified) | The operation includes the Underground mining, the processing plant, pollution control dams, workshops, material stockpiles, storage, excavations, access roads diesel and wash bays | The mine and its related activities will generate employment opportunities. | Relocation and loss of cattle grazing area for the herders at the Cattle post, overcrowding of the area in search of greener pastures. |

## 9.4 *The Possible Mitigation Measures and the Level of Risk*

**a) Air Quality**

The main impacts on air quality will be from material handling (soil, waste rock, ore), vehicle entrainment from unpaved roads and from conveyors. Proposed mitigation measures that will be employed include drop height reduction, avoidance of temporary storage piles, covering and/or enclosure of all transfer points and wet suppression. The main aim will be to maintain low dust concentrations.

**b) Terrestrial Ecology**

Common impacts will comprise of vegetation clearance, habitat destruction, encroachment of alien invasive plant species and loss of species of conservation concern. Implementation of alien invasive plant management plan during decommissioning to prevent the growth of invasive plants on rehabilitated areas to a low level and the rehabilitation of site with indigenous vegetation that occurs in the vicinity of the project area. This will help restore the site to its pre-mining condition.

**c) Groundwater**

Groundwater dewatering and groundwater contamination from hydrocarbon spillages and decant during post-closure will have a significant impact if not managed. The following mitigation measures, if implemented, will result in a low impact:

- Store the dewatered water in PCDs and ensure that the dams will have enough storage volume.
- If that is not possible, re-introduce treated water into the streams after ensuring that they meet the required standards as per the WUL or river quality objectives.
- Supply equal volumes and better-quality water to affected user if proven that there is an impact on specific users.
- Monitor groundwater water levels and groundwater inflow rates.
- Monitor groundwater levels, decant rates and qualities.

**d) Surface Water**

There is Ngweti river which cut across the project area. This perennial river will be affected within the study area where the mine and infrastructure will be located. The shaft and mine infrastructure area will be demarcated in approximately 500m from the rivers. However, the possibility of minimal surface water contamination will result due to:

- Clearing of the surface and site preparations, for the mine infrastructure will result in exposure of soil surfaces to erosion factors. When a large area of vegetation is cleared and topsoil disturbed, exposing a large area of loose material, susceptible to erosion. During rainfall , runoff from the exposed site will transport the eroded soil material into the nearby watercourses.
- Uncontrolled spills of contaminants such as fuel and oils, and subsequent washing away of these into the surface water resources

This will be reduced to a lower level if the following measures are implemented:

- Waste storage facilities should be on a hard parked, roofed and bunded facility.
- Storm water management measures such as diversion berms, trenches and PCDs should be monitored and maintained fairly regularly.
- Prevent and contain hydrocarbon spillages that may wash off into nearby watercourses.

**e) Soil, land use and land capability**

Soil chemical pollution as a result of spills of fuel and lubricants by vehicles and machinery as wells as the accumulation of domestic waste, is considered to be a moderate deterioration of the soil resource. This impact will be localised within the site boundary and have medium-high significance on the soil resource. Another major impact will be soil compaction which will be a measurable deterioration that will occur as a result of the weight of the topsoil and overburden stockpiles stored on the soil surface as well as the movement of vehicles on the soil surfaces (including access and haul roads). Impact will be lower if the following measures are implemented:

- Locate all soil stockpiles in areas where they will not have to be relocated prior to replacement for final rehabilitation.
- To minimise compaction associated with stockpile creation, it is recommended that the height of stockpiles be restricted between of 4 – 5 metres maximum.
- A low process or storage inventory must be held to reduce the potential volume of material that could be accidentally released or spilled.

**f) Noise**

The vibration and over-air pressure levels during blasting will result in an increase in the prevailing noise level when blasting take place. The same physical attributes such as distance, topography and wind direction will play a role on how the receptors will perceive the over-air pressure and ground vibration levels which last for up to 3-seconds per blast. The risk level of noise will be low to members of the public who will be exposed. Proposed mitigation measures will involve the following:

- Regular noise monitoring on site and the surrounding areas;
- Locating topsoil and overburden stockpiles to act as acoustic barriers between the underground mine and receptors where practical; and
- Enclosing noisy equipment, such as crushers, in buildings clad with sound-absorbing materials where necessary.

**g) Heritage and Cultural Aspects**

The Phase I Archaeological and Cultural Heritage Impact Assessment for the proposed mining right of Coal was conducted in order to identify the significant impacts to archaeological or grave resources that will need to be mitigated prior construction. Despite that there may be no archaeological objects observed during the survey, and that the area is disturbed due to agricultural activities, the client must know that unavailability of archaeological material does not mean absence, as archaeological material might be hidden underground. It is thus the responsibility of the developer to notify contractors and workers about archaeological material (e.g., pottery, stone tools, remnants of stonewalling, graves, etc.) and fossils that may be located underground to keep the impact low. Furthermore, the client is reminded to take precautions during construction.

## *9.5 Site Selection Matrix and Final Site Layout*

### 9.5.1 Mining Layout

To maintain optimal extraction of the resource, pillars left behind could be partially extracted towards the end of a panel being mined or towards the end of the Life of Mine (“LOM”) following specialized geotechnical guidelines. Due to the thickness of the parting between the three seams designated to be mined, it is envisaged that the three seams can be super-imposed. This implies that the layout of the lower seam is to be as close as practically possible to the layout of the upper seam. This layout will also be dependent on specialized recommendations from a geotechnical engineer with further studies and will mainly rely on the thickness and the competency of the parting in between.

Coal will be extracted through a mechanized mining method. This entails a mining cycle of cutting and loading the coal by means of a continuous miner and supporting the roof. Coal will then be conveyed by means of electrical shuttle cars to a feeder breaker from where it will be crushed in order to convey it to the processing plant.

### 9.5.2 Motivation where no Alternative sites were considered

The proposed underground mining operations was selected based on availability of Coal reserves to be mined. Minerals can only be mined where there are identified and verified, therefore it was not practical to select any other sites. The No-Go option is the only other alternative identified during the Scoping phase. If the proposed operation were not to proceed, the land may or may not be utilized for agricultural, or grazing activities in the future. It is worth noting that as much as the No-Go option may result in the protection of the environment in situ; the consequences of not proceeding with the proposed operation will include the forfeiture of a mining opportunity and therefore the loss of support towards the Nkomazi Local Municipality. It would further suggest that no new employment opportunities would be created as well as any resultant community upliftment and development programs would likely take place in the surrounding communities.

If an alternative resource cannot be identified, this will limit the development of the proposed mine. The site is therefore regarded as the preferred site, and alternative sites are not considered.

### 9.5.3 Statement Motivating the Preferred Sites

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

The location of the proposed mining activity was influenced by the following factors;

a) Availability of the Coal;
b) Land ownership.
c) Geo-hydrological impacts; and
d) Available transport modes and routes.

The proposed layout is therefore the most suitable and economically/environmentally viable option for the underground mining.

# *10* ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objectives of the EIA process are to understand the consequence of these potential impacts and to determine to what extent they can be minimised. Based on experience with past studies on similar mining operations, supported by site-specific specialist studies, it should be possible to predict the impacts on noise, heritage, soils, surface water, groundwater, air quality, the ecology and the local socio-economic and to formulate appropriate mitigation measures.

## *10.1 Project Phases*

The environmental impacts of the project were considered and assessed for the following phases:

a) Construction;
b) Operational; and
c) Closure and rehabilitation

### 10.1.1 Construction Phase

The construction phase will comprise of the following:

a) Site survey and putting up pegs to mark the mine and infrastructure footprint;
b) Vegetation clearing within the footprint;
c) Construction of stormwater facilities;
d) Construction of mine infrastructure (workshops, PCDs, office buildings and plant area); and
e) Demarcate mining area and topsoil, overburden and waste rock storage areas

### 10.1.2 Operational Phase (Mining Phase)

Activities will include the following:

a) Stripping and stockpiling of topsoil and overburden ahead of shaft opening;
b) Drilling and blasting;
c) Underground mining of the ore;
d) Transportation of the mined ore to the processing plant;

e) Crushing, and screening of the ROM;
f) Transportation of processed product off-site; and
g) Equipment and vehicle maintenance at the mine workshop.

### 10.1.3 Closure and Rehabilitation

Activities of closure and rehabilitation will involve:

a) Dismantling of the ore processing plant and removal of all metal structures;
b) Demolition of buildings and other infrastructure and disposal of the rubble;
c) Shaping of waste rock dump;
d) Emptying and backfilling of PCDs;
e) Revegetating the backfilled areas; and
f) Post-closure monitoring of surface water, groundwater and vegetation.

## *10.2 Air Quality*

With regards to health effects, the World Health Organisation (WHO) confirms that particulate air pollution is often associated with complaints of the respiratory system (WHO, 2000). PM size is relevant in terms of health as it is responsible for where in the respiratory system a given particle is deposited. There is an increasing number of research studies highlighting the impact of gases and air pollutants on humans. Many of these emissions, even in small quantities, have adverse effects on workers and neighbouring residents alike.

Particles can be classified by their aerodynamic properties into coarse particles, $PM_{10}$ and fine particles, $PM_{2.5}$ (Harrison & Van Grieken, 1998). The fine particles contain the secondarily formed aerosols such as sulphates and nitrates, combustion particles and re-condensed organic and metal vapours. The coarse particles contain earth crust materials and fugitive dust from roads and industries (Fenger, 2002).

In terms of health effects, particulate air pollution is associated with respiratory and cardiovascular morbidity, such as aggravation of asthma, respiratory symptoms and an increase in hospital admissions. Inhalable PM also leads to increased mortality from cardiovascular and respiratory diseases and from lung cancer (WHO, 2013). Particle size is important for health because it controls where in the respiratory system a given particle is deposited. Fine particles are thought to be more damaging to human health than coarse particles, as they are able to penetrate deeper into the lungs (Manahan, 1991). Larger particles are deposited into the extrathoracic part of the respiratory tract, while smaller particles are deposited into the smaller airways leading to the respiratory bronchioles (WHO, 2000).

In the past, daily particulate concentrations were in the range 100 to 1000µg/m$^{3,}$ whereas, in more recent times, daily concentrations are between 10 and 100µg/m$^{3}$. Overall, exposure-response can be described as curvilinear, with small absolute changes in exposure at the low end of the curve having similar effects on mortality to large absolute changes at the high end (WHO, 2000). Both short-term and long-term exposure to particulate matter in the air can have health impacts (Table 12).

**Table 12: Short-term and long-term health effects associated with exposure to PM (WHO, 2004)**

| Pollutant | Short-term exposure | Long-term exposure |
|---|---|---|
| Particulate matter | Lung inflammatory reactions | Increase in lower respiratory symptoms |
| | Respiratory symptoms | Reduction in lung function in children |
| | Adverse effects on the cardiovascular system | Increase in chronic obstructive pulmonary disease |
| | Increase in medication usage | Reduction in lung function in adults |
| | Increase in hospital admissions | Reduction in life expectancy |
| | Increase in mortality | Reduction in lung function development |

The findings of AQA indicate that the proposed mining development will have both positive and negative impacts. The findings indicate that the proposed mining development will result in the creation of employment and economic development opportunities. Most importantly the locals will experience a socio-economic benefit.

Negative impacts will also be experienced due to migration of job seekers into the area; decline in the quality of life due to air, noise, land and water pollution and increased traffic during construction.

It recommended that the management of Tenbosch introduce a dust monitoring programme throughout the project life of the mine. This will ensure that historical dust deposition data is available to feed into management practices aimed at reducing impacts from the construction, operation and closure phases of the project.

As the area exposed is directly proportional to the amount of dust generated and transported, it is advised that construction activities be limited during the windy periods of August, September and October. If construction has to be done during this period, it is advised to disturb a small area at a time. As trucks are a major source of dust, reducing speed of trucks in haul roads will reduce dust immensely.

In order to determine the wind speed for each particular day, a wind anemometer installed on site should be utilised. Wind speeds are recorded daily and when it exceeds 5.4 m/s (this is the threshold for transporting particles) extra dust control measures need to be carried out. During dust generating periods, sprinkling until it is moist is ideal for haul roads and traffic routes (Smolen et al., 1988). It must be noted however that excessive sprinkling to manage dust may result in runoff from the site.

Tenbosch should establish a fine particulate monitoring programme which should include at least one particulate instrument to monitor either PM10 or PM2.5. Ideally, both set of pollutants should be monitored as required by regulatory authorities. In addition to pollutants, the ambient monitoring unit should include measurement of meteorological parameters representative of the mining area. Air dispersion modelling should be done and always use site specific data if available. It is advised to install the unit at least one year prior to the construction phase to allow for the collection of ambient air quality baseline data set.

Tenbosch should facilitate basic air quality awareness training through relevant organisations (e.g. Department of Labour), tertiary education institutions (FET College), and community structures (Community Trusts, Ward councillors etc). Examples of education and awareness materials could include posters, information sharing sessions and skills development workshops, aimed at youth, women, and unemployed. This should allow individuals to become aware of the impacts of air quality on their health and therefore take the necessary precautionary measures.

### 10.2.1 Impact Assessment

**Table 13: Air quality impacts assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | **Construction** | |
| Vegetation clearing | Dust emissions due to the erosion of open storage piles and exposed areas occur when the threshold wind speed is exceeded (Cowherd, Muleski, & Kinsey, 1988; US EPA, 1995). | a) Wet suppression, applied sparingly, to ensure the absence of visible dust;<br>b) Wet suppression is about 50% effective on unpaved roads, but chemical binders such as Dustex or Dust-ASide may also be used;<br>c) Enforce low vehicle speeds on unpaved areas (< 40 km/h);<br>d) Use of shade cloth where necessary, to reduce wind speeds and reduce travel distance of dust;<br>e) Vegetate the berm and other surfaces that were laid bare as a result of construction | Medium |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | with locally indigenous grass species where practicable, as soon as possible; and<br>f) Requiring contractors to maintain construction vehicles in good condition | |
| Vehicle movement on haul roads | Same as above | Haul road mitigation measures include:<br><br>a) Tarring or paving, wet suppression and chemical surface treatments.<br>b) Regular, light watering of the road is needed for water spraying to be effective in reducing particulate emissions.<br>c) Other surface treatments include the use of chemicals such as calcium chloride or magnesium chloride. These chemicals attract moisture – drawing moisture out of the air during periods of high humidity, and also | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | reducing the evaporation rate of water during hot periods. | |
| **Operational** | | | |
| Drilling and Blasting | Emissions from drilling are a relatively minor component of the overall emission from the mine. The only available emission factor for drilling is a simple uncontrolled TSP emission factor of 0.59kg/hole for overburden | a) Efficiency will be applied to reduce wastage and unnecessary fuel consumption;<br>b) Carbon offsets will be considered if required;<br>c) Concurrent best practice rehabilitation and vegetation monitoring will be applied to allow for the restoration of some the carbon sink functionality within the mining right area.<br>d) Avoid blasting under windy conditions as far as practicable | Low |
| Processing Plant | The moisture content of the material processed can have a substantial effect on emissions | Surface wetness causes fine particles to agglomerate on, or to adhere to, the faces of larger chunks of ore, with a resulting dust suppression effect. However, as new fine particles are created by crushing and attrition, and as the moisture content is reduced by | Low |

| **Activity** | **Impact Description** | **Mitigation Measures** | **Significance Rating After Mitigation** |
|---|---|---|---|
| | | evaporation, this suppressive effect diminishes and may disappear | |
| Vehicle Movement | Vehicle entrainment from unpaved roads | a) Enforcement of a 40 km/hour speed restriction on unpaved haul roads;<br>b) Wet suppression on haul roads, with the addition of a chemical binder if necessary | Medium |
| Crushing and screening | Crushing and screening operations represent significant dust-generating sources if uncontrolled. The large percentage of fines in this dustfall material enhances the potential for it to become airborne. It was assumed that primary crushing (crushing to achieve particles of <300 mm) will take place in the area to reduce the ore to a transportable size for the conveyor system. | Wet suppression will be used for both the secondary and tertiary crushing stages | Low |
| Materials handling | Materials handling operations which are predicted to result in significant fugitive dust emissions from mining operations include the transfer of material by | a) Reduced tipping and drop heights where practicable; | Medium |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | means of loading and offloading of trucks, loading and offloading conveyors, transfer from one conveyor to another and bulldozing. The quantity of dust which will be generated will depend on various non-climatic parameters such as the nature (moisture content and silt content) and volume of the material handled. | b) Regular clean-up at loading areas and on paved surfaces to prevent entrainment by wind or vehicles;<br>c) Use of shade cloth where necessary, to reduce wind speeds and reduce travel distance of dust;<br>d) Covering of exposed areas with coarsely crushed rock or aggregate material where practicable;<br>e) Maintaining all vehicles in good condition at all times; and<br>f) Continuous dust and fine particulate monitoring should be implemented to monitor compliance with the NAAQS | |
| **Decommissioning and Rehabilitation** | | | |
| Demolition of infrastructure | Particulate mobilisation can be caused by the demolition of buildings and handling of the rubble, | a) Wet suppression during landscaping and materials handling activities; | Medium |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | backfilling of the storm water dam and "dirty" water collection channels and ripping and shaping of compacted areas | b) Enforcement of low vehicle speeds on unpaved areas (< 40 km/h);<br>c) Use of shade-cloth where necessary, to reduce wind speeds and reduce travel distance of dust;<br>d) Vegetation of bare surfaces with locally indigenous grass species as soon as possible;<br>e) Continue dust fall monitoring until vegetation cover is well established; and<br>f) Requiring contractors to maintain construction vehicles in good condition. | |

## 10.3 Noise Impact

The World Bank in the Environmental Health and Safety Guidelines has laid down the following noise level guidelines:

a) Residential area – 55.0dBA for the daytime and 45.0dBA for the night-time period; and
b) Industrial area – 70.0dBA for the day- and night-time periods.

The difference between the actual noise and the ambient noise level and the time of the day and the duration of the activity, will determine how people will respond to sound and what the noise impact will be. In order to evaluate such, there must be uniform guidelines to evaluate each scenario. SANS 10103 of 2008 has laid down sound pressure levels for specific districts and has provided the following continuous noise levels per district as given in Table 14 (Van der Merwe, 2019).

**Table 14: Recommended noise levels for different districts**

| Type of district | Equivalent continuous rating level ($L_{Req.T}$) for ambient noise - dBA | | | | | |
|---|---|---|---|---|---|---|
| | Outdoors | | | Indoors, with open windows | | |
| | Day-night $L_{Rdn}$ | Daytime $L_{Reqd}$ | Night-time $L_{Reqn}$ | Day-night $L_{R.dn}$ | Daytime $L_{Req.d}$ | Night-time $L_{Req.n}$ |
| a) Rural districts | 45 | 45 | 35 | 35 | 35 | 25 |
| b) Suburban districts with little road traffic | 50 | 50 | 40 | 40 | 40 | 30 |
| c) Urban districts | 55 | 55 | 45 | 45 | 45 | 35 |
| d) Urban districts with some workshops, with business premises and with main roads | 60 | 60 | 50 | 50 | 50 | 40 |
| e) Central business district | 65 | 65 | 55 | 55 | 55 | 45 |
| f) Industrial districts | 70 | 70 | 60 | 60 | 60 | 50 |

*For industrial districts, the $L_{R.dn}$ concept does not necessarily hold. For industries legitimately operating in an industrial district during the entire 24h day/night cycle, $L_{Req.d}$ = $L_{Req.n}$ = 70dBA can be considered as typical and normal.*

**Table 15: Sound pressure levels of construction machinery**

| Equipment | Reduction in the noise level some distance from the source - dBA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Cumulative distance from source in meters | 2m from the machinery and/or equipment | 15m | 30m | 60m | 120m | 240m | 480m | 960m | 1920m |
| Dump truck | 91.0 | 62.5 | 56.5 | 50.4 | 44.4 | 38.4 | 32.4 | 26.4 | 20.3 |
| Backhoe | 85.0 | 56.5 | 50.5 | 44.4 | 38.4 | 32.4 | 26.4 | 20.4 | 14.3 |
| Drilling Equipment | 100.0 | 71.5 | 65.5 | 59.4 | 53.4 | 47.4 | 41.4 | 35.4 | 29.3 |
| Flatbed truck | 85.0 | 56.5 | 50.5 | 44.4 | 38.4 | 32.4 | 26.4 | 20.4 | 14.3 |
| Pickup truck | 70.0 | 41.5 | 35.5 | 29.4 | 23.4 | 17.4 | 11.4 | 5.4 | -0.7 |
| Tractor trailer | 85.0 | 56.5 | 50.5 | 44.4 | 38.4 | 32.4 | 26.4 | 20.4 | 14.3 |
| Crane | 85.0 | 56.5 | 50.5 | 44.4 | 38.4 | 32.4 | 26.4 | 20.4 | 14.3 |
| Pumps | 70.0 | 41.5 | 35.5 | 29.4 | 23.4 | 17.4 | 11.4 | 5.4 | -0.7 |
| Welding Machine | 72.0 | 43.5 | 37.5 | 31.4 | 25.4 | 19.4 | 13.4 | 7.4 | 1.3 |
| Generator | 90.0 | 61.5 | 55.5 | 49.4 | 43.4 | 37.4 | 31.4 | 25.4 | 19.3 |
| Compressor | 85.0 | 56.5 | 50.5 | 44.4 | 38.4 | 32.4 | 26.4 | 20.4 | 14.3 |
| Pile driver | 100.0 | 71.5 | 65.5 | 59.4 | 53.4 | 47.4 | 41.4 | 35.4 | 29.3 |
| Jackhammer | 90.0 | 61.5 | 55.5 | 49.4 | 43.4 | 37.4 | 31.4 | 25.4 | 19.3 |
| Rock drills | 100.0 | 71.5 | 65.5 | 59.4 | 53.4 | 47.4 | 41.4 | 35.4 | 29.3 |
| Pneumatic tools | 85.0 | 56.5 | 50.5 | 44.4 | 38.4 | 32.4 | 26.4 | 20.4 | 14.3 |
| Cumulative noise levels from the construction activities when all of such work within a radius of 30m | 105.5 | 76.9 | 70.9 | 64.9 | 58.9 | 52.9 | 46.8 | 40.8 | 34.8 |

Source: (Van der Merwe, 2019)

The noise reduction calculated in Table 15 is for direct line of sight and medium ground conditions. Engineering control measures and topography can have an influence on how the noise level is perceived by the occupants of nearby noise sensitive areas. The cumulative noise level of the machinery and equipment will be 64.9dBA at 60m and 40.8dBA at 960m from the construction area if all the machinery operates in a radius of 30m at one time. This will seldom happen, and the cumulative noise level will therefore be lower.

### 10.3.1 Impact Assessment

**Table 16: Noise impact assessment**

| **Activity** | **Impact Description** | **Mitigation Measures** | **Significance Rating After Mitigation** |
|---|---|---|---|
| | | **Construction Phase** | |
| Site clearing | Clearing and stripping of topsoil and vegetation | Earthwork activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | Low |
| | Construction of mine infrastructure | Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | Low |
| | | **Operational Phase** | |
| Operation of processing plant | Noise increase at the boundary of the mine footprint and at the abutting residential | a) All noise sources exceeding 85.0dBA to be identified and if practical to be acoustically screened off.<br>b) Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise levels at the boundaries of the plant have not changed. | Medium |
| Shaft activities | | | |
| Hauling of waste rock to the waste dump | | | |
| Hauling of material to the plant | | | |
| Additional traffic | | Speed limit of mining areas to be adhered to at all times. | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| Operation of an emergency generator | | Noise readings to be done in the vicinity of and along the emergency boundaries to ensure that the prevailing ambient noise level is not exceeded. | Medium |
| **Decommissioning Phase** | | | |
| Planting of grass and vegetation at rehabilitated area | Noise increase at the boundary of the mine footprint and at the abutting residential | Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | Low |
| Maintenance of disturbed area | | Maintenance activities to be done during daytime working hours. | Low |

## 10.4 *Traffic Impact*

### 10.4.1 Mine Operations Traffic

#### *10.4.1.1 Employee Traffic*

It is estimated that once fully developed, the mine will employ approximately 300 workers, most of them will be from the surrounding areas. The mine will provide transportation through provision of buses to ferry the workers for the different shifts. Although the mine will operate in shifts in order to model the worst-case scenario Table 17 models all the employees arriving in the AM peak hour and departing in the PM peak hour.

**Table 17: Employee trip generation**

| | Number | Split | Vehicles |
|---|---|---|---|
| Employees | 194 | Buses | 3 |
| | 50 | Walk/Cycle | - |
| | 56 | Cars | 56 |
| Expected total trips | | Total number of expected vehicle cars | 59 trips |
| Directional split 90:10 AM | IN OUT<br>53 6 | | |
| Directional split 10:90 PM | IN OUT<br>6 53 | | |

**Table 18: Haulage trips**

| Directional split | | | | Number of trucks |
|---|---|---|---|---|
| Directional split 50:50 AM | IN<br><br>8 | OUT<br><br>8 | Total peak hour trips | 16 |
| Directional split 50:50 PM | IN<br><br>8 | OUT<br><br>8 | Total peak hour trips | 16 |

The trip calculation in Table 17 and Table 18 above assumes that all these trips happen within the typical peak hour duration, so as to model the worst case scenarios however as clearly set out the mine will operate under 3 different shifts starting as early as 0500hrs which falls outside the typical peak hour.

### 10.4.2 Impact Assessment

**Table 19: Traffic impact assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| **Construction Phase** | | | |
| Transportation of materials and labourers | Construction materials being transported to site will contribute to the addition of traffic on the road network | Road network able to support additional trucks. | Low |
| | Employees and labourers transported to/ from site | Road network able to support additional commuter trips | Low |
| | Dust will increase with increased traffic flow along gravel roads | Ensure that gravel roads are kept watered to prevent dust (other dust suppression measures may also be used). | Low |
| **Operational Phase** | | | |
| Transportation of staff | Haulage to/ from site; and<br><br>mine staff to/from site | Road network able to support additional trucks. | Low |
| Dust from vehicle movement | Dust will increase with increased traffic flow along gravel roads | Ensure that gravel roads are kept watered to prevent dust (other dust suppression measures may also be used). | Low |
| Noise from vehicle movement | Noise levels affecting sensitive areas including residential areas | Speed limits to be kept low and define routes away from residential areas. | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| **Decommissioning and Rehabilitation Phase** | | | |
| Removal of rubble and other materials from site | Added traffic on the road network | Road network able to support additional trucks. | Medium-Low |

## *10.5 Groundwater Impacts*

### 10.5.1 Aquifers

Based on the desktop study, site assessments and interpretation of collected data, the following conclusions are made:

a) Water levels are generally shallow ranging between 6,6 mbgl and 21.5 mbgl. The groundwater flow direction follows the surface topography. Therefore, groundwater will flow from highest to lowest elevation, in the direction of surface water drainage.

b) Groundwater generally flows towards the nearby Ngweti River.

c) Based on the regional aquifer types, all the boreholes identified during hydrocensus intersected fractured aquifer with average yield ranging between 0.1 – 0.5 l/s.

d) Existing boreholes (JANNESBH01 and LEMABH1) intersected intergranular and fractured aquifer with average yield ranges between 0.2 – 2.0 l/s.

e) Based on regional water quality, water quality is considered to be good to moderate; this is also confirmed by existing borehole (JANNESBH01 and LEMABH1) water quality with generally good to moderate water quality with the exception of LEMABH1 with elevated chloride.

f) According to slug test borehole BH1 has high borehole yield and hydraulic parameters as it is drilled within the fractured zone along a mapped dolerite dyke structure.

g) Data gaps identified are related to soil profiles, borehole logs, baseline water quality and hydraulic parameters of the underlain aquifer.

h) BH1 and BH5 were found to be within recommended SANS 241: 2015 drinking guideline values. Based on the tested parameters, the water of only these two boreholes is considered to be safe for human consumption.

i) BH1 shows high hydraulic conductivity. This means the aquifer in that area is more vulnerable to contamination than the area that is less permeable (BH2, BH3, BH4 and BH5),.

## 10.5.2 Impact Assessment

**Table 20: Groundwater impact assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| **Construction Phase** | | | |
| Drilling | Groundwater contamination as a result of drilling of 3 new monitoring boreholes to investigate possible preferred groundwater flow pathways and one or two areas outside preferred pathways, which will:<br><br>a) Identify geological and hydrogeological control across the proposed mining right area;<br>b) Provide facilities to undertake aquifer testing and water sample collection; and<br>c) Serve as future monitoring points in an initial groundwater monitoring network. | Monthly monitoring of the boreholes with regard to water levels and water quality | Low |
| Storage of fuels and lubricants and | Spills from improper storage of fuels and lubricants and also from leaking vehicles | a) Monthly monitoring of the boreholes with regard to water levels and water quality<br>b) Place drip trays under vehicles when parked. | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| movement of vehicles | | c) If in-field refuelling is done from a tanker, it should be done in a designated dirty area and a spill kit and clean- up team must be available on site;<br>d) Spillages should be cleaned up immediately and contaminated soil must either be remediated in situ or disposed of at an appropriately licensed landfill site;<br>e) Hydrocarbon storage areas must be in a bunded area and comply with the relevant SANS standards | |
| **Operational Phase** | | | |
| Mine water contamination | Deposition waste rock on WRDs can result in the contamination of groundwater as a result of seepage | a) Implement compacted clay or synthetic liner underneath the WRDs to minimizes seepage following the waste classification result;<br>b) Re-use water collected in the WRDs berms. Any excess should be treated to acceptable quality before it is discharged to the environment | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | c) Monthly and quarterly monitoring of the surface water and groundwater respectively. | |
| Mine dewatering | Dewatering during the construction phase (if any) is unlikely to cause environmental impact considering limited rock permeability, the duration and exaction depth | a) Store the dewatered water in PCDs and ensure that the dams will have enough storage volume;<br>b) If that is not possible, re-introduce treated water into the streams after ensuring that they meet the required standards as per the WUL or river quality objectives;<br>c) Supply equal volumes and better-quality water to affected user if proven that there is an impact on specific users;<br>d) Monitoring of groundwater water levels and groundwater inflow rates; and<br>e) Update numerical model annually | -Low |
| Mine water run off | Any contamination that will seep from the WRDs is expected to move eastern direction toward the north-north-east down-gradient of the waste dump. The toe of the plume estimated to | a) Implement compacted clay or synthetic liner underneath the WRDs to minimizes seepage following the waste classification result; | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | extend 700 m away from waste dump, 20 years after contamination commences | b) Re-use water collected in the WRDs berms. Any excess should be treated to acceptable quality before it is discharged to the environment;<br>c) Monthly and quarterly monitoring of the surface water and groundwater respectively | |
| **Decommissioning and Rehabilitation** | | | |
| Decanting and groundwater contamination | After mine closure and ceasing of dewatering, area is likely to decant. Once the mine starts to decant, it is not expected to stop naturally. Pollution from WRDs on groundwater quality will continue in perpetuity, even after mine closure.<br><br>Seepage and decant is expected to have a serious impact and require management and rehabilitation measures to prevent irreplaceable impacts. If the pH is acidic, dissolved metals and sulphates will remain is solution | a) Identify decant areas and raise topography to increase time to decant;<br>b) Plan underground mining so that the perimeters follow the surface contours along the lowest side of the area and not cut directly across streams;<br>c) Monitoring groundwater levels, decant rates and qualities;<br>d) Revegetated WRD as quickly as possible to minimize recharge rates;<br>e) Divert all clean runoff away from, the shaft through a series of berms;<br>f) Re-evaluate impact of decant after end of life, once monitoring information is available; and | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | g) Treat seepage and decanted water using passive or active means to meet the recommended standards. | |

## *10.6 Soil, Land Use and Land Capability*

The hydropedology survey was conducted on 19 April 2023. The survey was conducted to understand the soils present at the site as well as the hillslope hydrology which drive the wetlands in the area. The present ecological status of the project area is heavily modified. The survey was conducted using a transect method, with the crest being the starting point and the valley bottom the end. The investigation area is characterised by soils with recharge and stagnating properties. There are Permanently standing water high recharge in fractured rock. Shallow soils do not depict any signs of prolonged saturation, with the dominant flow direction being vertical through and out of the profile. On these types of soils, no wetland features were identified. On the other hand, soils with stagnating properties were dominated by cryptic wetlands and seasonal depressions features. This can be attributed to the low permeability of the hardpan carbonate and solid rock underlying the topsoil. These features occur mostly on depressional areas and thus allow for wetland temporary zones, meaning they are saturated for short periods in a year due to the high evapotranspiration demand of the investigation area.

Although, saturated for short periods, these wetland features are still considered to be of Ecological Importance and should be afforded the necessary protection.

During the site visit it was observed that majority of the wetland features and seasonal depressions were dry without freestanding water, however some did depict some form of wetness indicator (presence of lime precipitates). The groundwater component is not anticipated to have a significant contribution (if any) to the wetlands associated with the investigation area. The watercourses will therefore not be impacted by the development activities that will occur as part of the proposed expansion project.

Minor hydropedological losses is foreseen for these wetlands as interflow (sub surface flows recharging the wetlands) soil were not present within the catchment of these systems. Even though this is the case, direct impact is foreseen for the wetlands overlain by the proposed developments, thus the recommendation of the freshwater report compiled by SAS (2021) should strongly be considered. Additionally, other components in the water balance, with specific mention of recharge by surface water runoff may be impacted particularly in areas where the surface infrastructure is located within the catchment area and separation of clean and dirty water areas takes place.

The footprint area is largely dominated by non perennial watercourses thus total avoidance of direct impact on the watercourses will be impractical. The construction activities should aim to avoid developing within the scientific buffers where feasible. Alternatively, the mine should aim to minimise the disturbance within the scientific buffers as far as practically possible. Key recommendations presented below and those presented in the freshwater report compiled by SAS (2021) should strongly be considered, particularly during the finalization stage of the footprint layout. This will ensure that the Present Ecological State (PES), wetland functionality as well as impact on the Ecoservices the wetland provides remain unchanged during all phases of development.

### 10.6.1 Impact Assessment

**Table 21: Soil, land use and land capability impact assessment**

| **Activity** | **Impact Description** | **Mitigation Measures** | **Significance Rating After Mitigation** |
|---|---|---|---|
| | | **Construction Phase** | |
| Transport of materials and labour | This will compact the soil of the existing roads and fuel, and oil spills from vehicles may result in soil chemical pollution | **a) Minimise the footprint of the Tenbosch Mining Project**<br><br>The existing pre-construction mine layout and design are aiming to minimise the area to be occupied by mine infrastructure (workshops, administration, product stockpile, etc.) to as small as practically possible. All footprint areas should also be clearly defined and demarcated and edge effects beyond these areas clearly defined. This measure will significantly reduce areas to be compacted by heavy construction vehicles and regular activities during the operational phase | Medium-Low |
| Earthworks | Clearing of vegetation from the surface, stripping topsoil (soil excavation) and stockpiling as well as drilling and blasting for the initial removal of overburden at the planned shaft as well as the construction of infrastructure like the Primary Crushing Facility, water management systems, contractors camp. These activities are the most disruptive to natural soil horizon distribution and will impact on the current soil hydrological properties and functionality of soil. It will also change the current land use as well as land capability in areas where activities occur, and infrastructure is constructed. | | Low |

<table>
<tr><th>Activity</th><th>Impact Description</th><th>Mitigation Measures</th><th>Significance Rating After Mitigation</th></tr>
<tr><td>Handling and storage of building material</td><td>This will have the potential to result in soil pollution when not managed properly.</td><td rowspan="2">b) Management and supervision of construction teams<br><br>The activities of construction contractors or employees will be restricted to the planned areas. Instructions must be included in contracts that will restrict construction work and construction workers to the clearly defined limits of the construction site. In addition, compliance to these instructions must be monitored<br><br>c) Location of stockpiles<br><br>Locate all soil stockpiles in areas where they will not have to be relocated prior to replacement for final rehabilitation. Refrain from locating stockpiles as close as possible to the development for cost saving only to have them relocated later during the life of the operation. The ideal is to place all overburden materials removed during construction in their final closure location, or as close as practicable to it</td><td>Low</td></tr>
<tr><td>Vegetation clearance</td><td>Soil erosion is also anticipated due to vegetation clearance.</td><td>Medium-low</td></tr>
</table>

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | **d) Topsoil stripping**<br><br>Wherever possible, stripping and replacing of soils should be done in a single action. This is both to reduce compaction and also to increase the viability of the seed bank contained in the stripped surface soil horizons.<br><br>Stripping should be conducted a suitable distance ahead of development of, for example, the shaft, at all times to avoid loss and contamination. As a norm, soil stripping should be kept within 3-9 months of development, or between 50-100 metres ahead of the active operations.<br><br>**e) Stockpiling of topsoil**<br><br>To minimise compaction associated with stockpile creation, it is recommended that the height of stockpiles be restricted between of 4 – 5 meters maximum. For extra stability and erosion protection, the stockpiles may be benched. The clay content of the topsoil on the largest area of the Tenbosch Mining project area is not sufficient for stockpiles to remain | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | relatively stable without benching. The areas on the Arcadia soil form do have sufficient clay content<br><br>**f) Prevention of stockpile contamination**<br><br>Topsoil stockpiles can be contaminated by dumping waste materials next to or on the stockpiles, contamination by dust from blasting and waste rock stockpiles and the dampening for dust control with contaminated water are all hazards faced by stockpiles. This should be avoided at all cost and if it occurs, should be cleaned up immediately<br><br>**g) Terrain stability to minimise erosion potential**<br><br>Management of the terrain for stability by using the following measures will reduce the risk of erosion significantly:<br><br>• Using appropriate methods of excavating that are in accordance with regulatory requirements and industry best practices procedures; | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | • Reducing slope gradients as far as possible along road cuts and disturbed areas to gradients at or below the angle of repose of those disturbed surfaces; and<br>• Using drainage control measures and culverts to manage the natural flow of surface runoff<br><br>Management of the terrain for stability by using the following measures will reduce the risk of erosion significantly:<br><br>• Using appropriate methods of excavating that are in accordance with regulatory requirements and industry best practices procedures;<br>• Reducing slope gradients as far as possible along road cuts and disturbed areas to gradients at or below the angle of repose of those disturbed surfaces; and<br>• Using drainage control measures and culverts to manage the natural flow of surface runoff.<br>**h) Management of access and services roads** | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | Existing established roads should be used wherever possible. Where possible, roads that will carry heavy-duty traffic should be designed in areas previously disturbed rather than clearing new areas, where possible. The moisture content of access road surface layers must be maintained through routine spraying or the use of an appropriate dust suppressant.<br>Access roads should be designed with a camber to avoid ponding and to encourage drainage to side drains; where necessary, culverts will be installed to permit free drainage of existing water courses. The side drains on the roads can be protected with sediment traps and/or gabions to reduce the erosive velocity of water during storm events and where necessary geo-membrane lining can be used.<br>**i) Prevention of soil contamination**<br>During the construction phase, chemical soil pollution should be minimised as follows:<br>• Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment should be | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | contained by using a drip tray with plastic sheeting filled with absorbent material;<br>• Using biodegradable hydraulic fluids, using lined sumps for collection of hydraulic fluids, recovering contaminated soils and treating them off-site, and securely storing dried waste mud by burying it in a purpose-built containment area;<br>• Avoiding waste disposal at the site wherever possible, by segregating, trucking out, and recycling waste;<br>• Containing potentially contaminating fluids and other wastes; and<br>• Cleaning up areas of spillage of potentially contaminating liquids and solids. | |
| **Operational Phase** | | | |
| Shaft and mine infrastructure | Shaft and surface infrastructure will both lead to surface impacts on soil resources. Surface infrastructure like buildings, haul roads, waste rock dumps and product stockpiles are by far the most disruptive to current land uses, land capability as well as agricultural potential of the | **Management of potential soil contamination during the operational phase** | |

<table>
<tr><th>Activity</th><th>Impact Description</th><th>Mitigation Measures</th><th>Significance Rating After Mitigation</th></tr>
<tr><td></td><td>soil. Soil underneath buildings and stockpiles are subject to compaction and sterilization of the topsoil</td><td rowspan="2">The following management measures will either prevent or significantly reduce the impact of soil chemical pollution on site during the operation phase:<br><br>a) Stockpiles are managed so they do not become contaminated and then need additional handling or disposal;<br>b) A low process or storage inventory must be held to reduce the potential volume of material that could be accidentally released or spilled;<br>c) Processing areas should be contained, and systems designed to effectively manage and dispose of contained storm water, effluent and solids;<br>d) Storage tanks of fuels, oils or other chemicals stored are above ground, preferably with inspectable bottoms, or with bases designed to minimise corrosion. Above-ground (rather than in-ground) piping systems should be provided. Containment bunds should be sealed to prevent spills contaminating the soil and groundwater;</td><td></td></tr>
<tr><td>Spills of fuel and lubricants</td><td>Soil chemical pollution as a result of spills of fuel and lubricants by vehicles and machinery as wells as the accumulation of domestic waste, is considered to be a moderate deterioration of the soil resource. This impact will be localized within the site boundary and have medium-high significance on the soil resource.</td><td></td></tr>
</table>

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | e) Equipment, and vehicle maintenance and washdown areas, are contained and appropriate means provided for treating and disposing of liquids and solids;<br>f) Air pollution control systems avoid release of fines to the ground (such as dust from dust collectors;<br>g) Effluent and processing drainage systems avoid leakage to ground. | |
| Vehicle movement | Soil compaction will be a measurable deterioration that will occur as a result of the weight of the topsoil and overburden stockpiles stored on the soil surface as well as the movement of vehicles on the soil surfaces (including access and haul roads). This is a permanent impact that will be localized within the site boundary with medium-low consequence and significance in the mitigated scenario. | Same as above | |
| Vegetation clearance | During the operational phase, topsoil stockpiles as well as roads running down slopes will still be susceptible to erosion. Soil surfaces with infrastructure such as concrete | Same as above | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | slabs and buildings will not be exposed to erosion any longer. This is a permanent impact that will be localized within the site boundary with medium-high consequence and significance. | | |
| **Decommissioning and Rehabilitation** | | | |
| Traffic movement | Transport of materials away from site. This will compact the soil of the existing roads and fuel and oil spills from vehicles may result in soil chemical pollution. | **a) Management and supervision of decommissioning teams**<br><br>The activities of decommissioning contractors or employees will be restricted to the planned areas. Instructions must be included in contracts that will restrict decommissioning workers to the areas demarcated for decommissioning. In addition, compliance to these instructions must be monitored.<br><br>**b) Infrastructure removal** | |
| Earthworks | Earthworks will include redistribution of inert waste materials to fill the shaft as well as topsoil to add to the soil surface. These activities will not result in further impacts on land use and land capability but may increase soil compaction. | | |
| Handling and storage of materials | Other activities in this phase that will impact on soil are the handling and storage of materials and different kinds of waste generated as well as accidental spills and leaks with | | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | decommissioning and rehabilitation activities. This will have the potential to result in soil pollution when not managed properly. | All buildings, structures and foundations not part of the post-closure land use plan must be demolished and removed from site.<br><br>**c) Site preparation**<br><br>Once the site has been cleared of infrastructure and potential contamination, the slope must be re-graded (sloped) in order to approximate the pre-project aspect and contours. The previous infrastructure footprint area must be ripped a number of times in order to reduce soil compaction. The area must then be covered with topsoil material from the stockpiles.<br><br>**d) Seeding and re-vegetation**<br><br>Once the land has been prepared, seeding and re-vegetation will contribute to establishing a vegetative cover on disturbed soil as a means to control erosion and to restore disturbed areas to beneficial uses as quickly as possible. The vegetative cover reduces erosion potential, slows down | |
| Revegetation | With the decommissioning phase, soil surfaces are in the process of being replanted with indigenous vegetation and until vegetation cover has established successfully, all surfaces are still susceptible to potential soil erosion. | | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | runoff velocities, physically binds soil with roots and reduces water loss through evapotranspiration. Indigenous species will be used for the re-vegetation, the exact species will be chosen based on research available and then experience as the further areas are re-vegetated.<br><br>**e) Prevention of soil contamination**<br><br>During the decommissioning phase, chemical soil pollution should be minimised as follows:<br><br>Losses of fuel and lubricants from the oil sumps of vehicles and equipment should be contained using a drip tray with plastic sheeting and filled with absorbent material;<br><br>○ Using biodegradable hydraulic fluids, using lined sumps for collection of hydraulic fluids and recovering contaminated soils and treating them off-site;<br>○ Avoiding waste disposal at the site wherever possible, by segregating, trucking out, and recycling waste; | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | ○ Containing potentially contaminating fluids and other wastes; and<br>○ Cleaning up areas of spillage of potentially contaminating liquids and solids. | |

## 10.7 Heritage Impact Assessment

The Phase I Archaeological and Cultural Heritage Impact Assessment for the proposed mining right of Coal has identified was conducted to assess the significant impacts to archaeological or grave resources that will need to be mitigated prior construction. The Phase I Archaeological and Cultural Heritage Impact Assessment field survey for the proposed project did not find any cultural heritage resources within the proposed development site.

### 10.7.1 Impact Assessment

**Table 22: Heritage impact assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| **Construction Phase** | | | |
| Site clearance | Site Clearance for construction activities might reveal or expose archaeological artefacts. | a) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken.<br>b) Education and training on heritage resources will be given to mine employees. | Low |
| **Operational Phase** | | | |
| Excavations of shaft | Opening of the shaft might expose or reveal archaeological artefacts. | c) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken.<br>d) Education and training on heritage resources will be given to mine employees. | Low |
| **Decommissioning and Rehabilitation** | | | |
| Ripping and shaping of compacted areas | Ripping and shaping all compacted areas to be free draining, followed by re-vegetation might expose human remains or archaeological artefacts. | e) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken.<br>f) Education and training on heritage resources will be given to mine employees. | Low |

## *10.8 Visual Assessment*

### 10.8.1 Potential Receptors and Visual Corridors

The visual impact of the proposed activities is determined by the number of observers and their perception. Therefore, it is important to identify potential receptors and assess their sensitivity. According to Oberholzer (2005) different receptor types will display varying degrees of sensitivity to visual impact from the proposed underground area. For example, nature reserves and visitors to them are regarded as receptors with a high sensitivity, while mining areas are regarded as having a low sensitivity.

Naturally the perceptions of viewers will differ notably given their cultural backgrounds, state of mind, regularity of sighting, and if they are residents or visitors to the area. As a result, this complex subject is approached with a certain degree of generalization, and it is beyond the scope of this study to attempt a detailed breakdown of viewers' perceptions.

### 10.8.2 Viewshed Analysis

A viewshed is the geographical area that is visible from a location. It includes all surrounding points that are in line-of sight with that location and excludes points that are beyond the horizon or obstructed by terrain and other features (e.g., buildings, trees).

### 10.8.3 Impact Assessment

**Table 23: Visual impact assessment**

<table>
<tr><th>Activity</th><th>Impact Description</th><th>Mitigation Measures</th><th>Significance Rating After Mitigation</th></tr>
<tr><td colspan="4">Construction Phase</td></tr>
<tr><td>Site and road clearing (removal of soils and vegetation</td><td>a) Negative impact on sense of place.<br>b) Dust generation<br>c) Visual intrusion due to heavy machinery</td><td rowspan="3">a) Remove minimum amount of natural vegetation and topsoil;<br>b) Dust suppression techniques;<br>c) Overnight storage of equipment and materials away from receptors;<br>d) Ensure all equipment on site and general surrounds are maintained;<br>e) Ensure that rubble, litter and disused construction materials are managed and removed regularly;<br>f) Use natural hues and non-reflective material on structures to facilitate the structures ‘blending’ in;<br>g) Use vegetative screens of indigenous species to shield these structures from receptors;<br>h) Retain taller species of natural vegetation where possible to use as additional vegetative screens;</td><td>Low</td></tr>
<tr><td>Construction of mining infrastructure & buildings</td><td>a) Visual intrusion due to the presence of construction equipment & machinery, as well as infrastructure<br>b) Heavy vehicles using the roads<br>c) Dust generation<br>d) Introduction of artificial lighting</td><td>Low</td></tr>
<tr><td>Shaft excavation</td><td>a) Altering the topography and visual character<br>b) Dust generation<br>c) Visual intrusion of shaft & heavy machinery</td><td>Low</td></tr>
</table>

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | i) Position these structures, where possible, behind stockpiles and away from receptors;<br>j) Make use of down lighting and low impact lighting; and<br>k) Avoid tall lights on periphery and make use of motion sensors. | |
| **Operational Phase** | | | |
| Appearance of WRD<br>Blasting & load-and-haul operations<br>Appearance of RoM stockpile | a) Visual disturbance<br>b) Dust generation<br>c) Visual disturbance of heavy machinery using haul roads<br>d) Lighting | a) Proper design of WRD to ensure slopes do not exceed a 1:3 ratio (< 33°) depending on compaction tests done on the receiving soils<br>b) Establishing successive vegetation communities on the WRD to mitigate the visual intrusion, improve soil stability and reduce dust generation<br>c) Blasting under controlled conditions (avoid windy days) Blasting should not take place before 08H00 and after 16h00<br>d) Dust suppression techniques<br>e) Keep RoM stockpile within prescribed height of 3 m | Low |
| **Decommissioning and Rehabilitation** | | | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| Reclaiming stockpiles & WRD, removal of infrastructure | a) Visual intrusion associated with closure activities<br>b) Dust generation | a) Overnight storage of equipment and materials away from receptors;<br>b) Ensure all equipment on site and general surrounds are maintained;<br>c) Limit operations to daylight hours;<br>d) Maintain vegetative screens along roads carrying substantial traffic until Closure Phase is completed; and<br>e) Ensure that litter are managed and removed regularly | |

## *10.9 Terrestrial Biodiversity*

### 10.9.1 Vegetation

80-90 % of the mining right boundary is covered by citrus and sugarcane plantation. The area covered by natural vegetation is less than 3.5hectares. Based on the information from SANBI, the area is surrounded by three types of vegetation, namely, Delagoa Lowveld, Sweet arid basalt and Granite lowveld.

Two degraded vegetation community were confirmed.

- Degraded Sclerocarya birrea – Dichrostachys cinerea Mixed woodland

This vegetation unit represent on slightly undulating terrain in the western section of the site. This woodland type varies between a more open woody structure to denser areas in the central section of the site encroached by Dichrostachys cinerea. The woody layer is dominated by Sclerocarya birrea, Ziziphus mucronata, Acacia tortilis, Dichrostachys cinerea and Philenoptera violaceae on red apedal soils of the Hutton soil form.

The Botanical and characteristics of this vegetation unit indicates that mixed woodland have a high need for rehabilitation and its conservation priority and sensitivity is medium to low.

- Degraded Acacia xanthophloea – Schotia brachypetala – Lantana camara riparian woodland

The central-eastern section of the project area is characterised by riparian woodland underlied by fertile alluvial soils. Most of this area has been degraded and lost riparian functionality after the railway line was built through the riparian woodland, separating the Komati River from the riparian woodland to the north of the railway line with a berm. The vegetation is characterised by diagnostic sweetveld species such as Acacia xanthophloea, Schotia brachypetala, Diospyros mespiliformes and Combretum imberbe, while the shrub layer has become seriously encroached by sickle bush and lantana in certain areas.

For this vegetation unit, the need for rehabilitation is also high and the sensitivity and conservation priority are medium. In terms terrestrial Biodiversity assessment, the area is characterised by land already utilized. The mining boundary falls within the site characterised as least concern and no natural habitat(Maluleke, 2022).

### 10.9.2 Field Investigation

The field investigation consist of random sampling throughout the mining area with more focused sampling within the shaft area and plant area. As such, site surveys are critical for the verification of desktop findings and establishing the baseline ecological conditions of a site. The site visit was conducted on the 09th of July 2022 confirmed that the vegetation of the project area is SVl 4 Delagoa Lowveld.

### 10.9.3 Fauna

#### *10.9.3.1 Mammals*

The IUCN Red List Spatial Data (IUCN, 2017) lists 81 mammal species that could be expected to occur within the project area. Of these species, 9 are medium to large conservation dependant species, such Tragelaphus oryx (Common Eland) that, in South Africa, is generally restricted to protected areas such as game reserves. These species are not expected to occur in the project area and are removed from the expected SCC list. They are however still included (common name in red). Of the remaining 72 small to medium sized mammal species, fourteen (14) (19.4%) are listed as being of conservation concern on a regional or global basis.

#### *10.9.3.2 Avifauna*

It is important to note that the study site is classified as an important Bird Area. Important Bird and Biodiversity Areas (IBAs), as defined by BirdLife International, constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified nationally through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria. Essentially, these are the most important sites for conserving.

According to the South African Bird Atlas Project (SABAP2), almost 300 species of birds have been identified in the Manyeleti area. All birds that could be present within the vicinity of the study site are listed below.

### 10.9.4 Impact Assessment

**Table 24: Terrestrial Biodiversity impact assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | **Construction Phase** | |
| Site clearance for establishment or access roads, infrastructure and shaft area | Clearing of vegetation | Avoid sensitive areas and implement buffer zones | Low |
| | Loss of plant SSC | a) Limit the footprint area to the shaft and infrastructure<br>b) Avoid areas of remaining indigenous vegetation | Low |
| | Displacement of fauna species | Avoid high biodiversity sensitivity areas (natural vegetation, watercourses & wetlands) and comply to prescribed buffer zones | Low |
| | Loss of faunal SSC | a) Avoid areas in which plant species of conservation concern may occur;<br>b) If some areas cannot be avoided implement rescue of plant species of conservation concern | Low |
| | | **Operational Phase** | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| Operation of mine and access roads | Alien plant establishment | Implementation of alien invasive plant management plan needs to be continued during operation to prevent the growth of invasive on cleared areas | Medium |
| | Disturbance/Displacement of Faunal species | Minimise footprint area Work only in clearly demarcated areas | Medium |
| | Disturbance of vegetation communities | Minimise footprint area Work only in clearly demarcated areas | Medium |
| | Habitat fragmentation | Minimise footprint area Work only in clearly demarcated areas | Medium |
| | Killing of faunal species | Minimise footprint area Work only in clearly demarcated areas | Medium |
| **Decommissioning and Rehabilitation Phase** | | | |
| Shaping of landscape | Loss of species of conservation concern | All infrastructure that could have a negative impact on faunal species (powerlines etc.) needs to be decommissioned and removed. | Medium |
| Revegetation of landscape | Impact on the growth and health of both fauna and flora | Implement rehabilitation strategy and rehabilitation interventions. | Medium |
| Monitoring of plant species establishment | Establishment of vegetation | Implement rehabilitation monitoring plan and remedy actions. | Medium |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | Habitat reconstruction | Implement rehabilitation monitoring plan and remedy actions. | Medium |
| | Habitat stabilisation | Implement rehabilitation monitoring plan and remedy actions. | Low |

## *10.10 Health Impact*

### 10.10.1 Human Health Impacts of Minerals

Mining rarely result in a fully confined exposure to the target material being extracted from the environment. Coal contributes a major part to its commercial energy production and is widely used in the power industry to generate electricity. However, as compared to other fossil fuels, coal is more pollution intensive and the efficiency of energy is also very low.

Burning coal releases enormous amounts of harmful pollutants into the air and water, which leads to serious health consequences. Pollutants from coal affect all major body organ systems and contribute toward many leading causes of mortality which include such as heart diseases, cancers, stroke, and chronic lower respiratory diseases.

Each step of the coal lifecycle from mining, transportation, washing, combustion, and disposing of post combustion wastes impacts human health. Coal combustion in particular contributes to diseases like asthma, lung cancer, heart disease, and stroke, compounding the major public health challenges.

### 10.10.2 Impact Assessment

**Table 25: Health Impact Assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| **Construction, Operational and Decommission Phase** | | | |
| Housing design | Communicable Diseases Linked to Housing Design | a) Collaborate with the DoH on awareness-creation around vaccinations to communicable diseases for vulnerable sub-populations such as children and old people;<br>b) Labour policies should encourage hiring of local staff to avoid excessive job-seeking migrants. The Project should not hire at the “front gate” but consider a recruitment office at an off-site location. This will need to consider national recruitment and employment requirements;<br>c) Reduce the prevalence of communicable diseases by collaborating with relevant government departments and schools for awareness creation and improved understanding of factors exacerbating communicable diseases, including coping strategies that result in behaviour change; and initiating competitions at schools for illustrating innovative ways to improve conditions at home - either by reducing exposure and susceptibility or increasing coping capability; | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | d) Support community-based information campaigns related to TB symptoms and the need to seek care. The campaign should address the risk of co-infection between HIV and TB;<br>e) Influx management and advice with regards to town planning to prevent overcrowding; and<br>f) Develop partnerships to support the community-based TB control programs in conjunction with the DoH and any NGOs. This needs to include case detection, management and surveillance activities under the national TB program policy and strategy. | |
| Unprotected Sex | Sexually Transmitted Infections, including HIV/AID | a) Develop a HIV/AIDS policy that incorporates both the workplace and community considerations;<br>b) Develop an integrated HIV management program that considers both the workplace and the community. TB and STI must be integrated into this;<br>c) Support equal employment opportunities for women and establish livelihood programs to reduce risk for opportunistic sexual encounters and empower women and young girls to earn their own income to be in a position to provide for themselves without having to resort to sexual transactions; | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | d) Support (financial or otherwise) NGO groups active in the area on gender-based sexual violence; and<br>e) Support community-based condom distribution centres. These should be linked to other initiatives and not be run in isolation. | |
| Contamination of potable water | Soil-, Water- and Waste-related Diseases | a) Conduct baseline water and sanitation studies on communities based on accepted health indicators;<br>b) Monitor for groundwater organics, bi-annually, including: Total Coliform, E. Coli and Heterotrophic plate count;<br>c) Ensure proper disposal of human waste that is generated from the Project;<br>d) Ensure proper waste management from Project generated waste according to waste management principles;<br>e) Support the local authority in supporting and improving water and sanitation services, including the collection and disposal of waste in the communities;<br>f) Establish water and sanitation committees in the communities to manage their own water and sanitation services. This will improve sustainability of any outreach support;<br>g) Support information campaigns in the community on water use, hygiene and general sanitation; and | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | h) Depending on the results of the baseline data gathering, support the government's school deworming programme in partnership with local authorities. | |

**Impacts will remain the same during all phases*

## *10.11 Surface Water*

### 10.11.1 Water Quality Assessment.

Collected water samples were sent to a South African National Accreditation System (SANAS) accredited laboratory to be analysed for physical and chemical water quality parameters. The water quality guidelines that are used will be determined from the land use and current water use.

The surface water in the study area is mostly used for irrigation, livestock, and domestic use. The guidelines used are (DWAF, 1996):

a) Volume 1: Domestic [additionally SANS 241 (2015) for domestic];
b) Volume 4: Irrigation;
c) Volume 5: Livestock watering

In terms of water quality guidelines, the Komati River is of good quality for all the observed water uses. Most of the chemical parameter were not exceeded by any of the sampling points, except for the irrigation limit for pH which exceeded by the AC sampling point and the domestic limit for Aluminium (Al) which was exceeded by the KOM 01 point. The Komati River is used for fishing near KOM 01 sampling point, the aluminium material used by the fishermen might be the contributor of Al in this point.

The Ngweti River and its tributaries showed poor water quality in terms of EC which exceeded all the water quality guidelines. This river is surrounded by farms which uses fertilisers and pesticides that may wash of into the river during rainfall and irrigation. The river is not suitable for domestic use as all the sampling points exceeded the domestic limit for TDS, Ca, and Mg. It can be used for other purposes such as irrigation and livestock. It can be concluded from the chemical analysis results that the majority of the chemical parameters such as the EC, TDS, SO4, as well the cations i.e., Ca, Mg, and Na, were higher in the tributary when compared to the main system..

### 10.11.2 Water Balance

The amount of salts dissolved in water is normally expressed as a concentration such as in mg/l. This indicates the concentration of the dissolved salt but does not provide any information on the actual amount of salt dissolved in the system. If, however, the volume and the flow rate of the water are brought into the equation, a more meaningful result can be achieved. In this case, not only the concentration of the dissolved substance but also the mass of the substance flowing past a specific point for a specific period can be calculated. Expressions such as Kg/hour or Tons/day will now be the type of units used. When evaluating a dynamic system (i.e., moving as opposed to stagnant water) then the latter method is far more meaningful.

Only selected variables were averaged for analyses and further usage in calculating the salt loads. The chemical parameters were selected because they can form common salt complexes such as sodium chloride (NaCl), potassium chloride (KCl), and potassium sulphate (K2SO4). Only stream-based salt load calculations were done as there are no dirty water containment facilities on site yet.

### 10.11.3 Conceptual Stormwater Management Plan

The primary objectives of the SWMP according to the BPG 1 are:

- To address the impact that mining operations have on water flow and quality during different hydrological cycles;
- To determine the impacts the hydrological cycle has on mining activities;
- To protect life and property from floods; and
- To protect and conserve the environment and water resources.

The mine proposed the following surface infrastructure:

- Underground shaft – According to BPG 1, underground shafts are considered dirty water catchments that contaminate water bodies by introducing suspended solids (SS) and other contaminants formed during the extraction of coal.
- Overburden stockpiles – These are residues deposited during the mining activity such as fines, carbonaceous shales, and waste rock dumps.
- They are regarded as dirty water catchments by BPG 1.
- PCDs - PCDs are designed to collect and store dirty water runoff at the mining area. It also stores water pumped from the underground shaft. They are regarded as dirty water facilities as they store dirty water. They are not allowed to overflow more than once in a 50-year return period.

- Offices – Suspended Solids are the main water contaminants at offices; therefore, they can be considered clean water catchments.
- Roads – With regards to tarred roads, the BPG 1 regard them as clean water catchment as they are not expected to be contaminated by waste coal. Haul roads on the other hand are regarded as dirty water catchments because they may contain dissolved and suspended contaminants.
- Plant, stockpile, and workshop area – These are considered dirty facilities due to the coal stockpiling area, hazardous substances storage and handling and washing of machinery.

### 10.11.4 Impact Assessment

**Table 26: Surface water impact assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | **Construction** | |
| Exposure of topsoil | Sedimentation of watercourses due to exposing and loosening of soil as a result of vegetation clearing for the construction of infrastructure and pollution of watercourses due to hydrocarbon and chemical spillages | a) Use wet suppression, chemical stabilization and wind speed reduction methods that should be used to control open dust sources at the construction sites;<br>b) Vegetation should only be removed where absolutely necessary;<br>c) Hydrocarbons should be stored on hardpark bunded facilities to ensure that all spillages are contained; and<br>d) Clean and dirty surface water trenches/channels should be constructed to divert runoff separately to appropriate storage facilities. | Low |
| Vegetation removal | Altered drainage paths and loss of catchment yield due to the removal of vegetation and construction of diversion berms. | Reuse dirty water as much as possible onsite instead of obtaining water from the catchment, or to treat dirty water to acceptable standards and then to discharge to the catchment. | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | **Operational Phase** | |
| Mining activities | Pollution of surrounding watercourses as a result of activities during the operational phase (spills, overflows and contaminated runoff) | a) There are no mitigation measures for a loss of contained water to the catchment yield as long as the mine is there however,<br>b) Reuse dirty water as much as possible onsite instead of obtaining water from the catchment, or to treat dirty water to acceptable standards and then to discharge to the catchment. - Sustainable mine water management needs to be implemented. | Medium - Low |
| | | **Decommissioning and Rehabilitation Phase** | |
| Mine decommissioning | Pollution of surrounding watercourses as a result of activities during the decommissioning phase | a) The perimeter stormwater management measures should remain in place and should only be removed once rehabilitation of other activities has been completed. This will capture most of the sediment produced from rehabilitation activities and any spills from removal of hydrocarbon and chemical storage;<br>b) Credible contractors should be used for the cessation of the mining and decommissioning of all infrastructure. | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| Post-closure activities | Rehabilitation of the site post mining will result in a positive impact on surface water quantity when completed. | Rehabilitation will result in a positive improvement as surface water drainage patterns will be restored to a state similar to pre-mining which is likely to result in an improvement in catchment yield after land profiling and cover having been restored. | Medium-Low |

## *10.12 Aquatics Ecology*

### 10.12.1 Field Assessment

The assessment was conducted only for existing degradation of the study site by the existing access Road site with the focus on wetland habitats. From the assessments it is clear that impacts can be expected from the proposed activities.

### 10.12.2 Impact Assessment

**Table 27: Aquatic impact assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| **Construction Phase** | | | |
| Site clearance for establishment of access roads, infrastructure and shaft area | Sedimentation as a result of bare areas of soil | a) Sediment trapping berms Stormwater management plans<br>b) Dry season construction | Low |
| Vehicle movement and refuelling | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery<br>b) Refuel in hard-park/bunded area<br>c) Store hydrocarbons safely in bunded area<br>d) Vehicle maintenance and inspection daily<br>e) Spill kits must always be available and ready on-site | Low |
| **Operational Phase** | | | |
| Operation of mine and access roads | Vehicular movement and sedimentation | a) Sediment trapping berms<br>b) Stormwater management plans | Low |
| | Pollution of water resources as a result of mine waste | a) Implement Integrated Waste Water Management Plan<br>b) Aquatic biomonitoring | Low |
| | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery<br>b) Refuel in hard-park/bunded area<br>c) Store hydrocarbons safely in bunded area | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | d) Vehicle maintenance and inspection daily<br>e) Spill kits must always be available and ready on-site | |
| **Decommissioning and Rehabilitation Phase** | | | |
| Shaping of landscape | Sedimentation as a result of bare areas of soil | a) Sediment trapping berms<br>b) Stormwater management plans<br>c) Dry season working<br>d) Aquatic biomonitoring | Low |
| Vehicular and machinery movement | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery<br>b) Refuel in hard-park/bunded area<br>c) Store hydrocarbons safely in bunded area<br>d) Vehicle maintenance and inspection daily<br>e) Spill kits must always be available and ready on-site | Low |

## *10.13 Socio-Economic Impacts*

The Nkomazi Local Municipality has been encountering challenges which range from economic, environmental, social and spatial challenges. At a regional scale, like other various lagging municipalities, Mpumalanga is faced with developmental challenges coupled with socio-economic problems such as unemployment, job creation, education, HIV prevalence, basic service delivery, inequality, poverty, economic growth, sectorial dependency and economic distribution.

For the purpose of this Project, social impacts have been assessed in light of the current existing socio-economic challenges in the local area. It is expected that the proposed Tenbosch Mining Project will result in social changes which may positively or negatively affect communities within the study area. In terms of the social changes that have been assessed, the following social impacts have been identified:

a) Employment opportunities;
b) Change in movement patterns;
c) Loss of agricultural land and infrastructure;
d) Physical and Economic displacement;
e) Impact on the local tourism industry;
f) Increased pressure on Municipal infrastructure;
g) Increased social pathologies linked to the influx of workers and job seekers; and
h) Increased nuisance factors and changed sense of place;

In light of the above-mentioned, the following social variables were considered to determine the likely impacts:

a) Demographic processes - refer to the movement and structure of the local community;
b) Geographic characteristics- refer to the processes that affect the land uses of the local area;
c) Economic processes - refer to the economic activities with the affected project area;
d) Socio-cultural wellbeing - refers to the processes that affect the local culture of an affected area, i.e. the way in which the local community live;
e) Institutional, legal, political and equity - refers to the processes that affect service delivery of the study area.

The proposed Tenbosch Mining Project carries both positive and negative potential impacts, varying in their significance. The construction and operation of the proposed Tenbosch Mining Mine are expected to yield predominantly positive effects, primarily driven by the creation of employment opportunities. Additionally, the project is poised to stimulate the local economy through an increase in disposable income and generate revenue for the Nkomazi Local Municipality.

However, it is important to acknowledge the presence of negative impacts associated with the project. These may include the loss of agricultural land, physical and economic displacement, heightened pressure on municipal infrastructure, potential rise in social pathologies linked to the influx of job seekers and transient workers, increased nuisance factors, and a shift in the overall sense of place within the affected area.

Careful consideration and mitigation strategies will need to be implemented to address these negative impacts and ensure that the project's benefits are maximized while minimizing any adverse consequences.

### 10.13.1 Impact Assessment

**Table 28: Socio-economic impact assessment**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | **Construction Impacts** | |
| Construction activities | The residual impacts associated with the creation of employment and business opportunities and training during the construction phase is that the workers can improve their skills by gaining more experience. | a) Establish targets for employment and training;<br>b) Train workforce for longer term employment;<br>c) Adopt recruitment strategies that ensure local people are given employment preference;<br>d) Effective implementation of training and skills development initiatives;<br>e) The recruitment process has to be transparent and equitable;<br>f) Maximise and monitor local recruitment;<br>g) Consult local labour recruitment offices;<br>h) Prevent nepotism/corruption in local recruitment structures;<br>i) Promote employment of women and youth;<br>j) Formulate a labour recruitment strategy that would minimise impact on other sectors (e.g. do not recruit unskilled labour at wage levels above the wages paid in the agricultural sector); and | Positive impact |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | k) Establish a liaison point with the adjacent farming community to monitor the impact on their local labour force. | |
| | Multiplier impacts on the local economy | a) Development of a register of local SMMEs;<br>b) Linkages with skills development/ Small, Medium and Micro Enterprises (SMME) development institutions and other mining operations;<br>c) SMME skills development as part of mine SLP/LED commitments;<br>d) Create synergies with other mining/electricity enterprises LED/CSR projects;<br>e) Preference should be given to capable subcontractors who based within the local municipal area;<br>f) Align skills development to build capacity of SMMEs;<br>g) Monitoring of sub-contractors procurement;<br>h) Development of a register of local SMME; and<br>i) Local procurement targets should be formalised in Tenbosch Mining's procurement policy. | Positive impact |
| | a) Improved economic development; | a) Ensure that there is stakeholder buy-in;<br>b) Aligning LED projects with those of other development role-players;<br>c) Liaison with beneficiaries to ensure needs are met; | Positive impact |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | b) Increased capacity to develop and maintain livelihood strategies | d) Collaboration with other developmental role players (e.g. local and district municipalities, neighbouring mines and NGOs) during implementation of envisaged projects, and where possible aligning envisaged development projects with existing ones;<br>e) Expanding its skills development and capacity building programmes for non-employees;<br>f) Monitoring system to regulate Historically Disadvantaged South African procurement;<br>g) Where feasible, training should be NQF Accredited; and<br>h) A record of training courses completed per individual should be kept. | |
| | Increase in injuries and possible loss of lives | a) Access control to all project elements, including fencing;<br>b) Personal Protective Equipment for mine workers;<br>c) Notification of blasting schedules;<br>d) Blasting and storage of hazardous materials to adhere to prescribed regulation;<br>e) Measures suggested minimising the impact of flyrock on surrounding roads and structure;<br>f) Measures suggested in the Health Impact Assessment to minimize traffic related accidents; | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | g) Traffic calming measures to prevent speeding (e.g. speed humps);<br>h) Road maintenance;<br>i) Provide safe road crossing points and fencing of the main road and the mine site; and<br>j) Community education to sensitize community members to potential traffic and blasting safety risks. | |
| | Altered sense of place and breakdown of existing social networks | a) Where possible ensure that access to fields and grazing areas are uninterrupted by providing alternative access routes and/or temporary access points during construction activities;<br>b) Tenbosch Mine should ensure that residents are kept informed on a day-to-day basis of construction progress and of when access will be blocked;<br>c) Measures to prevent deterioration of roads;<br>d) suggested in Traffic Impact Assessment (e.g. drivers to report road deterioration to the MP Province Department of Transport);<br>e) Regulation of traffic at intersections and access roads to the site;<br>f) Road upgrading measures should be investigated and implemented in conjunction with the relevant government department (e.g. repairing and rehabilitating the main roads and sealing the roadway to increase its capacity for Heavy Moving Vehicles); | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | g) Inform communities of planned construction activities that would affect vehicle/pedestrian traffic;<br>h) Ensure that access to key services are uninterrupted by providing alternative access routes in cases where construction activities restricts or disrupt movement; and<br>i) Construction of cattle crossings at suitable intervals should be incorporated into project design. | |
| | a) Displaced farm workers;<br>b) Loss of livelihoods | a) Suitable mitigation measures should be defined that protect the farm workers and ensure that they are adequately provided for and supported should they be moved or lose their employment.<br>b) A Resettlement Action Plan and associated Livelihood Restoration Plan may be required.<br>c) Implement surface lease agreements with all community members who have grazing or ploughing land, this will minimise the impact of economic displacement.<br>d) Implement the Grievance Mechanism to ensure ongoing, proactive engagement and effective management of grievances. | Medium-Low |
| | Strain on the existing infrastructure which is already inadequate | a) To limit, as far as reasonably possible, additional pressure on existing infrastructure and services; | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | b) To work in partnership with government, industry, and relevant organisations to enhance the existing infrastructure and services;<br>c) To liaise openly and frequently with affected stakeholders to ensure they have information about the proposed Tenbosch Mining Project;<br>d) Liaison with district and local municipalities well in advance to ensure needs are met;<br>e) Ensure that municipalities take into account expected population influx;<br>f) Promotion of mining methods to allow for surface development<br>g) Influx management; and<br>h) To make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders. | |
| **Operational Impacts** | | | |
| Operational activities | The impact may be reversible over time as workers and jobseekers leave the area, consequences such as HIV/AIDS and unwanted pregnancies will be permanent | a) Limit, as far as reasonably possible, social ills caused by influx of workers and jobseekers;<br>b) Liaise openly and frequently with affected stakeholders to ensure they have information about the Project;<br>c) Extensive HIV/AIDS awareness and general health campaign. It should be noted that Tenbosch Mining Mine has no control over activities related to workers' behaviour, however it is | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | recommended that HIV/AIDS campaigns are conducted within the affected area;<br>d) Discourage influx of jobseekers by prioritising employment of unemployed members of local communities;<br>e) Liaise with Nkomazi Local Municipality, and Traditional Authority to ensure that expected population influx is taken into account in infrastructure development and spatial development planning;<br>f) Create synergies with local government IDP and other companies' SLP/CSR projects to promote infrastructure development;<br>g) Clear identification of workers –prevention of loitering;<br>h) Liaison with police or establish/ support community policing forum;<br>i) Promote projects providing housing, especially low-cost housing, to link with the proposed Tenbosch Mining mine;<br>j) Community education; and<br>k) Implement measures to address potential conflict between locals and non-locals. | |
| | The increase in nuisance factors and associated changed sense of place will be negative, and direct as a result of Project | a) Minimise all nuisance factors such as noise, air quality, traffic, and visual-Implement all mitigation measures as specified in the relevant specialist studies; | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | activities, and indirect as a result of migrant jobseekers | b) Make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders;and<br>c) Liaise openly and frequently with affected stakeholders to ensure they have information about activities that will generate nuisance factors | |
| | Strain on the existing infrastructure which is already inadequate. | a) To limit, as far as reasonably possible, additional pressure on existing infrastructure and services;<br>b) To work in partnership with government, industry, and relevant organisations to enhance the existing infrastructure and services;<br>c) To liaise openly and frequently with affected stakeholders to ensure they have information about the proposed Tenbosch Mining Project; and<br>d) To make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders. | Medium-Low |
| | Loss of grazing land | a) Ensure that the project design and associated layout seeks to minimise the project footprint, thus minimising the loss of agricultural land; engage with each directly affected landowner with the intention to acquire only the required servitude area; | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | b) Should Tenbosch Mine acquire the full farm and the project footprint only affects a portion of the land, the surrounding usable land should be utilised for agricultural purposes – potentially as part of a lease agreement; and<br>c) Where damage is incurred, suitable compensation must be negotiated with the affected farmer; Prepare a site Rehabilitation Plan that will be implemented as part of the decommissioning phase. | |
| | Altered sense of place and breakdown of existing social networks | a) Where possible ensure that access to fields and grazing areas are uninterrupted by providing alternative access routes and/or temporary access points during construction activities;<br>b) Tenbosch Mining should ensure that residents are kept informed on a day-to-day basis of construction progress and of when access will be blocked. | Low |
| Operational activities | a) Developed local economy;<br>b) Increased capacity to develop and maintain livelihood strategies | Maximise benefits from local employment, skills and economic development. | |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | Increase in injuries and possible loss of lives | a) Access control to all project elements, including fencing;<br>b) Personal Protective Equipment for mine workers;<br>c) Notification of blasting schedules;<br>d) Blasting and storage of hazardous materials to adhere to prescribed regulation;<br>e) Measures suggested minimising the impact of fly-rock on surrounding roads and structure;<br>f) Measures suggested in the Health Impact Assessment to minimize traffic related accidents;<br>g) Traffic calming measures to prevent speeding (e.g. speed humps);<br>h) Road maintenance;<br>i) Provide safe road crossing points and fencing of the main road and the mine site; and<br>j) Community education to sensitize community members to potential traffic and blasting safety risks. | Low |
| **Decommissioning and Rehabilitation Phase** | | | |
| Mine closure | The impact may be reversible over time as workers and jobseekers leave the area, consequences such crime and other social pathologies will be permanent | a) Effect retrenchments according to procedures stipulated in approved SLP;<br>b) The Mine's SLP should provide strategies and measures that prevent job loss; | Medium |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | c) Support economic diversification through development of alternative markets;<br>d) Develop a Mine Closure Plan;<br>e) Proactively and effectively implement mine closure plan;<br>f) Collaborate with adjacent mining companies to develop and implement sustainable community;<br>g) Develop alternative and sustainable livelihoods;<br>h) Alternatives to save jobs/avoid downscaling should be investigated beforehand;<br>i) Proactively assess and manage the social and economic impacts on individuals, regions and economies where retrenchment and/or closure of the mine are certain; and<br>j) Partner with the relevant government departments, to jointly manage Closure process | |

## *10.14 Waste Management Impacts*

The construction, operational and closure/rehabilitation activities will give rise to waste materials which, if not properly managed, could cause pollution of air, soil, surface water and groundwater. Waste other than mining residues are typically generated in small enough quantities to be stored in skips until they can be removed for recycling or disposal, and there will be no need to construct lined waste management facilities for such waste.

### 10.14.1 Waste Assessment Methodology

Collected samples will be analysed in order to classify the WRD material in accordance with the NEM: WA Regulations (2013) and NEM: WA, 2014 (Act No, 26 of 2014, by comparison with total and leachable concentration thresholds.

Total Concentration values will be determined by *aqua regia* digestion and analysis with ICP methods.

Total Concentration Threshold limits are subdivided into three categories as follows:

a) TCT0 limits based on screening values for the protection of water resources, as contained in the Framework for the Management of Contaminated Land (DEA, March 2010);
b) TCT1 limits derived from land remediation values for commercial/industrial land (DEA, March 2010); and
c) TCT2 limits derived by multiplying the TCT1 values by a factor of 4, as used by the Environmental Protection Agency, Australian State of Victoria.

Leachable concentration will be determined by following the Australian Standard Leaching Procedure for Wastes, Sediments and Contaminated Soils (AS 4439.3-1997), as specified in the NEM: WA Regulations (2013). The procedure recommends the use of reagent water for leaching of non-putrescible material that will be mono-filled.

Leachable Concentration Threshold (LCT) limits will be subdivided into four categories as follows:

a) LCT0 limits derived from human health effect values for drinking water, as published by the Department of Water and Sanitation (DWS) and South African National Standards (SANS);
b) LCT1 limits derived by multiplying LCT0 values by a Dilution Attenuation Factor (DAF) of 50, as proposed by the Australian State of Victoria;
c) LCT2 limits derived by multiplying LCT1 values by a factor of 2; and
d) LCT3 limits derived by multiplying the LCT2 values by a factor of 4.

Waste is classified by comparison of the total and leachable concentration of elements and chemical substances in the waste material to TCT and LCT limits as specified in the National Norms and Standards for Waste Classification and the National Norms and Standards for Disposal to Landfill as per Table 29.

**Table 29: Waste Classification Criteria**

| Waste Type | Element or chemical substance concentration | Disposal |
|---|---|---|
| 0 | LC > LCT3 **OR** TC > TCT2 | Not allowed |
| 1 | LCT2 < LC ≤ LCT3 **OR** TCT1 < TC ≤ TCT2 | Class A or Hh:HH landfill |
| 2 | LCT1 < LC ≤ LCT2 **AND** TC ≤ TCT1 | Class B or GLB+ landfill |
| 3 | LCT0 < LC ≤ LCT1 **AND** TC ≤ TCT1 | Class C or GLB- landfill |
| 4 | LC ≤ LCT0 **AND** TC ≤ TCT0 for metal ions and inorganic anions<br><br>**AND** all chemical substances are below the total concentration<br><br>limits provided for organics and pesticides listed | Class D or GLB- landfill |

### 10.14.2 Impact Assessment

**Table 30: Waste management impacts**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| **Construction Phase** | | | |
| Construction activities | Typical waste produced during construction activities include unused concrete mix, oils, lubricants, paints, solvents, packaging materials, general domestic waste and offcuts of building materials such as steel, wood, glass and tiles. If stored or discarded on open ground, hydrocarbons will cause soil contamination and possibly groundwater pollution. | a) Sort the waste and store in separate skips or other containers for hydrocarbons, recyclable materials and non- recyclable materials. Recyclable materials should be sorted into wood, steel, glass, plastic, paper and used oil, and stored in separate containers;<br>b) Have recyclable waste removed by responsible recyclers; and<br>c) Have non-recyclable waste removed by reputable contractors for disposal at appropriately licensed landfill. | Low |
| **Operational Phase** | | | |
| Mining activities | Contamination of groundwater from WRD seepage | Kimopax advises that monitoring of boreholes be established near the waste rock dumps. | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | In terms of the National Environmental Management Amendment Act 2014, mining residues are classified as wastes and must be managed as prescribed by the National Environmental Management: Waste Act of 2008 and its Regulations GN R.632 and R.633 | a) Manage waste in accordance with Regulations GN R.634.<br>b) Undertake regular inspection and maintenance of waste management facilities;<br>c) Monitor groundwater and surface water quality down-gradient of waste management facilities; and<br>d) Take such corrective action as may be required. | Low |
| **Decommissioning and Rehabilitation** | | | |
| Mine closure | Waste expected to result from the decommissioning and rehabilitation activities include scrap metals, building rubble, oils, lubricants, paints, solvents, contaminated soils, waste rock dumps and potentially recyclable materials such as steel, wood, plastics, glass and tiles. If stored or discarded on open ground, hydrocarbons will cause soil contamination and possibly groundwater pollution, an impact rated as low. | a) Identify areas of possible soil contamination, sample such areas, analyse and determine degree of soil contamination. Remove and dispose of soil with contamination levels exceeding the prevailing standards/guidelines;<br>b) Sort the remaining waste and store in separate skips or other containers for hydrocarbons, recyclable materials and non- recyclable materials. Recyclable materials should be sorted into wood, steel, glass, plastic, paper and used oil, and stored in separate containers;<br>c) Have recyclable waste removed by responsible recyclers; and | Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | d) Have non-recyclable waste removed by reputable contractors for disposal at appropriately licensed landfills. | |

## *10.15 Blasting and Vibration*

### 10.15.1 Blasting Design

Prior to the start of blasting a proposed blast design should be modelled to determine the firing sequence and the number of holes firing together and the combined charge mass per delay. Based on these figures the peak particle velocities should be calculated at the points of concern. These predictions should be compared to recognised standards to ensure compliance. When acceptable results are obtained, the design should be fixed for use.

The final blast design should be marked and drilled off. After the blast is drilled off and charging commences then the process should be audited to ensure that all stages of the operation are proceeding as per the design. The blast pattern, blasthole depths, charge mass per hole and final stemming lengths should all be checked. Any unusual occurrences should be noted and where possible, immediately corrected.

### 10.15.2 Ground Vibration

Ground vibration may attract comment from people in the vicinity of a blast. Ground vibration disturbances will need to be quantified to ensure compliance with recognised and accepted industry standards such as the United States Bureau of Mines Standard (USBM RI 8507) or the Deutsches Institut für Normung (DIN) Standard. Ground vibrations occur as a consequence of blasting activity. The intensity of the vibrations depends on a number of factors some of which can be managed and controlled to help reduce the impact.

The two principal factors that control vibration levels are distance and charge weight. Vibration energy is attenuated by the rock mass so normally lower amplitudes are experienced further from a blast. Vibration levels will increase as the charge weight increases. The larger the charge mass the higher the amplitude of the vibration. The charge weight can be controlled by reducing the blasthole diameter or limiting the number of holes that fire at an instant in time.

### 10.15.3 Fly Rock

Side effects such as fly rock is undesirable and usually occur unexpectedly, sometimes for unknown reasons. Fly rock typically originates either from the breaking face or the surface of the blast. The severity of the fly rock will be limited to the shaft area.

### 10.15.4 Impact Assessment

**Table 31: Blasting and vibration impacts**

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| **Operational Phase** | | | |
| Opening up of the shaft | **Airblast**<br><br>Airblast is usually the main cause of blasting related complaints. Airblast is an atmospheric pressure wave consisting of high-frequency sound that is audible and low-frequency sound or concussion that is sub-audible and cannot be heard. Either or both of the sound waves can cause damage if the sound pressure is high enough (Konya).<br><br>Airblast results from explosive gasses being vented to the atmosphere that results in an air pressure pulse. This occurs as a consequence of stemming ejections or hole blowouts, direct rock displacement through face ruptures or surface cratering, the use of high Velocity of Detonation (VOD) accessories that are left unconfined and / or uncovered (e.g. | a) Exercise ongoing care and control during all stages of the drilling and blasting operation. Check, check and check again.<br>b) Prior to charging up the blast, the holes drilled should be inspected and all 'problem' holes identified for corrective action. Examples of 'problem' holes could include holes that are under burdened, holes that are short drilled, holes surrounded by badly cracked ground and off pattern holes that could potentially lead to problems.<br>c) Production QC checks must be implemented as part of the Standard Operating Procedures. This is particularly important if bulk explosives are being | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | detonating cord on surface), by ground vibration or by various combinations of the above. | used. During charging up of the holes the bulk explosive product should be sampled on an ongoing basis to ensure acceptable quality. The explosives' supplier should have standard operating procedures in place to address this issue. These procedures should be shared with the end user.<br>d) After charging up is complete and prior to stemming the holes closed, the holes should be taped to determine the explosive column rise to ensure that the required stemming length is obtained. Any errors must be corrected before the hole is stemmed closed.<br>e) The tie up should be carried out according to the blast plan to ensure that the timing and sequencing of the blast proceeds as planned.<br>f) Avoid prolonged sleeping of blasts particularly in wet ground conditions. It is preferable to charge and blast in the shortest possible time frame. | |
| | **Fly Rock**<br><br>Fly rock typically originates either from the breaking face or the surface of the blast. The main causes are under burdened holes, geological discontinuities, | | Medium-Low |
| | **Blast Fumes and Dust**<br><br>Explosives are formulated to be oxygen balanced to minimize fumes and optimize the energy output. Fumes such as carbon monoxide and oxides of nitrogen can be produced in the detonation process. Dust on the other hand is an inevitable consequence of blasting. | | Medium-Low |

| Activity | Impact Description | Mitigation Measures | Significance Rating After Mitigation |
|---|---|---|---|
| | | g) If fumes occur after a blast, then the area must be kept clear until these have dissipated.<br>h) The stipulated re-entry times must be enforced. | |

# 11 SUMMARY OF ENVIRONMENTAL IMPACTS

## *11.1 Summary Construction Impacts*

Summary of construction impacts indicated in **Table 32**

**Table 32: Summary of construction impacts**

| Potential Environmental Impact | Environmental Significance Before Mitigation | | | | | | Environmental Significance After Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | D | I | P | TOTAL | RISK | E | D | I | P | TOTAL | RISK |
| **Construction Phase** | | | | | | | | | | | | |
| **Air Quality**<br><br>Site clearance, civil works and vehicle movement will | 1 | 3 | 3 | 3 | 21 | Medium-High | 1 | 2 | 1 | 1 | 4 | Low |

| Potential Environmental Impact | Environmental Significance<br><br>Before Mitigation | | | | | | Environmental Significance<br><br>After Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | D | I | P | TOTAL | RISK | E | D | I | P | TOTAL | RISK |
| cause dispersion of PM10 and PM2.5 particulates and emissions from vehicles | | | | | | | | | | | | |
| **Noise**<br><br>Impact will be limited by distance, existing noise levels and relatively short construction period | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Traffic Impact**<br><br>Increased traffic flow along gravel roads giving rise to dust production | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Groundwater**<br><br>Contamination from accidental spills and improper storage of fuels and lubricants | 1 | 3 | 2 | 3 | 18 | Medium-High | 1 | 3 | 1 | 2 | 12 | Medium |
| **Soil, land use and land capability** | 1 | 1 | 2 | 3 | 12 | Low-Medium | 1 | 1 | 1 | 2 | 6 | Low-Medium |

| **Potential Environmental Impact** | **Environmental Significance Before Mitigation** | | | | | | **Environmental Significance After Mitigation** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| Soil compaction resulting from vehicle movement and soil contamination resulting from accidental spills | | | | | | | | | | | | |
| **Heritage**<br><br>Impacts will occur only if fossils are unearthed during earthmoving operations | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Visual**<br><br>Altering the topography and visual character, dust generation, visual intrusion of shaft & heavy machinery | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Terrestrial Biodiversity**<br><br>Removal of flora and stripping of topsoil and also the disturbance of faunal habitat | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |

| **Potential Environmental Impact** | **Environmental Significance Before Mitigation** | | | | | | **Environmental Significance After Mitigation** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| **Health Impact**<br><br>communicable diseases linked to housing design and HIV and STIs | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Surface water**<br><br>Sedimentation of watercourses and altered drainage paths and loss of catchment yield. | 1 | 3 | 2 | 3 | 18 | Medium-High | 1 | 3 | 1 | 2 | 12 | Medium |
| **Aquatic Ecology**<br><br>Sedimentation as a result bare area of soil and pollution of water courses resulting from hydrocarbon spills | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Socio-economic**<br><br>Employment creation | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |

| **Potential Environmental Impact** | **Environmental Significance Before Mitigation** | | | | | | **Environmental Significance After Mitigation** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| **Waste management**<br><br>Poor waste management could cause soil contamination by hydrocarbons, chemicals, cement | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Blasting and Vibration**<br><br>Fumes produced in the detonation process | 1 | 3 | 2 | 3 | 18 | Medium-High | 1 | 3 | 1 | 2 | 12 | Medium |

## *11.2 Summary of Operational Impacts*

Potential impacts resulting for the operational phase are indicated in **Table 33**

**Table 33: Summary of operational impacts**

| **Potential Environmental Impact** | **Environmental Significance<br><br>Before Mitigation** | | | | | | **Environmental Significance<br><br>After Mitigation** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| Operational Phase | | | | | | | | | | | | |
| **Air Quality**<br><br>Particulate mobilisation from stockpiles, crushers, and vehicular movement | 1 | 3 | 1 | 3 | 12 | Low-Medium | 1 | 3 | 1 | 2 | 6 | Low-Medium |
| **Noise**<br><br>Noise unlikely to cause exceedances of guideline levels, but some receptors will experience intrusive noise | 1 | 3 | 2 | 3 | 18 | Medium-High | 1 | 3 | 1 | 2 | 12 | Medium |
| **Traffic Impact** | 1 | 3 | 1 | 3 | 15 | Low-Medium | 1 | 3 | 1 | 1 | 5 | Low |

| Potential Environmental Impact | Environmental Significance<br><br>Before Mitigation | | | | | Environmental Significance<br><br>After Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| Increase in traffic on the road networks | | | | | | | | | | | | |
| **Groundwater**<br><br>Groundwater inflow into the shaft and reduction of groundwater levels due to dewatering of shafts | 1 | 3 | 2 | 3 | 18 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Soil, land use and land capability**<br><br>Loss of current land uses and agricultural productivity and soil compaction from vehicle movements | 1 | 3 | 3 | 3 | 21 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Heritage**<br><br>Excavations may expose archaeological artefacts | 1 | 3 | 2 | 3 | 18 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Visual**<br><br>Appearing of WRD and blasting which cause the | 1 | 3 | 1 | 3 | 15 | Low-Medium | 1 | 3 | 1 | 1 | 5 | Low |

| **Potential Environmental Impact** | **Environmental Significance Before Mitigation** | | | | | | **Environmental Significance After Mitigation** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| altering the topography and visual character, dust generation, visual intrusion of shaft & heavy machinery | | | | | | | | | | | | |
| **Terrestrial Biodiversity**<br><br>Displacement of faunal, habitat fragmentation | 1 | 3 | 3 | 3 | 21 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Health Impact**<br><br>communicable diseases linked to housing design and HIV and STIs | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Surface water**<br><br>Pollution of surrounding watercourses due to spills, overflows and contaminated run-off | 3 | 3 | 3 | 2 | 18 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Aquatic Ecology** | 1 | 3 | 2 | 3 | 18 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |

| Potential Environmental Impact | Environmental Significance Before Mitigation | | | | | | Environmental Significance After Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | D | I | P | TOTAL | RISK | E | D | I | P | TOTAL | RISK |
| Sedimentation as a result bare area of soil and pollution of water courses resulting from hydrocarbon spills | | | | | | | | | | | | |
| **Socio-economic**<br><br>Strain on basic services and loss of livelihoods for relocated farmers. Possible increase in HIV/AIDS and unwanted pregnancies. | 3 | 3 | 3 | 3 | 27 | High | 1 | 3 | 1 | 2 | 10 | Low-Medium |
| **Waste management**<br><br>Mining residues have low potential for mobilisation of contaminants | 2 | 3 | 3 | 3 | 24 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Blasting and Vibration** | 1 | 3 | 2 | 3 | 18 | Medium-High | 1 | 3 | 1 | 2 | 12 | Medium |

| Potential Environmental Impact | Environmental Significance Before Mitigation | | | | | | Environmental Significance After Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | D | I | P | TOTAL | RISK | E | D | I | P | TOTAL | RISK |
| Fumes and fly rock produced in the detonation process | | | | | | | | | | | | |

### 11.2.1 Summary of Decommissioning and Rehabilitation Phase

Impacts emanating from decommissioning and rehabilitation phase are indicated in **Table 34.**

**Table 34: Summary of decommissioning and rehabilitation impacts**

| Potential Environmental Impact | Environmental Significance Before Mitigation | | | | | | Environmental Significance After Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | D | I | P | TOTAL | RISK | E | D | I | P | TOTAL | RISK |
| **Decommissioning and Rehabilitation Phase** | | | | | | | | | | | | |
| **Air Quality**<br><br>Considerations and impacts similar to construction phase, possibly greater due to larger area and eddy | 2 | 3 | 1 | 3 | 18 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Noise** | 3 | 3 | 3 | 3 | 27 | High | 3 | 3 | 1 | 1 | 7 | Low-Medium |

| **Potential Environmental Impact** | **Environmental Significance<br><br>Before Mitigation** | | | | | | **Environmental Significance<br><br>After Mitigation** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| Noise unlikely to cause exceedances of guideline levels, but some receptors will experience intrusive noise | | | | | | | | | | | | |
| **Traffic Impact**<br><br>Significantly less traffic than operational phase, but will have some effect on road safety, wear & tear, driver frustration. | 2 | 3 | 3 | 3 | 24 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Groundwater**<br><br>Decanting and groundwater contamination | 2 | 3 | 3 | 3 | 24 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Soil, land use and land capability**<br><br>Soil impacts on WRD footprints will be permanent. Elsewhere, | 3 | 3 | 3 | 3 | 27 | High | 3 | 3 | 1 | 1 | 7 | Low-Medium |

| **Potential Environmental Impact** | **Environmental Significance<br><br>Before Mitigation** | | | | | | **Environmental Significance<br><br>After Mitigation** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| mixing of topsoil with subsoil<br><br>during rehabilitation would have an adverse impact | | | | | | | | | | | | |
| **Heritage**<br><br>The closure and rehabilitation activities cannot possibly affect any items of archaeological or cultural significance unless earthmoving takes place on areas of the site where no such activities were undertaken<br><br>during the construction and operational phases. If any | 0 | 0 | 0 | 0 | 0 | None | 0 | 0 | 0 | 0 | 0 | None |

| Potential Environmental Impact | Environmental Significance<br><br>Before Mitigation | | | | | Environmental Significance<br><br>After Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | E | D | I | P | TOTAL | RISK | E | D | I | P | TOTAL | RISK |
| **Visual**<br><br>Reclaiming stockpiles & WRD, removal of infrastructure | 1 | 3 | 3 | 3 | 21 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Terrestrial Biodiversity**<br><br>Habitat stabilisation and reconstruction | 1 | 3 | 3 | 3 | 21 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Health Impact**<br><br>communicable diseases linked to housing design and HIV and STIs | 1 | 1 | 1 | 2 | 6 | Low-Medium | 1 | 1 | 1 | 1 | 3 | Low |
| **Surface water**<br><br>Increase in surface water quantity | 2 | 3 | 2 | 3 | 21 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Aquatic Ecology**<br><br>Sedimentation as a result bare area of soil and | 3 | 3 | 3 | 3 | 27 | High | 3 | 3 | 1 | 1 | 7 | Low-Medium |

| Potential Environmental Impact | Environmental Significance<br><br>Before Mitigation | | | | | | Environmental Significance<br><br>After Mitigation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** | **E** | **D** | **I** | **P** | **TOTAL** | **RISK** |
| pollution of water courses resulting from hydrocarbon spills | | | | | | | | | | | | |
| **Socio-economic**<br><br>Loss of jobs and local spend can be softened by skills training and support for entrepreneurs and proper rehabilitation of disturbed footprint. | 2 | 3 | 3 | 3 | 24 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |
| **Waste management**<br><br>Mobilisation of particulates and other contaminants from mining residue deposits | 2 | 3 | 3 | 3 | 24 | Medium-High | 1 | 3 | 1 | 1 | 5 | Low |

# 12 CUMMULATIVE IMPACTS

## *12.1 Terrestrial Biodiversity*

Cumulative impacts are contextual and encompass a broad spectrum of impacts at different spatial and temporal scales (IFC, 2013) i.e. bulk of the vegetation is disturbed by human settlements. The proposed development will have a negative impact on the vegetation onsite. The additional loss of vegetation as a consequence of the proposed road will therefore have a High cumulative impact.

SCC have likely already been lost as a result of the existing developments in the area i.e farming. As such, the loss of SCC associated with the proposed mining activities will likely contribute to the cumulative loss of SCC within the region. However, if the mitigation measures as described in this report are implemented and adhered to, this impact can be reduced to moderate negative.

### 12.1.1 Mitigation Measures

Recommended mitigation and rehabilitation measures for faunal community's hinge largely on protecting their habitats and ensuring it remains intact. In additional to this the following measures are recommended:

- If any faunal species are recorded during construction, especially the protected species found on site, activities should temporarily cease, and an appropriate specialist should be consulted to identify the correct course of action;
- Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited;
- The areas that were delineated with the lowest sensitivities should be the only areas considered for development; and
- As far as possible, the proposed developments should be placed in areas that have already been disturbed and transformed (low sensitivity areas). It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.

## *12.2 Hydrology*

Even with extensive mitigation, significant latent impacts on the receiving aquatic ecological environment are deemed likely. The following points highlight the key latent impacts that are anticipated:

a) Disturbance of ecologically sensitive aquatic habitats and downstream areas;
b) Sedimentation of aquatic habitat;
c) Deterioration of water quality of the aquatic resources;
d) Alteration of aquatic habitat.

### 12.2.1 Mitigation Measures

The mitigation actions provided below are important to consider with other specialist assessment which include but not limited to the following specialist studies: Groundwater, Surface Water and Wetlands. Proposed mitigation measures are as follows:

a) Placing sediment trapping berms;
b) Implementing a stormwater management plan with purpose to re-use the water for dust suppression;
c) Affected watercourse areas must be rehabilitated to maintain functionality; and
d) The banks of rivers and streams are often susceptible to collapse and must be monitored and reinforced if needed.

# 13 ENVIRONMENTAL IMPACT STATEMENT

## *13.1 Summary of the Key Findings of the Environmental Impact Assessment*

The impact assessment above discusses impacts and provides an overall impact assessment. Although some impacts of high significance may be anticipated, no fatal flaws have been identified for the project thus far.

The surface infrastructure area will be placed and avoids all highly sensitive habitat such as wetlands, rivers and ridges. The flora associated with this area is transformed due to agriculture and thus the loss of biodiversity is not significant in this area. Impact to the agriculturally important soil is a significant impact, thus correct soil stripping, handling and management is important.

The infrastructure area will be designed to minimise the overall footprint as far as possible. Clean and dirty water areas will be mapped, and a storm water management plan will be compiled in accordance with GN704. Ensuring properly designed storage areas (waste, chemicals and mine residue) and practising good housekeeping practices at all times by ensuring all materials are properly stored within designated areas, will further reduce the potential risk for contamination by surface water runoff. Although not further detailed here, other impacts of moderate or lower significance must be managed in accordance with the EMP.

## *13.2 Final Site Map*

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

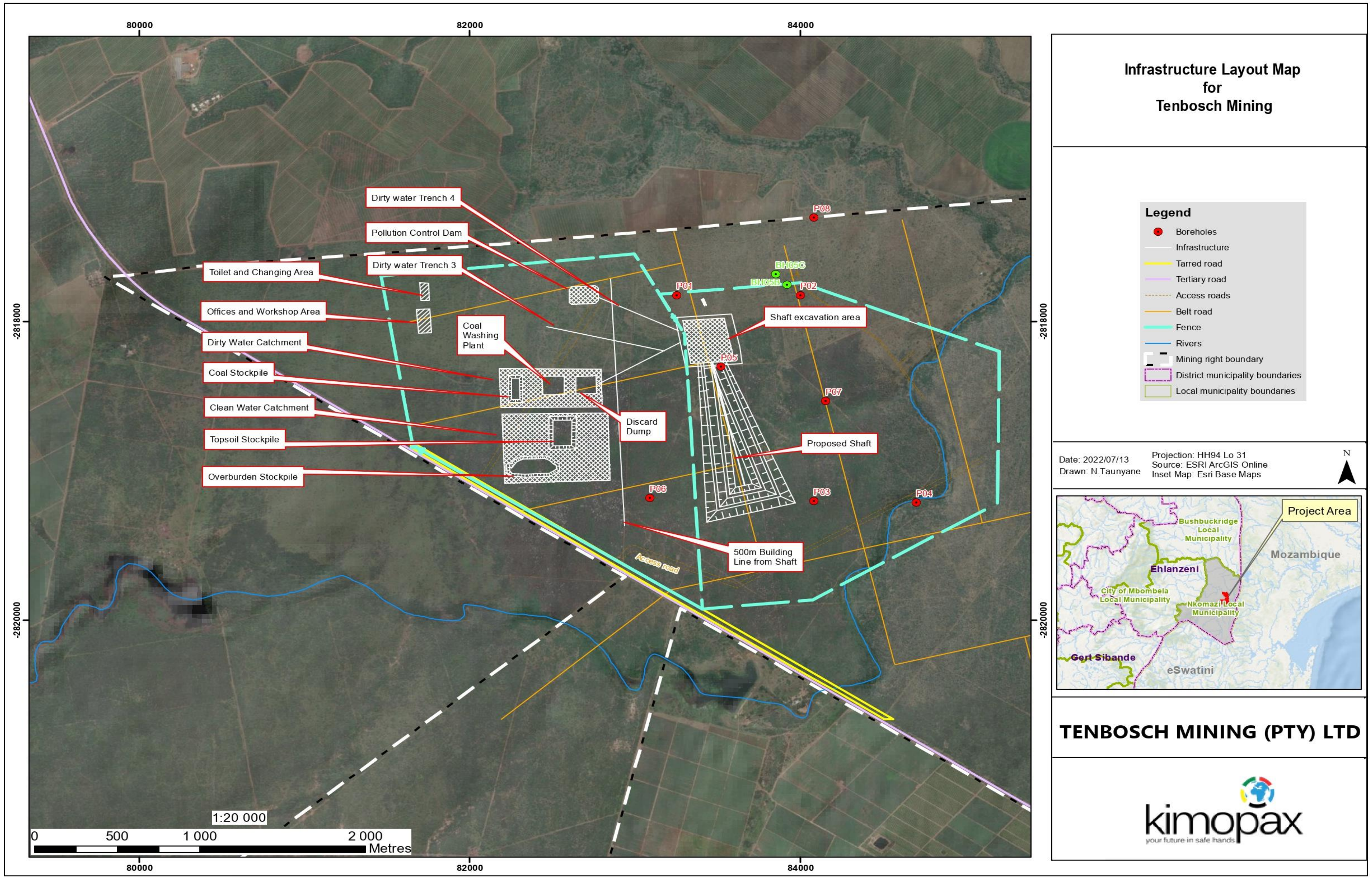



**Figure 20: Site Layout Map**

### *13.3 Summary of the Positive and Negative Implications and Risks of the Proposed Activity and Identified Alternatives*

Refer to **Table 11: Positive and Negative impact of the proposed activity**

# 14 PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

The EMP will address the environmental impacts during the Construction, Operational, Decommissioning and Post-Closure Phases of the Project. Due regard must be given to environmental protection during the entire Project; many environmental recommendations are made to achieve environmental protection. The impact management objectives and outcomes of the proposed project are as follows:

a) To reduce mine decant at the rehabilitated shaft;
b) To reuse contaminated water from mining site and prevent discharge of contaminated onto natural environment;
c) To continually monitor ground water levels and water quality to ensure that adverse impacts are managed;
d) To re-shape rehabilitated slopes to ensure free draining;
e) To monitor dust dispersion as per the Dust Regulations;
f) To monitor noise during all phases of the mine;
g) To reduce traffic congestion on feeder roads;
h) To establish a buffer zone between ecologically sensitive areas and the mine boundaries;
i) To prevent soil compaction, contamination and soil erosion;
j) To prevent sedimentation and surface water contamination;
k) To continually carry out noise surveys to assess the impacts of noise on the surrounding communities; and
l) To create road safety culture amongst the employees during all phase of the mine.

# 15 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

The authorisation should include the following conditions:

a) Compliance with the approved EMPr.
b) Undertaking of environmental performance assessment reporting once in every two (2) years.
c) Revising quantum financial provision on an annual basis.
d) External auditing of the EMPr by an independent environmental auditor.

# 16 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

All specialist studies will be conducted to certain levels of confidence, and in all instances known and accepted methodologies will be used, and confidence levels are generally high. This means that in most cases, the situation described in the pre-mining environment may be accurate at high certainty levels, but there exists a low probability that some issues may not be identified during the studies. Such situations cannot be avoided simply due to the nature of field work.

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

The EIA/EMPr is a comprehensive document with information provided through the specialist studies, none of which identified fatal flaws. Upon review of all specialist input, the project should go ahead with the recommended mitigation measures contained in the final EIA/EMPr. It is, therefore, Kimopax's reasoned opinion that the activity be authorised on condition that the EMP is fully adhered to, annually audited and amended where necessary based on audit findings.

## *17.1 Rehabilitation requirements*

Rehabilitation of the project will aim to:

a) Ensure that the final elevation around the site is free draining.
b) Ensure that soil replaced in the same sequence to ensure soil characteristics are retained as far as possible.
c) Ensure a self-sustaining post-mining land capability similar to pre-mining of grazing and limited low-intensity arable lands.
d) Ensure that the rehabilitated areas are cleared of all contaminating substances and that runoff from the area is returned to the natural catchment.
e) Ensure that vegetation growth and cover on the rehabilitated area is sustainable and local indigenous species are establishing on site and that succession and colonisation from surrounding areas is taking place on rehabilitated areas.
f) Ensure that alien invasive growth is eradicated until the closure certificate is granted.

# 18 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED.

The Environmental Authorisation will be required for a period of 30 years.

# 19 UNDERTAKING

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

# 20 FINANCIAL PROVISION

As per NEMA financial provision regulations, itemised costs must be provided within the financial provision. As the DMR's closure cost assessment provides itemised costs, this process was used to determine the quantum for financial provision. Financial Provision will be made by way of a guarantee acceptable to the DMR, as per the Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations.

# 21 DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

## *21.1 Deviations from the Methodology Used in Determining the Significance Of Potential Environmental Impacts and Risks*

No deviations will be made.

## *21.2 Motivation For the Deviation*

Not applicable as no deviation was made.

# 22 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

## *22.1 Socio-Economic Impacts*

The directly affected people will be farm owners and the neighbours.

Impacts and mitigation measures are detailed in the Social Impact Assessment Specialist report.

## *22.2 Impact On Any National Estate Referred to In Section 3(2) Of The National Heritage Resources Act.*

Despite that no archaeological objects were observed during the site visit, and that the area is disturbed due to farming activities, the client is reminded that unavailability of archaeological material does not mean absence, as archaeological material might be hidden underground. It is thus the responsibility of the developer to notify contractors and workers about archaeological material (e.g., pottery, stone tools, remnants of stone-walling, graves, etc.) and fossils that may be located underground. Furthermore, the client is reminded to take precautions during construction.

## *22.3 Other Matters Required in Terms Of Sections 24(4)(a) and (b) of the Act*

Section 24(4) (b) (i) of the Act specifies the need for investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity.

# PART B

# ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

# 23 ENVIRONMENTAL MANAGEMENT PROGRAMME.

## *23.1 Introduction*

An Environmental Management Plan (EMP) is a document used to prescribe management mechanisms/methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits of a development. An EMP can be based on the National Environmental Management Act (Act No. 107 of 1998, (NEMA)(as amended), and also bestows a 'Duty of Care' on those who cause, have caused or may in future cause pollution or degradation of the environment, as per of Section 28(1) of NEMA.

## *23.2 Objectives of the EMP*

The EMP has been compiled to provide recommendations and guidelines for environmental monitoring throughout the construction and operational phase of the proposed mining project. This is done to ensure that all relevant factors are considered, and to ensure for environmentally responsible development. More specific objectives for this EMP include:

a) To provide an outline of the legal requirements;
b) To ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
c) To mitigate the management of construction associated impacts such as water quality impairment, flow modification, loss of riparian habitat and loss of aquatic ecosystem services;
d) To assign roles and responsibilities to parties involved regarding the implementation of this EMPr;
e) To describe a monitoring / stakeholder engagement programme which will enable a review of the success of the EMPr;
f) To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the proposed project;
g) To Identifying construction activities that might have detrimental impacts on the environment;
h) To identify measures that could optimize beneficial impacts;

i) To establish a method of monitoring and auditing environmental management practices during all phases of project;
j) To detail specific actions deemed necessary to assist in mitigating the environmental impact of the project; and
k) To propose mechanisms for monitoring compliance with the EMPr and reporting thereon.

## *23.3 Details of the EAP*

The details of the EAP have been provided in Section 6, Item 6.1 in Part A of this report.

## *23.4 Description of the Aspects of the Activity*

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (7.1.1) herein as required).

Refer to Section 1.2 of Part A.

## *23.5 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).***

## *23.6 Description of Impact Management Objectives Including Management Statements*

The objectives of impact mitigation and management are to:

a) Primarily pre-empt impacts and prevent the realisation of these impacts - PREVENTION.
b) Ensure activities that are expected to impact on the environment are undertaken and controlled in such a way so as to minimise their impacts – MODIFY and/or CONTROL.
c) Ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.

d) Implement an adequate monitoring programme to:

- Ensure that mitigation and management measure are effective.
- Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
- Reduce duration of any potential negative impacts.

Environmental management outcomes and related management statements are:

a) Protect the biophysical environment as far as possible.
- Minimise impacts to the biophysical environment.
- Ensure relevant legislation are applied on site including but not limited to alien invasive management and protection of ecologically sensitive species and environments.
- Permits for any activities related to protected species on site will be sought prior to these species being affected. Preservation and 'offset' approaches will be applied to these species as far as possible.

b) Protect the water resources in the area.

- Ensure clean and dirty water separation systems are established on site from the onset and are in line with GN704 principals.
- Use water responsibly and recycle water as much as possible.
- Ensure relevant legislation regarding the National Water Act are applied on site.
- Ensure IWUL is obtained prior to activities commencing on site.
- Annually update the IWWMP with updated data recorded from site.

c) Ensure atmospheric pollution is to a minimum:

- Manage dust generation.
- Revegetate all bare soil.

d) Mine responsibly and ensure operation is compliant with legislative requirements.

- Ensure an adequate rehabilitation model is compiled before decommissioning.

- Ensure soil utilisation guide is applied on site and maintain soil berms and stockpiles at all times from the onset of activities.
- Conduct annual EMP audits and complete the necessary amendment process where this is deemed necessary.

e) Ensure socially responsible mining:

- Ensure the targets and objectives set out in the SLP are followed and adhered to.
- Provide a safe environment for people to work in:
  - ✓ Ensure safety policies are established on site in line with national policy.
  - ✓ Ensure adequate PPE for staff, contractors and visitors to the site.
  - ✓ Ensure health and environmental policies are established and in line with national policies.

f) Protect historical and cultural aspects:

- Ensure all archaeological and cultural artefacts/sites are preserved in situ until such time that authorisation to remove these is obtained.
- Ensure South African Heritage Resources Act principals are applied with regard to all the archaeological and cultural artefacts/sites
- Ensure any relocation of culturally sensitive sites is done according to SAHRA principals, in a socially sensitive manner and with open and transparent communication with relevant I&APs.

g) Maintain open and transparent dialogue with I&APs:

- Conduct regular feedback meetings with I&APs (at least biannually).
- Maintain a complaint register on site and respond to comments in a timely manner.
- Ensure communications and any necessary agreements are made between any sensitive I&APs identified through any stage of the project.

## *23.7 Determination of Closure Objectives.*

The overall closure objective is to restore the area disturbed by the project activities to condition that is safe for humans and animals and suitable for farming and cattle grazing, and to ensure that off-site environmental quality is not adversely affected by physical effects and chemical contamination arising from the past mining and ore processing activities. This will be done by:

a) Leaving the haul roads to provide safe and easy access to water accumulating in the shaft and to discourage more dangerous access across the waste rock berms (enviro bunds) surrounding the rest of the shaft perimeters;
b) Conducting dedicated soil surveys over the operational footprint area and removing identified pockets of contaminated soil;
c) Cleaning up of sources of possible soil contamination still present on the site to protect the downstream receiving environment;
d) Ripping compacted areas and shaping all project-affected areas to be free draining and so that runoff from the rehabilitated project area is routed to the natural drainage lines;
e) Spreading stockpiled subsoil and topsoil consecutively on areas from which it had been stripped, on the upper surface and sparingly onto the waste rock dumps;
f) Testing the topsoil and ameliorating/fertilising it appropriately;
g) Vegetating the site with locally indigenous species of grass, forbs, shrubs and trees
h) Monitoring groundwater quality and surface runoff for at least 5 years after closure, longer if warranted by the results. Target water quality objectives must be based on pre-closure groundwater and surface runoff quality from the Smarty mine and infrastructure site; and
i) Providing the required measures to limit at source the generation of contaminants which could adversely affect local groundwater quality.

## *23.8 Closure Objectives*

Closure objectives must be met with regards to:

a) Topography

- To ensure that the final elevation will result in the continuation of the pre-mining surface drainage pattern.

b) Soil, Land Capability and Land Use

- To ensure that soil types are replaced in correct sequence, subsoil followed by topsoil, and at appropriate depths.
- To ensure post-mining land capability is at least similar to pre-mining, which is grazing and some arable lands.
- To ensure that the land capability is self-sustaining.
- To ensure that pre-mining land uses can continue.

c) Surface Water

- To ensure that no dirty water from the site enters the surrounding surface water systems.
- To maintain flow in downstream rivers to prevent deterioration of ecological status.

d) Groundwater

- To ensure that possible plumes originating from the mining areas do not impact significantly on the surface water features or surrounding user's boreholes.
- To ensure that groundwater users that are impacted have alternative sustainable water sources of the similar quality and quantity.

e) Flora and Fauna

- To ensure that vegetation growth and cover on the rehabilitated areas is sustainable.
- To ensure that alien invasive growth is eradicated until the closure certificate is granted.
- To encourage surrounding animals to return into the rehabilitated areas to maintain the surrounding biodiversity.

f) Aquatic Ecosystems

- To ensure that aquatic ecosystems are maintained as close as possible to that of the pre-mining environment.

g) Wetlands

- To minimise the disturbance on wetlands.
- To ensure that the adjacent wetland conditions are similar to that of the pre-mining Present Ecological State.

## *23.9 The Process for Managing Any Environmental Damage, Pollution, Pumping And Treatment Of Extraneous Water Or Ecological Degradation As A Result Of Undertaking A Listed Activity.*

**Surface Water**

a) Clean and dirty water separation and dirty water containment features must be established on site, in line with GN704 requirements and engineered designs, prior to any other activity taking place on site:

- The dirty water catchment must be demarcated and managed as small as possible.
- Upslope soil berms will be constructed as close to the activity area as possible to divert clean water runoff around the site into natural drainage lines.
- Where diverted storm water flow enters a wetland or drainage line, flow dissipaters and / or silt traps must be installed if high flow, erosion and / or sedimentation is observed.
- Internal trenches will be excavated to drain dirty water from the active footprint to lined containment dams. Excavated soils will be placed upslope of the trenches to prevent contamination of the soil with dirty water runoff.
- All storm water diversion features will be designed to divert a 1:50 year 24hr storm event.
- All dirty water runoff will be collected in these trenches which will divert the runoff to the PCD.
- Silt traps will be established upslope of PCD to reduce the need for silt clearing in dirty water dams.
- PCD and high-load trenches will be lined with an appropriate liner.
- All trenches and PCDs will be designed to contain a 1:50 year 24hr storm event.

b) Pipelines and pumps required on site will be adequately sized and backups will be available on site to ensure continuation of water transfer activities in event of breakdowns.

- Pipelines should be laid within the dirty water footprint area.
- Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur.
- Inspect, maintain and repair all pipelines and pumps throughout the life of mine.

## *23.10 Potential Risk of Acid Mine Drainage*

The acid generation potential of the hard rock and stockpile materials will be estimated by using ABA on the samples that will be collected from waste representing the WRD. The NAG test provides a direct assessment of the potential for a material to produce acid after a period of exposure (to a strong oxidant) and weathering. The test can be used to refine the results of the ABA predictions. In the Net-acid Generating (NAG) test hydrogen peroxide ($H_2O_2$) is used to oxidize sulphide minerals in order to predict the acid generation potential of the sample.

For the material to be classified in terms of their acid-mine drainage (AMD) potential, the ABA results could be screened in terms of its NNP, %S and NP:AP ratio.

## *23.11 Volumes and Rate of Water Use Required for The Mining*

A total of approximately 125 000 cubic metres will be required.

## *23.12 Has a Water Use Licence Been Applied For?*

A water use license application (IWULA) and associated Integrated Water and Waste Management Plan (IWWMP) will be applied will be submitted to the DWS.

## *23.13 Impacts to be mitigated in their respective phases*

**Table 35: Impacts to be mitigated in their respective phases**

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
|---|---|---|---|---|---|
| **Construction Phase** | | | | | |
| Air Quality | Excavations All infrastructure areas, development footprints and associated activities | Dust emissions due to erosion of open storage stockpiles and exposed areas when the threshold wind speed is exceeded. | a) Wet suppression, applied sparingly, to ensure the absence of visible dust;<br>b) Wet suppression is about 50% effective on unpaved roads, but chemical binders such as Dustex or Dust-ASide may also be used;<br>c) Enforce low vehicle speeds on unpaved areas (< 40 km/h);<br>d) Use of shade cloth where necessary, to reduce wind speeds and reduce travel distance of dust;<br>e) Vegetate the berm and other surfaces that were laid bare as a result of construction with a locally indigenous grass species where practicable, as soon as possible; and<br>f) Requiring contractors to maintain construction vehicles in good condition. | Dust fallout will be monitored and managed as per GNR827 and compared to baseline limits (which already exceed NEM:AQA limits). Conditions stipulated in licenses/rights/permits. | Dust management plan must be in place at the start of the project and carried out through all phases of the LOM. |
| | Vehicle movement | Emissions from the resuspension of loose material on the road surface. Vehicle-entrained dust emissions from the unpaved haul roads within the proposed Tenbosch Mining Project mining area potentially represent the most significant source of fugitive dust for the mine. | Haul road mitigation measures include tarring or paving, wet suppression and chemical surface treatments. Regular, light watering of the road is needed for water spraying to be effective in reducing particulate emissions. Other surface treatments include the use of chemicals such as calcium chloride or magnesium chloride. These chemicals attract moisture – drawing moisture out of the air during periods of high humidity, and also reducing the evaporation rate of water during hot periods. Some products contain surfactants which act as wetting agents. These not only reduce the amount of water required for wetting the roads, but also have slight binding properties. Another approach to dust | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
|---|---|---|---|---|---|
| | | | control involves the application of organic or synthetic compounds that physically bind the dust particles together. The disadvantage of paving/tarring, infrequent watering and chemical mitigation measures is their inability to prevent material spillage from being re-entrained. | | |
| Ecology | Site clearance for establishment or access roads, infrastructure and shaft area | Clearing of vegetation | Avoid sensitive areas and implement buffer zones. | Preservation of biodiversity in terms of NEM:BA | From day 1, through life of project until rehabilitation vegetation established |
| | | Loss of plant SSC | Limit the footprint area to the shaft and infrastructure Avoid areas of remaining indigenous vegetation. | | |
| | | Displacement of fauna species | Avoid high biodiversity sensitivity areas (natural vegetation, watercourses & wetlands) and comply to prescribed buffer zone.s | | |
| | | Loss of faunal SSC | Avoid areas in which plant species of conservation concern may occur;<br>If some areas cannot be avoided implement rescue of plant species of conservation concern. | | |
| Noise Impact | Site clearing | Clearing and stripping of topsoil and vegetation | Earthwork activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | Environmental Conservation Act, Noise Regulations | From day 1, through life of project until rehabilitation vegetation established |
| | | Construction of mine infrastructure | Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | | |
| Aquatic Ecology | Site clearance for establishment of access roads, infrastructure and shaft area | Sedimentation as a result of bare areas of soil | a) Sediment trapping berms<br>b) Stormwater management plans<br>c) Dry season construction | GNR704 and Water Use License | From construction phase until rehabilitation |
| | Establishment or access roads and crossings structures | Disturbance of watercourse channels and sedimentation | a) Upgrade existing roads and causeways<br>b) Dry season construction | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
|---|---|---|---|---|---|
| | Vehicle movement and refuelling | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery Refuel in hard-park/bunded area Store hydrocarbons safely in bunded area.<br>b) Vehicle maintenance and inspection daily.<br>c) Spill kits must always be available and ready on-site. | | |
| Soil, Land Use and Land Capability | Transport of materials and labour<br><br>Earthworks | Transport of materials and labour with trucks and buses as well as other light vehicles using the existing access roads. This will compact the soil of the existing roads and fuel and oil spills from vehicles may result in soil chemical pollution.<br><br>Earthworks will include clearing of vegetation from the surface, stripping topsoil (soil excavation) and stockpiling as well as drilling and blasting for the initial removal of overburden at the planned shaft as well as the construction of infrastructure like the Primary Crushing Facility, water management systems, contractors camp and sewage treatment plants. These activities are the most disruptive to natural soil horizon distribution and will impact on the current soil hydrological properties and functionality of soil. It will also change the current land use as well as land capability in areas where activities occur and infrastructure is constructed. | **a) Minimise the footprint of the Tenbosch Mining Project**<br><br>The existing pre-construction mine layout and design is aiming to minimise the area to be occupied by mine infrastructure (workshops, administration, product stockpile, etc.) to as small as practically possible. All footprint areas should also be clearly defined and demarcated and edge effects beyond these areas clearly defined. This measure will significantly reduce areas to be compacted by heavy construction vehicles and regular activities during the operational phase.<br><br>**b) Management and supervision of construction teams**<br><br>The activities of construction contractors or employees will be restricted to the planned areas. Instructions must be included in contracts that will restrict construction work and construction workers to the clearly defined limits of the construction site. In addition, compliance to these instructions must be monitored.<br><br>**c) Location of stockpiles**<br><br>Locate all soil stockpiles in areas where they will not have to be relocated prior to replacement for final | NEMA, MPRDA & CARA regarding rehabilitation & erosion control. NEM:BA in terms of protection of biodiversity. Any conditions stipulated in licenses/rights/permits | Demarcate infrastructure area and fence off before any activity takes place and maintain these for life of mine. Rehabilitate areas completely as soon as activity in those areas ceases. |
| | Handling and storage of building material | This will have the potential to result in soil pollution when not managed properly. | | | |
| | Vegetation clearance | Soil erosion is also anticipated due to vegetation clearance. The impacts of soil | | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | erosion are both direct and indirect. The direct impacts are the reduction in soil quality which results from the loss of the nutrient-rich upper layers of the soil and the reduced water-holding capacity of severely eroded soils. The off-site indirect impacts of soil erosion include the disruption of riparian ecosystems and sedimentation. Soil erosion is a permanent impact for once the resource has been lost from the landscape it cannot be recovered. Although there are off-site indirect impacts associated with this, the impact is mainly considered to be local. | rehabilitation. Refrain from locating stockpiles as close as possible to the development for cost saving only to have them relocated later during the life of the operation. The ideal is to place all overburden materials removed during construction in their final closure location, or as close as practicable to it.<br><br>**d) Topsoil stripping**<br><br>Wherever possible, stripping and replacing of soils should be done in a single action. This is both to reduce compaction and also to increase the viability of the seed bank contained in the stripped surface soil horizons.<br><br>Stripping should be conducted a suitable distance ahead of development of, for example the shaft, at all times to avoid loss and contamination. As a norm, soil stripping should be kept within 3-9 months of development, or between 50-100 metres ahead of the active operations.<br><br>**e) Stockpiling of topsoil**<br><br>To minimise compaction associated with stockpile creation, it is recommended that the height of stockpiles be restricted between of 4 – 5 meters maximum. For extra stability and erosion protection, the stockpiles may be benched. The clay content of the topsoil on the largest area of the Tenbosch Mining project area is not sufficient for stockpiles to remain relatively stable without benching. The areas on the Arcadia soil form do have sufficient clay content.<br><br>**f) Prevention of stockpile contamination** | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | Topsoil stockpiles can be contaminated by dumping waste materials next to or on the stockpiles, contamination by dust from blasting and waste rock stockpiles and the dampening for dust control with contaminated water are all hazards faced by stockpiles. This should be avoided at all cost and if it occurs, should be cleaned up immediately.<br><br>**g) Terrain stability to minimise erosion potential**<br><br>Management of the terrain for stability by using the following measures will reduce the risk of erosion significantly:<br><br>• Using appropriate methods of excavating that are in accordance with regulatory requirements and industrial best practices procedures;<br>• Reducing slope gradients as far as possible along road cuts and disturbed areas to gradients at or below the angle of repose of those disturbed surfaces; and<br>• Using drainage control measures and culverts to manage the natural flow of surface runoff.<br><br>Management of the terrain for stability by using the following measures will reduce the risk of erosion significantly:<br><br>• Using appropriate methods of excavating that are in accordance with regulatory requirements and industrial best practices procedures; | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | • Reducing slope gradients as far as possible along road cuts and disturbed areas to gradients at or below the angle of repose of those disturbed surfaces; and<br>• Using drainage control measures and culverts to manage the natural flow of surface runoff.<br><br>**h) Management of access and services roads**<br>• Existing established roads should be used wherever possible. Where possible, roads that will carry heavy-duty traffic should be designed in areas previously disturbed rather than clearing new areas, where possible. The moisture content of access road surface layers must be maintained through routine spraying or the use of an appropriate dust suppressant. Access roads should be designed with a camber to avoid ponding and to encourage drainage to side drains; where necessary, culverts will be installed to permit free drainage of existing water courses. The side drains on the roads can be protected with sediment traps and/or gabions to reduce the erosive velocity of water during storm events and where necessary geo-membrane lining can be used.<br><br>**i) Prevention of soil contamination**<br>During the construction phase, chemical soil pollution should be minimised as follows:<br>• Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment should be contained by using a drip tray with plastic sheeting filled with absorbent material; | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | • Using biodegradable hydraulic fluids, using lined sumps for collection of hydraulic fluids, recovering contaminated soils and treating them off-site, and securely storing dried waste mud by burying it in a purpose-built containment area;<br>• Avoiding waste disposal at the site wherever possible, by segregating, trucking out, and recycling waste;<br>• Containing potentially contaminating fluids and other wastes; and<br>• Cleaning up areas of spillage of potentially contaminating liquids and solids. | | |
| Groundwater | Drilling | Groundwater contamination as a result of drilling of new monitoring boreholes to investigate possible preferred groundwater flow pathways and one or two areas outside preferred pathways, which will:<br>a) Identify geological and hydrogeological control across the proposed mining right area;<br>b) Provide facilities to undertake aquifer testing and water sample collection; and<br>c) Serve as future monitoring points in an initial groundwater monitoring network. | Monthly monitoring of the boreholes with regard to water levels and water quality | Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. MHSA will be complied with regarding signage and access control. Surface water and groundwater quality in neighbouring areas will be maintained within SANS 241:2011 standards for hydrocarbons. | Hydrocarbons will only be stored on site once bunded areas are constructed. Storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine. |
| | Storage of fuels and lubricants and movement of vehicles | Spills from improper storage of fuels and lubricants and also from leaking vehicles | a) Monthly monitoring of the boreholes with regard to water levels and water quality; | Same as above | Same as above |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | b) Place drip trays under vehicles when parked;<br>c) If in-field refuelling is done from a tanker, it should be done in a designated dirty area and a spill kit and clean- up team must be available on site;<br>d) Spillages should be cleaned up immediately and contaminated soil must either be remediated in situ or disposed of at an appropriately licensed landfill site; and<br>e) Hydrocarbon storage areas must be in a bunded area and comply with the relevant SANS standards. | | |
| Surface Water | Exposure of topsoil | Sedimentation of watercourses due to exposing and loosening of soil as a result of vegetation clearing for the construction of infrastructure and pollution of watercourses due to hydrocarbon and chemical spillages | a) Use wet suppression, chemical stabilization and wind speed reduction methods that should be used to control open dust sources at the construction sites<br>b) Vegetation should only be removed where absolutely necessary;<br>c) Hydrocarbons should be stored on hardpark bunded facilities to ensure that all spillages are contained; and<br>d) Clean and dirty surface water trenches/channels should be constructed to divert runoff separately to appropriate storage facilities. | Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. MHSA will be complied with regarding signage and access control. Surface water and groundwater quality in neighbouring areas will be maintained within SANS 241:2011 standards for hydrocarbons. | Hydrocarbons will only be stored on site once bunded areas are constructed. Storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine. |
| | Vegetation removal | Altered drainage paths and loss of catchment yield due to the removal of vegetation and construction of diversion berms | Reuse dirty water as much as possible onsite instead of obtaining water from the catchment, or to treat dirty water to acceptable standards and then to discharge to the catchment. | | |
| Traffic | Transportation of materials and labourers | Construction materials being transported to site will contribute to the addition of traffic on the road network | Road network able to support additional trucks. | Mine safety in terms of MHSA and relevant regulations | From day 1 until mine closure |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | Employees and labourers transported to/ from site | Road network able to support additional commuter trips. | | |
| | | Dust will increase with increased traffic flow along gravel roads | Ensure that gravel roads are kept watered to prevent dust (other dust suppression measures may also be used). | | |
| Heritage | Site clearance | Site Clearance for construction activities might reveal or expose archaeological artefacts. | a) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken.<br>a) Education and training on heritage resources will be given to mine employees. | Heritage resources act | From construction until closure |
| Socio-Economic | Construction activities | The residual impacts associated with the creation of employment and business opportunities and training during the construction phase is that the workers can improve their skills by gaining more experience. | a) Establish targets for the employment and training;<br>b) Train workforce for longer term employment;<br>c) Adopt recruitment strategies that ensure local people are given employment preference;<br>d) Effective implementation of training and skills development initiatives;<br>e) The recruitment process has to be transparent and equitable;<br>f) Maximise and monitor local recruitment;<br>g) Consult local labour recruitment offices;<br>h) Prevent nepotism/corruption in local recruitment structures;<br>i) Promote employment of women and youth;<br>j) Formulate a labour recruitment strategy that would minimise impact on other sectors (e.g. do not recruit unskilled labour at wage levels above the wages paid in the agricultural sector); and | SLP, Mine Charter and Good relations with communities | From construction until mine closure |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | k) Establish a liaison point with the adjacent farming community to monitor the impact on their local labour force. | | |
| | | Multiplier impacts on the local economy | a) Development of a register of local SMMEs;<br>b) Linkages with skills development/ Small, Medium and Micro Enterprises (SMME) development institutions and other mining operations;<br>c) SMME skills development as part of mine SLP/LED commitments;<br>d) Create synergies with other mining/electricity enterprises LED/CSR projects;<br>e) Preference should be given to capable subcontractors who based within the local municipal area;<br>f) Align skills development to build capacity of SMMEs;<br>g) Monitoring of sub-contractors' procurement;<br>h) Development of a register of local SMME; and<br>i) Local procurement targets should be formalised in Tenbosch Mining's procurement policy. | | |
| | | a) Improved economic development;<br>b) Increased capacity to develop and maintain livelihood strategies | a) Ensure that there is stakeholder buy-in;<br>b) Aligning LED projects with those of other development role-players;<br>c) Liaison with beneficiaries to ensure needs are met;<br>d) Collaboration with other developmental role players (e.g. local and district municipalities, neighbouring mines and NGOs) during implementation of | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | envisaged projects, and where possible aligning envisaged development projects with existing ones;<br>e) Expanding its skills development and capacity building programmes for non-employees;<br>f) Monitoring system to regulate Historically Disadvantaged South African procurement<br>g) Where feasible, training should be NQF Accredited; and<br>h) A record of training courses completed per individual should be kept. | | |
| | | Increase in injuries and possible loss of lives | a) Access control to all project elements, including fencing;<br>b) Personal Protective Equipment for mine workers;<br>c) Notification of blasting schedules;<br>d) Blasting and storage of hazardous materials to adhere to prescribed regulation;<br>e) Measures suggested minimising the impact of flyrock on surrounding roads and structure;<br>f) Measures suggested in the Health Impact Assessment to minimize traffic related accidents;<br>g) Traffic calming measures to prevent speeding (e.g. speed humps);<br>h) Road maintenance;<br>i) Provide safe road crossing points and fencing of the main road and the mine site; and | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | j) Community education to sensitize community members to potential traffic and blasting safety risks. | | |
| | | Altered sense of place and breakdown of existing social networks | a) Where possible ensure that access to fields and grazing areas are uninterrupted by providing alternative access routes and/or temporary access points during construction activities;<br>b) Tenbosch Mine should ensure that residents are kept informed on a day-to-day basis of construction progress and of when access will be blocked;<br>c) Measures to prevent deterioration of roads;<br>d) suggested in Traffic Impact Assessment (e.g. drivers to report road deterioration to the MP Province Department of Transport);<br>e) Regulation of traffic at intersections and access roads to the site;<br>f) Road upgrading measures should be investigated and implemented in conjunction with the relevant government department (e.g. repairing and rehabilitating the main roads and sealing the roadway to increase its capacity for Heavy Moving Vehicles);<br>g) Inform communities of planned construction activities that would affect vehicle/pedestrian traffic;<br>h) Ensure that access to key services are uninterrupted by providing alternative access routes in cases where construction activities restricts or disrupt movement; and | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | i) Construction of cattle crossings at suitable intervals should be incorporated into project design. | | |
| | | a) Displaced farm workers;<br>b) Loss of livelihoods | a) Suitable mitigation measures should be defined that protect the farm workers and ensure that they are adequately provided for and supported should they be moved or lose their employment;,<br>b) A Resettlement Action Plan and associated Livelihood Restoration Plan may be required;<br>c) Implement surface lease agreements with all community members who have grazing or ploughing land, this will minimise the impact of economic displacement; and.<br>d) Implement the Grievance Mechanism to ensure ongoing, proactive engagement and effective management of grievances. | | |
| | | Strain on the existing infrastructure which is already inadequate | a) To limit, as far as reasonably possible, additional pressure on existing infrastructure and services;<br>b) To work in partnership with government, industry, and relevant organisations to enhance the existing infrastructure and services;<br>c) To liaise openly and frequently with affected stakeholders to ensure they have information about the proposed Tenbosch Mining Project;<br>d) Liaison with district and local municipalities well in advance to ensure needs are met;<br>e) Ensure that municipalities take into account expected population influx; | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | f) Promotion of mining methods to allow for surface development;<br>g) Influx management; and<br>h) To make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders. | | |
| Waste Management | Construction activities | Typical wastes produced during construction activities include unused concrete mix, oils, lubricants, paints, solvents, packaging materials, general domestic waste and offcuts of building materials such as steel, wood, glass and tiles. If stored or discarded on open ground, hydrocarbons will cause soil contamination and possibly groundwater pollution. | a) Sort the wastes and store in separate skips or other containers for hydrocarbons, recyclable materials and non- recyclable materials. Recyclable materials should be sorted into wood, steel, glass, plastic, paper and used oil, and stored in separate containers;<br>b) Have recyclable wastes removed by responsible recyclers; and<br>c) Have non-recyclable wastes removed by reputable contractors for disposal at appropriately licensed landfill. | Waste management standards and Regulations | From construction until closure |
| **Operational Phase** | | | | | |
| Air Quality | Drilling and blasting | Emissions from drilling are a relatively minor component of the overall emission from an umderground mine. The only available emission factor for drilling is a simple uncontrolled TSP emission factor of 0.59kg/hole for overburden (US EPA, 1995). Clearly, other variables such as the depth of the holes, diameter of the holes, and moisture content of the material being drilled would also be relevant and it might be supposed that an emission factor equation should take account of these variables. However, in the absence of other data (and given the relatively minor contribution of this | a) Efficiency will be applied to reduce wastage and unnecessary fuel consumption;<br>b) Carbon offsets will be considered if required;<br>c) Concurrent best practice rehabilitation and vegetation monitoring will be applied to allow for the restoration of some the carbon sink functionality within the mining right area; and<br>d) Avoid blasting under windy conditions as far as practicable. | Dust fallout will be monitored and managed as per GNR827 and compared to baseline limits (which already exceed NEM:AQA limits). Conditions stipulated in licenses/rights/permits. | Dust management plan must be in place at the start of the project and carried out through all phases of the LOM. |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | source to overall emissions from mining operations), it is reasonable to accept the 0.59 kg/hole factor for TSP | | | |
| | Processing plant | The moisture content of the material processed can have a substantial effect on emissions | Surface wetness causes fine particles to agglomerate on, or to adhere to, the faces of larger chunks of ore, with a resulting dust suppression effect. However, as new fine particles are created by crushing and attrition, and as the moisture content is reduced by evaporation, this suppressive effect diminishes and may disappear. | | |
| | Vehicle movement | Vehicle entrainment from unpaved roads | a) Enforcement of a 40 km/hour speed restriction on unpaved haul roads;<br>b) Wet suppression on haul roads, with the addition of a chemical binder if necessary. | | |
| | Crushing and screening | Crushing and screening operations represent significant dust-generating sources if uncontrolled. The large percentage of fines in this dustfall material enhances the potential for it to become airborne. It was assumed that primary crushing (crushing to achieve particles of <300 mm) will take place in the shaft area to reduce the ore to a transportable size for the conveyor system. | Wet suppression will be used for both the secondary and tertiary crushing stages. | | |
| | Materials handling | Materials handling operations which are predicted to result in significant fugitive dust emissions from mining operations include the transfer of material by means of loading and offloading of trucks, loading and offloading conveyors, transfer from one conveyor to another and bulldozing. The quantity of dust which will be generated will depend on | a) Reduced tipping and drop heights where practicable;<br>b) Regular clean-up at loading areas and on paved surfaces to prevent entrainment by wind or vehicles;<br>c) Use of shade cloth where necessary, to reduce wind speeds and reduce travel distance of dust; | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | various non-climatic parameters such as the nature (moisture content and silt content) and volume of the material handled. | d) Covering of exposed areas with coarsely crushed rock or aggregate material where practicable;<br>e) Maintaining all vehicles in good condition at all times; and<br>f) Continuous dust and fine particulate monitoring should be implemented to monitor compliance with the NAAQS. | | |
| Ecology | | Alien plant establishment | Implementation of alien invasive plant management plan needs to be continued during operation to prevent the growth of invasive on cleared areas. | Preservation of biodiversity in terms of NEM:BA | From day 1, through life of project until rehabilitation vegetation established |
| | | Disturbance/Displacement of Faunal species | Minimise footprint area Work only in clearly demarcated areas | | |
| | | Disturbance of vegetation communities | Minimise footprint area Work only in clearly demarcated areas | | |
| | | Habitat fragmentation | Minimise footprint area Work only in clearly demarcated areas | | |
| | | Killing of faunal species | Minimise footprint area Work only in clearly demarcated areas | | |
| Noise | Operation of processing plant | Noise increase at the boundary of the mine footprint and at the abutting residential | a) All noise sources exceeding 85.0dBA to be identified and if practical to be acoustically screened off.<br>b) Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise levels at the boundaries of the plant have not changed. | Environmental Conservation Act, Noise Regulations | From day 1, through life of project until rehabilitation vegetation established |
| | Shaft sinking activities | | | | |
| | Hauling of waste rock to the waste dump | | | | |
| | Hauling of material to the plant | | | | |
| | Additional traffic | | Speed limit of mining areas to be adhered to at all times | | |
| | Operation of an emergency generator | | Noise readings to be done in the vicinity of and along the emergency boundaries to ensure that the prevailing ambient noise level is not exceeded. | | |
| Aquatic Ecology | | Vehicular movement and sedimentation | a) Sediment trapping berms | GNR704 and Water Use License | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | Operation of mine and management of access roads | | b) Stormwater management plans | | From construction phase until rehabilitation |
| | | Pollution of water resources as a result of mine waste | a) Implement Integrated Wastewater Management Plan<br>b) Aquatic biomonitoring | | |
| | | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery Refuel in hard-park/bunded area Store hydrocarbons safely in bunded area;<br>b) Vehicle maintenance and inspection daily; and<br>c) Spill kits must always be available and ready on-site. | | |
| Soil, land use and land capability | Shaft and mine infrastructure | Shaft and surface infrastructure will both lead to surface impacts on soil resources. Surface infrastructure like buildings, haul roads, waste rock dumps and product stockpiles are by far the most disruptive to current land uses, land capability as well as agricultural potential of the soil. Soil underneath buildings and stockpiles are subject to compaction and sterilization of the topsoil | **Management of potential soil contamination during the operational phase**<br><br>The following management measures will either prevent or significantly reduce the impact of soil chemical pollution on site during the operation phase:<br><br>a) Stockpiles are managed so they do not become contaminated and then need additional handling or disposal;<br>b) A low process or storage inventory must be held to reduce the potential volume of material that could be accidentally released or spilled;<br>c) Processing areas should be contained and systems designed to effectively manage and dispose of contained storm water, effluent and solids;<br>d) Storage tanks of fuels, oils or other chemicals stored are above ground, | NEMA, MPRDA & CARA regarding rehabilitation & erosion control. NEM:BA in terms of protection of biodiversity. Any conditions stipulated in licenses/rights/permits | Demarcate infrastructure area and fence off before any activity takes place and maintain these for life of mine. Rehabilitate areas completely as soon as activity in those areas ceases. |
| | Spills of fuel and lubricants | Soil chemical pollution as a result of spills of fuel and lubricants by vehicles and machinery as wells as the accumulation of domestic waste, is considered to be a moderate deterioration of the soil resource. This impact will be localized within the site boundary and have medium-high significance on the soil resource. | | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | Coal is likely to cause toxic effects for soil microbes or plants due to dust from or soil stockpiles. | preferably with inspectable bottoms, or with bases designed to minimise corrosion. Above-ground (rather than in-ground) piping systems should be provided. Containment bunds should be sealed to prevent spills contaminating the soil and groundwater;<br>e) Equipment, and vehicle maintenance and washdown areas, are contained and appropriate means provided for treating and disposing of liquids and solids;<br>f) Air pollution control systems avoid release of fines to the ground (such as dust from dust collectors;<br>g) Solids and slurries are disposed of in a manner consistent with the nature of the material and avoids contamination; and<br>h) Effluent and processing drainage systems avoid leakage to ground. | | |
| | Vehicle movement | Soil compaction will be a measurable deterioration that will occur as a result of the weight of the topsoil and overburden stockpiles stored on the soil surface as well as the movement of vehicles on the soil surfaces (including access and haul roads). This is a permanent impact that will be localized within the site boundary with medium-low consequence and significance in the mitigated scenario. | | | |
| | Vegetation clearance | During the operational phase, topsoil stockpiles as well as roads running down slopes will still be susceptible to erosion. Soil surfaces with infrastructure such as concrete slabs and buildings will not be exposed to erosion any longer. This is a permanent impact that will be localized within the site boundary with medium-high consequence and significance. With proper mitigation measures and the embedded controls as recommended in the Soil Management Plan, it is anticipated that the significance of this impact will be reduced to low | | | |
| Groundwater | Mine dewatering | Underground mining will result in Groundwater inflow which gives a baseline understanding of the current estimate of groundwater inflow; therefore boreholes need to be drilled around mining to quantify area within the mine expected to be impacted by mine dewatering and also to quantify the extent of radius of influence of cone of | a) Store the dewatered water in PCDs and ensure that the dams will have enough storage volume;<br>b) If that is not possible, re-introduce treated water into the streams after ensuring that they meet the required standards as per the WUL or river quality objectives; | Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. MHSA will be complied with regarding signage and access control. Surface water and groundwater quality in neighbouring areas will be maintained within SANS | Hydrocarbons will only be stored on site once bunded areas are constructed. Storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | depression from the mining area to borehole around the mine. | c) Supply equal volumes and better-quality water to affected user if proven that there is an impact on specific users;<br>d) Monitoring of groundwater water levels and groundwater inflow rates; and<br>e) Update numerical model annually. | 241:2011 standards for hydrocarbons. | hydrocarbons are brought to site for the life of mine. |
| | Mine water runoff | Any contamination that will seep from the WRDs is expected to move eastern direction toward the north-north-east down-gradient of the waste dump. The toe of the plume estimated to extend 700 m away from waste dump, 20 years after contamination commences | a) Implement compacted clay or synthetic liner underneath the WRDs to minimizes seepage following the waste classification result;<br>b) Re-use water collected in the WRDs berms. Any excess should be treated to acceptable quality before it is discharged to the environment; and<br>c) Monthly and quarterly monitoring of the surface water and groundwater respectively. | | |
| Surface water | Mining activities | Pollution of surrounding watercourses as a result of activities during the operational phase (spills, overflows and contaminated runoff) | a) There are no mitigation measures for a loss of contained water to the catchment yield as long as the mine is there however,<br>b) Reuse dirty water as much as possible onsite instead of obtaining water from the catchment, or to treat dirty water to acceptable standards and then to discharge to the catchment. - Sustainable mine water management needs to be implemented. | Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. MHSA will be complied with regarding signage and access control. Surface water and groundwater quality in neighbouring areas will be maintained within SANS 241:2011 standards for hydrocarbons. | Hydrocarbons will only be stored on site once bunded areas are constructed. Storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine. |
| Traffic | Transportation of staff | Haulage to/ from site; and<br><br>mine staff to/from site | Road network able to support additional trucks. | Mine safety in terms of MHSA and relevant regulations | From day 1 until mine closure |
| | Dust from vehicle movement | Dust will increase with increased traffic flow along gravel roads | Ensure that gravel roads are kept watered to prevent dust (other dust suppression measures may also be used). | | |
| | Noise from vehicle movement | Noise levels affecting sensitive areas including residential areas | Speed limits to be kept low and define routes away from residential areas. | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| Heritage Impact Assessment | Opening of shaft | Opening of the shaft might expose or reveal archaeological artefacts | a) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken; and<br>b) Education and training on heritage resources will be given to mine employees. | Heritage resources act | From construction until closure |
| Socio-Economic | | The impact may be reversible over time as workers and job-seekers leave the area, consequences such as HIV/AIDS and unwanted pregnancies will be permanent | a) Limit, as far as reasonably possible, social ills caused by influx of workers and job-seekers;<br>b) Liaise openly and frequently with affected stakeholders to ensure they have information about the Project;<br>c) Extensive HIV/AIDS awareness and general health campaign. It should be noted that Tenbosch Mining Mine has no control over activities related to workers' behaviour, however It is recommended that HIV/AIDS campaigns are conducted within the affected area;<br>d) Discourage influx of job-seekers by prioritising employment of unemployed members of local communities;<br>e) Liaise with Nkomazi Local Municipality, and Traditional Authority to ensure that expected population influx is taken into account in infrastructure development and spatial development planning;<br>f) Create synergies with local government IDP and other companies' SLP/CSR projects to promote infrastructure development;<br>g) Clear identification of workers – prevention of loitering;<br>h) Liaison with police or establish/ support community policing forum; | SLP, Mine Charter and Good relations with communities | From construction until mine closure |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | i) Promote projects providing housing, especially low cost housing, to link with the proposed Tenbosch mine;<br>j) Community education; and<br>k) Implement measures to address potential conflict between locals and non-locals. | | |
| | | The increase in nuisance factors and associated changed sense of place will be negative, and direct as a result of Project activities, and indirect as a result of migrant job-seekers | a) Minimise all nuisance factors such as noise, air quality, traffic, and visual- Implement all mitigation measures as specified in the relevant specialist studies;<br>b) Make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders; and<br>c) Liaise openly and frequently with affected stakeholders to ensure they have information about activities that will generate nuisance factors. | | |
| | | Strain on the existing infrastructure which is already inadequate. | a) To limit, as far as reasonably possible, additional pressure on existing infrastructure and services;<br>b) To work in partnership with government, industry, and relevant organisations to enhance the existing infrastructure and services;<br>c) To liaise openly and frequently with affected stakeholders to ensure they have information about the proposed Tenbosch Mining Project; and<br>d) To make available, maintain and effectively implement a grievance/complaint register that is easily | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | accessible to all neighbours and affected stakeholders. | | |
| | | Loss of grazing land | a) Ensure that the project design and associated layout seeks to minimise the project footprint, thus minimising the loss of agricultural land; engage with each directly affected landowner with the intention to acquire only the required servitude area;<br>b) Should Tenbosch Mine acquire the full farm and the project footprint only affects a portion of the land, the surrounding usable land should be utilised for agricultural purposes – potentially as part of a lease agreement; and<br>c) Where damage is incurred, suitable compensation must be negotiated with the affected farmer; Prepare a site Rehabilitation Plan that will be implemented as part of the decommissioning phase. | | |
| | | Altered sense of place and breakdown of existing social networks | a) Where possible ensure that access to fields and grazing areas are uninterrupted by providing alternative access routes and/or temporary access points during construction activities;<br>b) Tenbosch Mining should ensure that residents are kept informed on a day-to-day basis of construction progress and of when access will be blocked. | | |
| | | a) Developed local economy; | Maximise benefits from local employment, skills and economic development | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | b) Increased capacity to develop and maintain livelihood strategies | | | |
| | | Increase in injuries and possible loss of lives | a) Access control to all project elements, including fencing;<br>b) Personal Protective Equipment for mine workers;<br>c) Notification of blasting schedules;<br>d) Blasting and storage of hazardous materials to adhere to prescribed regulation;<br>e) Measures suggested minimising the impact of flyrock on surrounding roads and structure;<br>f) Measures suggested in the Health Impact Assessment to minimize traffic related accidents;<br>g) Traffic calming measures to prevent speeding (e.g. speed humps);<br>h) Road maintenance;<br>i) Provide safe road crossing points and fencing of the main road and the mine site; and<br>j) Community education to sensitize community members to potential traffic and blasting safety risks. | | |
| Waste management | Mining operations | In terms of the National Environmental Management Amendment Act 2014, mining residues are classified as wastes and must be managed as prescribed by the National Environmental Management: Waste Act of 2008 and its Regulations GN R.632 and R.633 | a) Manage waste in accordance with Regulations GN R.634 – 636;<br>b) Undertake regular inspection and maintenance of waste management facilities;<br>c) Monitor groundwater and surface water quality down-gradient of waste management facilities; and | Waste management standards and Regulations | From construction until closure |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | d) Take such corrective action as may be required. | | |
| **Decommissioning Phase** | | | | | |
| Air quality | Demolition of infrastructure | Particulate mobilisation can be caused by the demolition of buildings and handling of the rubble, backfilling of the storm water dam and "dirty" water collection channels and ripping and shaping of compacted areas | a) Wet suppression during landscaping and materials handling activities;<br>b) Enforcement of low vehicle speeds on unpaved areas (< 40 km/h);<br>c) Use of shade-cloth where necessary, to reduce wind speeds and reduce travel distance of dust;<br>d) Vegetation of bare surfaces with a locally indigenous grass species as soon as possible;<br>e) Continue dust fall monitoring until vegetation cover is well established; and<br>f) Requiring contractors to maintain construction vehicles in good condition. | Dust fallout will be monitored and managed as per GNR827 and compared to baseline limits (which already exceed NEM:AQA limits). Conditions stipulated in licenses/rights/permits. | Dust management plan must be in place at the start of the project and carried out through all phases of the LOM. |
| Ecology | Shaping of landscape | Loss of species of conservation concern | All infrastructure that could have a negative impact on faunal species (powerlines etc) needs to be decommissioned and removed. | Preservation of biodiversity in terms of NEM:BA | From day 1, through life of project until rehabilitation vegetation established |
| | Revegetation of landscape | Impact on the growth and health of both fauna and flora | Implement rehabilitation strategy and rehabilitation interventions. | | |
| | Monitoring of plant species establishment | Establishment of vegetation | Implement rehabilitation monitoring plan and remedy actions. | | |
| | | Habitat reconstruction | Implement rehabilitation monitoring plan and remedy actions. | | |
| | | Habitat stabilisation | Implement rehabilitation monitoring plan and remedy actions. | | |
| Noise | Rehabilitate of disturbed areas | Noise increase at the boundary of the mine footprint and at the abutting residential | Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | Environmental Conservation Act, Noise Regulations | From day 1, through life of project until rehabilitation vegetation established |
| | Planting of grass and vegetation at rehabilitated area | | Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | Maintenance of disturbed area | | Maintenance activities to be done during daytime working hours. | | |
| Aquatic Ecology | Shaping of landscapes | Sedimentation as a result of bare areas of soil | a) Sediment trapping berms<br>b) Stormwater management plans<br>c) Dry season working<br>d) Aquatic biomonitoring | GNR704 and Water Use License | From construction phase until rehabilitation |
| | Vehicular and machinery movement | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery Refuel in hard-park/bunded area Store hydrocarbons safely in bunded area.<br>b) Vehicle maintenance and inspection daily<br>c) Spill kits must always be available and ready on-site. | | |
| Soil, land use and land capability | Traffic movement | Transport of materials away from site. This will compact the soil of the existing roads and fuel and oil spills from vehicles may result in soil chemical pollution | **a) Management and supervision of decommissioning teams**<br><br>The activities of decommissioning contractors or employees will be restricted to the planned areas. Instructions must be included in contracts that will restrict decommissioning workers to the areas demarcated for decommissioning. In addition, compliance to these instructions must be monitored.<br><br>**b) Infrastructure removal**<br><br>All buildings, structures and foundations not part of the post-closure land use plan must be demolished and removed from site.<br><br>**c) Site preparation**<br><br>Once the site has been cleared of infrastructure and potential contamination, the slope must be re-graded (sloped) in order to approximate the pre- | NEMA, MPRDA & CARA regarding rehabilitation & erosion control. NEM:BA in terms of protection of biodiversity. Any conditions stipulated in licenses/rights/permits | Demarcate infrastructure area and fence off before any activity takes place and maintain these for life of mine. Rehabilitate areas completely as soon as activity in those areas ceases. |
| | Earthworks | Earthworks will include redistribution of inert waste materials to fill the shaft as well as topsoil to add to the soil surface. These activities will not result in further impacts on land use and land capability but may increase soil compaction | | | |
| | Handling and storage of materials | Other activities in this phase that will impact on soil are the handling and storage of materials and different kinds of waste generated as well as accidental spills and leaks with decommissioning and rehabilitation activities. This will have the potential to result in soil pollution when not managed properly | | | |
| | Revegetation | With the decommissioning phase, soil surfaces are in the process of being replanted with indigenous vegetation and until vegetation cover has | | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | established successfully, all surfaces are still susceptible to potential soil erosion | project aspect and contours. The previous infrastructure footprint area must be ripped a number of times in order to reduce soil compaction. The area must then be covered with topsoil material from the stockpiles.<br><br>**d) Seeding and re-vegetation**<br><br>Once the land has been prepared, seeding and re-vegetation will contribute to establishing a vegetative cover on disturbed soil as a means to control erosion and to restore disturbed areas to beneficial uses as quickly as possible. The vegetative cover reduces erosion potential, slows down runoff velocities, physically binds soil with roots and reduces water loss through evapotranspiration. Indigenous species will be used for the re-vegetation, the exact species will be chosen based on research available and then experience as the further areas are re-vegetated.<br><br>**e) Prevention of soil contamination**<br><br>During the decommissioning phase, chemical soil pollution should be minimised as follows:<br><br>Losses of fuel and lubricants from the oil sumps of vehicles and equipment should be contained using a drip tray with plastic sheeting and filled with absorbent material;<br><br>○ Using biodegradable hydraulic fluids, using lined sumps for collection of hydraulic fluids and recovering contaminated soils and treating them off-site; | | |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | o Avoiding waste disposal at the site wherever possible, by segregating, trucking out, and recycling waste;<br>o Containing potentially contaminating fluids and other wastes; and<br>o Cleaning up areas of spillage of potentially contaminating liquids and solids. | | |
| Groundwater | Decanting | After mine closure and ceasing of dewatering, shaft is likely to decant. Once the mine starts to decant, it is not expected to stop naturally. Pollution from WRDs on groundwater quality will continue in perpetuity, even after mine closure.<br><br>Seepage and decant is expected to have a serious impact and require management and rehabilitation measures to prevent irreplaceable impacts. If the pH is acidic, dissolved metals and sulphates will remain is solution | a) Identify decant areas and raise topography to increase time to decant;<br>b) Plan underground mining so that the perimeters follow the surface contours along the lowest side of the shaft and not cut directly across streams;<br>c) Monitoring groundwater levels, decant rates and qualities;<br>d) Revegetated WRD as quickly as possible to minimize recharge rates;<br>e) Divert all clean runoff away from, the shaft through a series of berms;<br>f) Re-evaluate impact of decant after end of life, once monitoring information is available; and<br>g) Treat seepage and decanted water using passive or active means to meet the recommended standards. | Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. MHSA will be complied with regarding signage and access control. Surface water and groundwater quality in neighbouring areas will be maintained within SANS 241:2011 standards for hydrocarbons. | Hydrocarbons will only be stored on site once bunded areas are constructed. Storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine. |
| Surface water | Mine rehabilitation | Pollution of surrounding watercourses as a result of activities during the decommissioning phase | a) The perimeter stormwater management measures should remain in place and should only be removed once rehabilitation of other activities has been completed. This will capture most of the sediment produced from rehabilitation activities and any spills from removal of hydrocarbon and chemical storage; | Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. MHSA will be complied with regarding signage and access control. Surface water and groundwater | Hydrocarbons will only be stored on site once bunded areas are constructed. Storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | b) Credible contractors should be used for the cessation of the mining and decommissioning of all infrastructure. | quality in neighbouring areas will be maintained within SANS 241:2011 standards for hydrocarbons. | with the EMP as soon as hydrocarbons are brought to site for the life of mine. |
| | Post closure | Rehabilitation of the site post mining will result in a positive impact on surface water quantity when completed. | Rehabilitation will result in a positive improvement as surface water drainage patterns will be restored to a state similar to pre-mining which is likely to result in an improvement in catchment yield after land profiling and cover having been restored. | | |
| Traffic Impact | Removal of rubble and other materials from site | Added traffic on the road network | Road network able to support additional trucks. | Mine safety in terms of MHSA and relevant regulations | From day 1 until mine closure |
| Heritage | Ripping and shaping of compacted areas | Ripping and shaping all compacted areas to be free draining, followed by re-vegetation might expose human remains or archaeological artefacts | a) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken.<br>b) Education and training on heritage resources will be given to mine employees. | Heritage resources act | From construction until closure |
| Socio-Economic | Mine closure | The impact may be reversible over time as workers and job-seekers leave the area, consequences such crime and other social pathologies will be permanent | a) Effect retrenchments according to procedures stipulated in approved SLP;<br>b) The Mine's SLP should provide strategies and measures that prevent job loss;<br>c) Support economic diversification through development of alternative markets;<br>d) Develop a Mine Closure Plan;<br>e) Proactively and effectively implement mine closure plan;<br>f) Collaborate with adjacent mining companies to develop and implement sustainable community;<br>g) Develop alternative and sustainable livelihoods;<br>h) Alternatives to save jobs/avoid downscaling should be investigated beforehand;<br>i) Proactively assess and manage the social and economic impacts on individuals, regions and economies where | SLP, Mine Charter and Good relations with communities | From construction until mine closure |

| Environmental Aspect | Activity | Potential Impacts | Mitigation Measures | Compliance with Standards | Time Period for Implementation |
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| | | | retrenchment and/or closure of the mine are certain; and<br>j) Partner with the relevant government departments, to jointly manage Closure process. | | |
| Waste management | Mine closure | Waste expected to result from the decommissioning and rehabilitation activities include scrap metals, building rubble, oils, lubricants, paints, solvents, contaminated soils, waste rock dumps and potentially recyclable materials such as steel, wood, plastics, glass and tiles. If stored or discarded on open ground, hydrocarbons will cause soil contamination and possibly groundwater pollution, an impact rated as | a) Identify areas of possible soil contamination, sample such areas, analyse and determine degree of soil contamination. Remove and dispose of soil with contamination levels exceeding then prevailing standards/guidelines;<br>b) Sort the remaining wastes and store in separate skips or other containers for hydrocarbons, recyclable materials and non-recyclable materials. Recyclable materials should be sorted into wood, steel, glass, plastic, paper and used oil, and stored in separate containers;<br>c) Have recyclable wastes removed by responsible recyclers; and<br>d) Have non-recyclable wastes removed by reputable contractors for disposal at appropriately licensed landfills. | Waste management standards and Regulations | From construction until closure |

## *23.14 Impact Management Outcomes*

They have been discussed in Section 14.

## *23.15 Impact Management Actions*

They have been discussed in detail in Section 10.

## 23.16 Summary of Environmental Impact Management and Monitoring Actions

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| Air Quality | Excavations All infrastructure areas, development footprints and associated activities | Remain within the Air Quality Regulations and Dust Regulations standards | Dust emissions due to erosion of open storage stockpiles and exposed areas when the threshold wind speed is exceeded. | a) Wet suppression, applied sparingly, to ensure the absence of visible dust;<br>b) Wet suppression is about 50% effective on unpaved roads, but chemical binders such as Dustex or Dust-ASide may also be used;<br>c) Enforce low vehicle speeds on unpaved areas (< 40 km/h);<br>d) Use of shade cloth where necessary, to reduce wind speeds and reduce travel distance of dust;<br>e) Vegetate the berm and other surfaces that were laid bare as a result of construction with a locally indigenous grass species where practicable, as soon as possible; and<br>f) Requiring contractors to maintain construction vehicles in good condition. | ECO<br><br>Occupational hygienist | Monthly<br><br>Monthly Dust Monitoring Report |
| | Vehicle movement | Same as above | Emissions from the resuspension of loose material on the road surface. Vehicle-entrained dust emissions from the unpaved haul roads within the proposed Tenbosch Mining Project mining area potentially represent the most significant source of fugitive dust for the mine | Haul road mitigation measures include tarring or paving, wet suppression and chemical surface treatments. Regular, light watering of the road is needed for water spraying to be effective in reducing particulate emissions. Other surface treatments include the use of chemicals such as calcium chloride or magnesium chloride. These chemicals attract moisture – drawing moisture out of the air during periods of high humidity, and also reducing the evaporation rate of water during hot periods. Some products contain surfactants which act as wetting agents. These not only reduce the amount of water required for wetting the roads, but also have slight binding properties. Another approach to dust control involves the application of organic or synthetic compounds that physically bind the dust particles | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | together. The disadvantage of paving/tarring, infrequent watering and chemical mitigation measures is their inability to prevent material spillage from being re-entrained. | | |
| Ecology | Site clearance for establishment or access roads, infrastructure and shaft area | | Clearing of vegetation | Avoid sensitive areas and implement buffer zones. | ECO | Monthly<br><br>Alien Management Plan |
| | | | Loss of plant SSC | Limit the footprint area to the shaft and infrastructure. Avoid areas of remaining indigenous vegetation. | | |
| | | | Displacement of fauna species | Avoid high biodiversity sensitivity areas (natural vegetation, watercourses & wetlands) and comply to prescribed buffer zones. | | |
| | | | Loss of faunal SSC | Avoid areas in which plant species of conservation concern may occur;<br>If some areas cannot be avoided implement rescue of plant species of conservation concern. | | |
| Noise Impact | Site clearing | To prevent indiscreet noise levels to surrounding environment | Clearing and stripping of topsoil and vegetation | Earthwork activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | ECO<br><br>Occupational hygienist | Monthly<br><br>Monthly Noise Survey Reports |
| | | | Construction of mine infrastructure | Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | | |
| Aquatics Ecology | Site clearance for establishment of access roads, infrastructure and shaft area | To minimise impacts on aquatics | Sedimentation as a result of bare areas of soil | a) Sediment trapping berms Stormwater management plans .<br>b) Dry season construction | ECO | Monthly<br><br>Monthly Aquatic Biomonitoring Reports<br><br>Monthly Water Quality Reports |
| | Establishment or access roads and crossings structures | | Disturbance of watercourse channels and sedimentation | a) Upgrade existing roads and causeways.<br>b) Dry season construction. | | |
| | Vehicle movement and refuelling | Same as above | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery Refuel in hard-park/bunded area Store hydrocarbons safely in bunded area;<br>b) Vehicle maintenance and inspection daily; and | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | c) Spill kits must always be available and ready on-site. | | |
| Soil, Land Use and Land Capability | Transport of materials and labour<br><br>Earthworks | To preserve quality of topsoil until it is needed for closure | Transport of materials and labour with trucks and buses as well as other light vehicles using the existing access roads. This will compact the soil of the existing roads and fuel and oil spills from vehicles may result in soil chemical pollution.<br><br>Earthworks will include clearing of vegetation from the surface, stripping topsoil (soil excavation) and stockpiling as well as drilling and blasting for the initial removal of overburden at the planned shaft as well as the construction of infrastructure like the Primary Crushing Facility, water management systems, contractors camp and sewage treatment plants. These activities are the most disruptive to natural soil horizon distribution and will impact on the current soil hydrological properties and functionality of soil. It will also change the current land use as well as land capability in areas where activities occur and infrastructure is constructed. | **a) Minimise the footprint of the Tenbosch Mining Project**<br><br>The existing pre-construction mine layout and design is aiming to minimise the area to be occupied by mine infrastructure (workshops, administration, product stockpile, etc.) to as small as practically possible. All footprint areas should also be clearly defined and demarcated and edge effects beyond these areas clearly defined. This measure will significantly reduce areas to be compacted by heavy construction vehicles and regular activities during the operational phase.<br><br>**b) Management and supervision of construction teams**<br><br>The activities of construction contractors or employees will be restricted to the planned areas. Instructions must be included in contracts that will restrict construction work and construction workers to the clearly defined limits of the construction site. In addition, compliance to these instructions must be monitored.<br><br>**c) Location of stockpiles**<br><br>Locate all soil stockpiles in areas where they will not have to be relocated prior to replacement for final rehabilitation. Refrain from locating stockpiles as close as possible to the development for cost saving only to have them relocated later during the life of the operation. The ideal is to place all overburden | ECO | Monthly |
| | Handling and storage of building material | | This will have the potential to result in soil pollution when not managed properly. | | ECO | Monthly |
| | Vegetation clearance | | Soil erosion is also anticipated due to vegetation clearance. The impacts of soil erosion are both direct and indirect. The direct impacts are the reduction in soil quality which results from the loss of the nutrient-rich upper layers of the soil and the reduced water-holding capacity of | | ECO | Monthly |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | severely eroded soils. The off-site indirect impacts of soil erosion include the disruption of riparian ecosystems and sedimentation. Soil erosion is a permanent impact for once the resource has been lost from the landscape it cannot be recovered. Although there are off-site indirect impacts associated with this, the impact is mainly considered to be local. | materials removed during construction in their final closure location, or as close as practicable to it.<br><br>**d) Topsoil stripping**<br><br>Wherever possible, stripping and replacing of soils should be done in a single action. This is both to reduce compaction and also to increase the viability of the seed bank contained in the stripped surface soil horizons.<br><br>Stripping should be conducted a suitable distance ahead of development of, for example the shaft, at all times to avoid loss and contamination. As a norm, soil stripping should be kept within 3-9 months of development, or between 50-100 metres ahead of the active operations.<br><br>**e) Stockpiling of topsoil**<br><br>To minimise compaction associated with stockpile creation, it is recommended that the height of stockpiles be restricted between of 4 – 5 meters maximum. For extra stability and erosion protection, the stockpiles may be benched. The clay content of the topsoil on the largest area of the Tenbosch Mining project area is not sufficient for stockpiles to remain relatively stable without benching. The areas on the Arcadia soil form do have sufficient clay content.<br><br>**f) Prevention of stockpile contamination**<br><br>Topsoil stockpiles can be contaminated by dumping waste materials next to or on the stockpiles, contamination by dust from blasting and waste rock stockpiles and the dampening for dust control with contaminated water are all hazards faced by | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| | | | | stockpiles. This should be avoided at all cost and if it occurs, should be cleaned up immediately.<br><br>**g) Terrain stability to minimise erosion potential**<br><br>Management of the terrain for stability by using the following measures will reduce the risk of erosion significantly:<br><br>• Using appropriate methods of excavating that are in accordance with regulatory requirements and industrial best practices procedures;<br>• Reducing slope gradients as far as possible along road cuts and disturbed areas to gradients at or below the angle of repose of those disturbed surfaces; and<br>• Using drainage control measures and culverts to manage the natural flow of surface runoff<br><br>Management of the terrain for stability by using the following measures will reduce the risk of erosion significantly:<br><br>• Using appropriate methods of excavating that are in accordance with regulatory requirements and industrial best practices procedures;<br>• Reducing slope gradients as far as possible along road cuts and disturbed areas to gradients at or below the angle of repose of those disturbed surfaces; and | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | • Using drainage control measures and culverts to manage the natural flow of surface runoff.<br><br>**h) Management of access and services roads**<br>Existing established roads should be used wherever possible. Where possible, roads that will carry heavy-duty traffic should be designed in areas previously disturbed rather than clearing new areas, where possible. The moisture content of access road surface layers must be maintained through routine spraying or the use of an appropriate dust suppressant.<br>Access roads should be designed with a camber to avoid ponding and to encourage drainage to side drains; where necessary, culverts will be installed to permit free drainage of existing water courses. The side drains on the roads can be protected with sediment traps and/or gabions to reduce the erosive velocity of water during storm events and where necessary geo-membrane lining can be used<br><br>**i) Prevention of soil contamination**<br>During the construction phase, chemical soil pollution should be minimised as follows:<br>• Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment should be contained by using a drip tray with plastic sheeting filled with absorbent material;<br>• Using biodegradable hydraulic fluids, using lined sumps for collection of hydraulic fluids, recovering contaminated soils and treating them off-site, and securely storing dried waste mud by burying it in a purpose-built containment area; | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| | | | | • Avoiding waste disposal at the site wherever possible, by segregating, trucking out, and recycling waste;<br>• Containing potentially contaminating fluids and other wastes; and<br>• Cleaning up areas of spillage of potentially contaminating liquids and solids. | | |
| Groundwater | Drilling | To prevent deterioration in ground water quality | Groundwater contamination as a result of drilling of new monitoring boreholes to investigate possible preferred groundwater flow pathways and one or two areas outside preferred pathways, which will:<br><br>a) Identify geological and hydrogeological control across the proposed mining right area;<br>b) Provide facilities to undertake aquifer testing and water sample collection; and<br>c) Serve as future monitoring points in an initial groundwater monitoring network. | Monthly monitoring of the boreholes with regard to water levels and water quality. | ECO | Monthly<br><br>Monthly Water Quality Reports |
| | Storage of fuels and lubricants and movement of vehicles | Same as above | Spills from improper storage of fuels and lubricants and also from leaking vehicles | a) Monthly monitoring of the boreholes with regard to water levels and water quality;<br>b) Place drip trays under vehicles when parked.<br>c) If in-field refuelling is done from a tanker, it should be done in a designated dirty area and a spill kit and clean- up team must be available on site;<br>d) Spillages should be cleaned up immediately and contaminated soil must either be remediated in situ or disposed of at an appropriately licensed landfill site; and | ECO | Monthly |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | e) Hydrocarbon storage areas must be in a bunded area and comply with the relevant SANS standards. | | |
| Surface Water | Exposure of topsoil | To prevent pollution of surface waterbodies | Sedimentation of watercourses due to exposing and loosening of soil as a result of vegetation clearing for the construction of infrastructure and pollution of watercourses due to hydrocarbon and chemical spillages. | a) Use wet suppression, chemical stabilization and wind speed reduction methods that should be used to control open dust sources at the construction sites;<br>b) Vegetation should only be removed where absolutely necessary;<br>c) Hydrocarbons should be stored on hard park bunded facilities to ensure that all spillages are contained; and<br>d) Clean and dirty surface water trenches/channels should be constructed to divert runoff separately to appropriate storage facilities. | ECO | Monthly<br><br>Monthly Water Quality Reports |
| | Vegetation removal | Same as above | Altered drainage paths and loss of catchment yield due to the removal of vegetation and construction of diversion berms. | Reuse dirty water as much as possible onsite instead of obtaining water from the catchment, or to treat dirty water to acceptable standards and then to discharge to the catchment. | | |
| Traffic | Transportation of materials and labourers | Minimise congestion in access roads and intersections | Construction materials being transported to site will contribute to the addition of traffic on the road network. | Road network able to support additional trucks. | ECO | Monthly |
| | | | Employees and labourers transported to/ from site. | Road network able to support additional commuter trips. | | |
| | | | Dust will increase with increased traffic flow along gravel roads. | Ensure that gravel roads are kept watered to prevent dust (other dust suppression measures may also be used). | | |
| Heritage | Site clearance | To prevent destruction of artefacts should they be unearthed. | Site Clearance for construction activities might reveal or expose archaeological artefacts. | a) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken. | ECO | Monthly |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| | | | | b) Education and training on heritage resources will be given to mine employees. | | |
| Socio-Economic | Construction activities | To create employment opportunities for the local communities | The residual impacts associated with the creation of employment and business opportunities and training during the construction phase is that the workers can improve their skills by gaining more experience. | a) Establish targets for the employment and training;<br>b) Train workforce for longer term employment;<br>c) Adopt recruitment strategies that ensure local people are given employment preference;<br>d) Effective implementation of training and skills development initiatives;<br>e) The recruitment process has to be transparent and equitable;<br>f) Maximise and monitor local recruitment;<br>g) Consult local labour recruitment offices;<br>h) Prevent nepotism/corruption in local recruitment structures;<br>i) Promote employment of women and youth;<br>j) Formulate a labour recruitment strategy that would minimise impact on other sectors (e.g. do not recruit unskilled labour at wage levels above the wages paid in the agricultural sector); and<br>k) Establish a liaison point with the adjacent farming community to monitor the impact on their local labour force. | ECO | Monthly<br><br>Annual SLP Review Report |
| | | | Multiplier impacts on the local economy | a) Development of a register of local SMMEs;<br>b) Linkages with skills development/ Small, Medium and Micro Enterprises (SMME) development institutions and other mining operations;<br>c) SMME skills development as part of mine SLP/LED commitments; | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | d) Create synergies with other mining/electricity enterprises LED/CSR projects;<br>e) Preference should be given to capable subcontractors who based within the local municipal area;<br>f) Align skills development to build capacity of SMMEs;<br>g) Monitoring of sub-contractors procurement;<br>h) Development of a register of local SMME; and<br>i) Local procurement targets should be formalised in Tenbosch Mining's procurement policy. | | |
| | | | a) Improved economic development;<br>b) Increased capacity to develop and maintain livelihood strategies | a) Ensure that there is stakeholder buy-in;<br>b) Aligning LED projects with those of other development role-players;<br>c) Liaison with beneficiaries to ensure needs are met;<br>d) Collaboration with other developmental role players (e.g. local and district municipalities, neighbouring mines and NGOs) during implementation of envisaged projects, and where possible aligning envisaged development projects with existing ones;<br>e) Expanding its skills development and capacity building programmes for non-employees;<br>f) Monitoring system to regulate Historically Disadvantaged South African procurement<br>g) Where feasible, training should be NQF Accredited; and<br>h) A record of training courses completed per individual should be kept. | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | Increase in injuries and possible loss of lives | a) Access control to all project elements, including fencing;<br>b) Personal Protective Equipment for mine workers;<br>c) Notification of blasting schedules;<br>d) Blasting and storage of hazardous materials to adhere to prescribed regulation;<br>e) Measures suggested minimising the impact of flyrock on surrounding roads and structure;<br>f) Measures suggested in the Health Impact Assessment to minimize traffic related accidents;<br>g) Traffic calming measures to prevent speeding (e.g. speed humps);<br>h) Road maintenance;<br>i) Provide safe road crossing points and fencing of the main road and the mine site; and<br>j) Community education to sensitize community members to potential traffic and blasting safety risks. | | |
| | | | Altered sense of place and breakdown of existing social networks | a) Where possible ensure that access to fields and grazing areas are uninterrupted by providing alternative access routes and/or temporary access points during construction activities;<br>b) Tenbosch Mine should ensure that residents are kept informed on a day-to-day basis of construction progress and of when access will be blocked;<br>c) Measures to prevent deterioration of roads;<br>d) suggested in Traffic Impact Assessment (e.g. drivers to report road deterioration to the MP Province Department of Transport); | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | e) Regulation of traffic at intersections and access roads to the site;<br>f) Road upgrading measures should be investigated and implemented in conjunction with the relevant government department (e.g. repairing and rehabilitating the main roads and sealing the roadway to increase its capacity for Heavy Moving Vehicles);<br>g) Inform communities of planned construction activities that would affect vehicle/pedestrian traffic;<br>h) Ensure that access to key services are uninterrupted by providing alternative access routes in cases where construction activities restricts or disrupt movement<br>i) Construction of cattle crossings at suitable intervals should be incorporated into project design. | | |
| | | | a) Displaced farm workers;<br>b) Loss of livelihoods | a) Suitable mitigation measures should be defined that protect the farm workers and ensure that they are adequately provided for and supported should they be moved or lose their employment;<br>b) A Resettlement Action Plan and associated Livelihood Restoration Plan may be required;<br>c) Implement surface lease agreements with all community members who have grazing or ploughing land, this will minimise the impact of economic displacement; and<br>d) Implement the Grievance Mechanism to ensure ongoing, proactive engagement and effective management of grievances. | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| | | | Strain on the existing infrastructure which is already inadequate | a) To limit, as far as reasonably possible, additional pressure on existing infrastructure and services;<br>b) To work in partnership with government, industry, and relevant organisations to enhance the existing infrastructure and services;<br>c) To liaise openly and frequently with affected stakeholders to ensure they have information about the proposed Tenbosch Mining Project;<br>d) Liaison with district and local municipalities well in advance to ensure needs are met;<br>e) Ensure that municipalities take into account expected population influx;<br>f) Promotion of mining methods to allow for surface development;<br>g) Influx management; and<br>h) To make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders. | | |
| Waste Management | Construction activities | To practise the 3Rs (Recycle, Reuse and Reduce) | Typical wastes produced during construction activities include unused concrete mix, oils, lubricants, paints, solvents, packaging materials, general domestic waste and offcuts of building materials such as steel, wood, glass and tiles. If stored or discarded on open ground, hydrocarbons will cause soil contamination and possibly groundwater pollution. | a) Sort the wastes and store in separate skips or other containers for hydrocarbons, recyclable materials and non- recyclable materials. Recyclable materials should be sorted into wood, steel, glass, plastic, paper and used oil, and stored in separate containers;<br>b) Have recyclable wastes removed by responsible recyclers; and<br>c) Have non-recyclable wastes removed by reputable contractors for disposal at appropriately licensed landfil.l | ECO | Monthly |
| **Operational Phase** | | | | | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| Air Quality | Drilling and blasting | Monitor emissions concentrations in line with Air Quality Standards and Dust Regulations | Emissions from drilling are a relatively minor component of the overall emission from an underground mine. The only available emission factor for drilling is a simple uncontrolled TSP emission factor of 0.59kg/hole for overburden (US EPA, 1995). Clearly, other variables such as the depth of the holes, diameter of the holes, and moisture content of the material being drilled would also be relevant and it might be supposed that an emission factor equation should take account of these variables. However, in the absence of other data (and given the relatively minor contribution of this source to overall emissions from mining operations), it is reasonable to accept the 0.59 kg/hole factor for TSP. | a) Efficiency will be applied to reduce wastage and unnecessary fuel consumption;<br>b) Carbon offsets will be considered if required;<br>c) Concurrent best practice rehabilitation and vegetation monitoring will be applied to allow for the restoration of some the carbon sink functionality within the mining right area; and<br>d) Avoid blasting under windy conditions as far as practicable. | ECO<br><br>Occupational hygienist | Monthly<br><br>Monthly Dust Monitoring Reports |
| | Processing plant | | The moisture content of the material processed can have a substantial effect on emissions. | Surface wetness causes fine particles to agglomerate on, or to adhere to, the faces of larger chunks of ore, with a resulting dust suppression effect. However, as new fine particles are created by crushing and attrition, and as the moisture content is reduced by evaporation, this suppressive effect diminishes and may disappear. | | |
| | Vehicle movement | | Vehicle entrainment from unpaved roads | a) Enforcement of a 40 km/hour speed restriction on unpaved haul roads.<br>b) Wet suppression on haul roads, with the addition of a chemical binder if necessary. | | |
| | Crushing and screening | | Crushing and screening operations represent significant dust-generating sources if uncontrolled. The large percentage of fines in this dustfall material enhances the potential for it to become airborne. It was assumed that primary | Wet suppression will be used for both the secondary and tertiary crushing stages. | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | crushing (crushing to achieve particles of <300 mm) will take place in the shaft to reduce the ore to a transportable size for the conveyor system. | | | |
| | Materials handling | | Materials handling operations which are predicted to result in significant fugitive dust emissions from mining operations include the transfer of material by means of loading and offloading of trucks, loading and offloading conveyors, transfer from one conveyor to another and bulldozing. The quantity of dust which will be generated will depend on various non-climatic parameters such as the nature (moisture content and silt content) and volume of the material handled. | a) Reduced tipping and drop heights where practicable;<br>b) Regular clean-up at loading areas and on paved surfaces to prevent entrainment by wind or vehicles;<br>c) Use of shade cloth where necessary, to reduce wind speeds and reduce travel distance of dust;<br>d) Covering of exposed areas with coarsely crushed rock or aggregate material where practicable;<br>e) Maintaining all vehicles in good condition at all times; and<br>f) Continuous dust and fine particulate monitoring should be implemented to monitor compliance with the NAAQS. | | |
| Ecology | Operation of mine and management of access roads | Confine vegetation clearance and faunal disturbance to mine boundary | Alien plant establishment | Implementation of alien invasive plant management plan needs to be continued during operation to prevent the growth of invasive on cleared areas. | ECO | Monthly |
| | | | Disturbance/Displacement of Faunal species | Minimise footprint area Work only in clearly demarcated areas. | | |
| | | | Disturbance of vegetation communities | Minimise footprint area Work only in clearly demarcated areas. | | |
| | | | Habitat fragmentation | Minimise footprint area Work only in clearly demarcated areas. | | |
| | | | Killing of faunal species | Minimise footprint area Work only in clearly demarcated areas | | |
| Noise | Operation of processing plant<br>shaft activities<br>Hauling of waste rock to the waste dump | To minimise intrusive noise levels at al sensitive receptors | Noise increase at the boundary of the mine footprint and at the abutting residential | a) All noise sources exceeding 85.0dBA to be identified and if practical to be acoustically screened off. | ECO<br><br>Occupational hygienist | Monthly<br><br>Monthly Noise Surveys |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | Hauling of material to the plant | | | b) Noise survey to be done on a quarterly basis and after one year to change to an annual basis if the prevailing ambient noise levels at the boundaries of the plant have not changed. | | |
| | Additional traffic | | | Speed limit of mining areas to be adhered to at all times. | | |
| | Operation of an emergency generator | | | Noise readings to be done in the vicinity of and along the emergency boundaries to ensure that the prevailing ambient noise level is not exceeded. | | |
| Aquatic Ecology | Operation of mine and management of access roads | Prevent contamination of water bodies | Vehicular movement and sedimentation | a) Sediment trapping berms<br>b) Stormwater management plans | ECO | Monthly<br><br>Monthly aquatic biomonitoring report<br><br>Water Quality Assessment Reports<br><br>Annual Water Liability Reports |
| | | | Pollution of water resources as a result of mine waste | a) Implement Integrated Waste Water Management Plan<br>b) Aquatic biomonitoring | | |
| | | | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery Refuel in hard-park/bunded area Store hydrocarbons safely in bunded area.<br>b) Vehicle maintenance and inspection daily.<br>c) Spill kits must always be available and ready on-site. | | |
| Soil, land use and land capability | Shaft and mine infrastructure | To protect soil from contamination; and<br><br>To preserve as much of the fertility of the topsoil as possible; | Shaft and surface infrastructure will both lead to surface impacts on soil resources. Surface infrastructure like buildings, haul roads, waste rock dumps and product stockpiles are by far the most disruptive to current land uses, land capability as well as agricultural potential of the soil. Soil underneath buildings and stockpiles are subject to compaction and sterilization of the topsoil. | **Management of potential soil contamination during the operational phase**<br><br>The following management measures will either prevent or significantly reduce the impact of soil chemical pollution on site during the operation phase:<br><br>a) Stockpiles are managed so they do not become contaminated and then need additional handling or disposal; | ECO | Monthly |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | Spills of fuel and lubricants | | Soil chemical pollution as a result of spills of fuel and lubricants by vehicles and machinery as wells as the accumulation of domestic waste, is considered to be a moderate deterioration of the soil resource. This impact will be localised within the site boundary and have medium-high significance on the soil resource.<br><br>Soil is likely to cause toxic effects for soil microbes or plants due to dust from or soil stockpiles | b) A low process or storage inventory must be held to reduce the potential volume of material that could be accidentally released or spilled;<br>c) Processing areas should be contained and systems designed to effectively manage and dispose of contained storm water, effluent and solids;<br>d) Storage tanks of fuels, oils or other chemicals stored are above ground, preferably with inspectable bottoms, or with bases designed to minimise corrosion. Above-ground (rather than in-ground) piping systems should be provided. Containment bunds should be sealed to prevent spills contaminating the soil and groundwater;<br>e) Equipment, and vehicle maintenance and washdown areas, are contained and appropriate means provided for treating and disposing of liquids and solids;<br>f) Air pollution control systems avoid release of fines to the ground (such as dust from dust collectors;<br>g) Solids and slurries are disposed of in a manner consistent with the nature of the material and avoids contamination; and<br>h) Effluent and processing drainage systems avoid leakage to ground. | | |
| | Vehicle movement | | Soil compaction will be a measurable deterioration that will occur as a result of the weight of the topsoil and overburden stockpiles stored on the soil surface as well as the movement of vehicles on the soil surfaces (including access and haul roads). This is a permanent impact that will be localised within the site boundary with medium-low consequence and significance in the mitigated scenario. | | | |
| | Vegetation clearance | | During the operational phase, topsoil stockpiles as well as roads running down slopes will still be susceptible to erosion. Soil surfaces with infrastructure such as concrete slabs and buildings will not be exposed to erosion any longer. This is a permanent impact that will be localized within the site boundary with medium-high consequence and significance. With proper mitigation measures and the embedded controls as recommended in the Soil Management Plan, it is anticipated | | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | that the significance of this impact will be reduced to low. | | | |
| Groundwater | Mine dewatering | Prevent groundwater contamination and reduction of groundwater levels | Underground mining of coal will result in groundwater inflow which gives a baseline understanding of the current estimate of groundwater inflow; therefore boreholes need to be drilled around mining to quantify area within the mine expected to be impacted by mine dewatering and also to quantify the extent of radius of influence of cone of depression from the mining area to borehole around the mine. | a) Store the dewatered water in PCDs and ensure that the dams will have enough storage volume;<br>b) If that is not possible, re-introduce treated water into the streams after ensuring that they meet the required standards as per the WUL or river quality objectives;<br>c) Supply equal volumes and better-quality water to affected user if proven that there is an impact on specific users;<br>d) Monitoring of groundwater water levels and groundwater inflow rates; and<br>e) Update numerical model annually. | ECO | Monthly<br><br>Water Quality Assessment Reports<br><br>Annual Water Liability Reports |
| | Mine water runoff | | Any contamination that will seep from the WRDs is expected to move eastern direction toward the north-north-east down-gradient of the waste dump. The toe of the plume estimated to extend 700 m away from waste dump, 20 years after contamination commences. | a) Implement compacted clay or synthetic liner underneath the WRDs to minimizes seepage following the waste classification result;<br>b) Re-use water collected in the WRDs berms. Any excess should be treated to acceptable quality before it is discharged to the environment; and<br>c) Monthly and quarterly monitoring of the surface water and groundwater respectively. | | |
| Surface water | Mining activities | Prevent contamination of surface water bodies | Pollution of surrounding watercourses as a result of activities during the operational phase (spills, overflows and contaminated runoff) | a) There are no mitigation measures for a loss of contained water to the catchment yield as long as the mine is there however,<br><br>b) Reuse dirty water as much as possible onsite instead of obtaining water from the catchment, or to treat dirty water to acceptable standards and then to discharge to the catchment. - Sustainable mine water management needs to be implemented. | ECO | Monthly<br><br>Monthly aquatic biomonitoring report<br><br>Water Quality Assessment Reports<br><br>Annual Water Liability Reports |
| Traffic | Transportation of staff | | Haulage to/ from site; and<br>mine staff to/from site | Road network able to support additional trucks. | ECO | Monthly |

| **Environmental Aspect** | **Activity** | **Objective** | **Potential Impacts** | **Mitigation Measures** | **Responsible Person** | **Monitoring Frequency and Reports** |
|---|---|---|---|---|---|---|
| | Dust from vehicle movement | Ensure worker safety and compliant with road safety signages | Dust will increase with increased traffic flow along gravel roads. | Ensure that gravel roads are kept watered to prevent dust (other dust suppression measures may also be used). | | |
| | Noise from vehicle movement | | Noise levels affecting sensitive areas including residential areas. | Speed limits to be kept low and define routes away from residential areas. | | |
| Heritage Impact Assessment | Sinking of shaft | Report any suspicion of unmarked graves or artefacts to SAHRA and Provincial Heritage Resource Agency | Sinking of shaft might expose or reveal archaeological artefacts. | a) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken.<br>b) Education and training on heritage resources will be given to mine employees. | ECO | Monthly |
| Socio-Economic | | To implement the conditions of the SLP | The impact may be reversible over time as workers and job-seekers leave the area, consequences such as HIV/AIDS and unwanted pregnancies will be permanent. | a) Limit, as far as reasonably possible, social ills caused by influx of workers and job-seekers;<br>b) Liaise openly and frequently with affected stakeholders to ensure they have information about the Project;<br>c) Extensive HIV/AIDS awareness and general health campaign. It should be noted that Tenbosch Mining Mine has no control over activities related to workers' behaviour, however It is recommended that HIV/AIDS campaigns are conducted within the affected area;<br>d) Discourage influx of job-seekers by prioritising employment of unemployed members of local communities;<br>e) Liaise with Nkomazi Local Municipality, and Traditional Authority to ensure that expected population influx is taken into account in infrastructure development and spatial development planning;<br>f) Create synergies with local government IDP and other companies' SLP/CSR projects to promote infrastructure development;<br>g) Clear identification of workers –prevention of loitering; | ECO | Monthly<br><br>Annual SLP Review Report |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | h) Liaison with police or establish/ support community policing forum;<br>i) Promote projects providing housing, especially low cost housing, to link with the proposed Tenbosch mine;<br>j) Community education; and<br>k) Implement measures to address potential conflict between locals and non-locals. | | |
| | | | The increase in nuisance factors and associated changed sense of place will be negative, and direct as a result of Project activities, and indirect as a result of migrant job-seekers. | a) Minimise all nuisance factors such as noise, air quality, traffic, and visual-Implement all mitigation measures as specified in the relevant specialist studies;<br>b) Make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders; and<br>c) Liaise openly and frequently with affected stakeholders to ensure they have information about activities that will generate nuisance factors. | | |
| | | | Strain on the existing infrastructure which is already inadequate. | a) To limit, as far as reasonably possible, additional pressure on existing infrastructure and services;<br>b) To work in partnership with government, industry, and relevant organisations to enhance the existing infrastructure and services;<br>c) To liaise openly and frequently with affected stakeholders to ensure they have information about the proposed Tenbosch Mining Project; and<br>d) To make available, maintain and effectively implement a grievance/complaint register | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | that is easily accessible to all neighbours and affected stakeholders. | | |
| | | | Loss of grazing land | a) Ensure that the project design and associated layout seeks to minimise the project footprint, thus minimising the loss of agricultural land; engage with each directly affected landowner with the intention to acquire only the required servitude area;<br>b) Should Tenbosch Mine acquire the full farm and the project footprint only affects a portion of the land, the surrounding usable land should be utilised for agricultural purposes – potentially as part of a lease agreement; and<br>c) Where damage is incurred, suitable compensation must be negotiated with the affected farmer; Prepare a site Rehabilitation Plan that will be implemented as part of the decommissioning phase. | | |
| | | | Altered sense of place and breakdown of existing social networks | a) Where possible ensure that access to fields and grazing areas are uninterrupted by providing alternative access routes and/or temporary access points during construction activities;<br>b) Tenbosch Mining should ensure that residents are kept informed on a day-to-day basis of construction progress and of when access will be blocked. | | |
| | | | a) Developed local economy;<br>b) Increased capacity to develop and maintain livelihood strategies | Maximise benefits from local employment, skills and economic development . | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| | | | Increase in injuries and possible loss of lives | a) Access control to all project elements, including fencing;<br>b) Personal Protective Equipment for mine workers;<br>c) Notification of blasting schedules;<br>d) Blasting and storage of hazardous materials to adhere to prescribed regulation;<br>e) Measures suggested minimising the impact of flyrock on surrounding roads and structure;<br>f) Measures suggested in the Health Impact Assessment to minimize traffic related accidents;<br>g) Traffic calming measures to prevent speeding (e.g. speed humps);<br>h) Road maintenance;<br>i) Provide safe road crossing points and fencing of the main road and the mine site; and<br>j) Community education to sensitize community members to potential traffic and blasting safety risks. | | |
| Waste management | Mining operations | To prevent contamination of soil and water resources by acid, salts or metals and to practises 3Rs of waste management | In terms of the National Environmental Management Amendment Act 2014, mining residues are classified as wastes and must be managed as prescribed by the National Environmental Management: Waste Act of 2008 and its Regulations GN R.632 and R.633. | a) Manage waste in accordance with Regulations GN R.634 – 636;<br>b) Undertake regular inspection and maintenance of waste management facilities;<br>c) Monitor groundwater and surface water quality down-gradient of waste management facilities; and<br>d) Take such corrective action as may be required. | ECO | Weekly |
| **Decommissioning and Rehabilitation Phase** | | | | | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| Air quality | Demolition of infrastructure | To remain within national standards at site perimeter and at sensitive receptors | Particulate mobilisation can be caused by the demolition of buildings and handling of the rubble, backfilling of the storm water dam and "dirty" water collection channels and ripping and shaping of compacted areas. | a) Wet suppression during landscaping and materials handling activities;<br>b) Enforcement of low vehicle speeds on unpaved areas (< 40 km/h);<br>c) Use of shade-cloth where necessary, to reduce wind speeds and reduce travel distance of dust;<br>d) Vegetation of bare surfaces with a locally indigenous grass species as soon as possible;<br>e) Continue dust fall monitoring until vegetation cover is well established; and<br>f) Requiring contractors to maintain construction vehicles in good condition. | ECO | Weekly<br><br>Dust Monitoring Reports |
| Ecology | Shaping of landscape | To establish a self-sustaining diversity of local indigenous vegetation | Loss of species of conservation concern | All infrastructure that could have a negative impact on faunal species (powerlines etc) needs to be decommissioned and removed. | ECO | Monthly<br><br>Alien Invasive Species Management Plan |
| | Revegetation of landscape | | Impact on the growth and health of both fauna and flora | Implement rehabilitation strategy and rehabilitation interventions. | | |
| | Monitoring of plant species establishment | | Establishment of vegetation | Implement rehabilitation monitoring plan and remedy actions. | | |
| | | | Habitat reconstruction | Implement rehabilitation monitoring plan and remedy actions. | | |
| | | | Habitat stabilisation | Implement rehabilitation monitoring plan and remedy actions. | | |
| Noise | Backfill of disturbed areas | To avoid intrusive noise levels at<br><br>sensitive receptors | Noise increase at the boundary of the mine footprint and at the abutting residential | Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | ECO<br><br>Occupational Hygienist | Monthly<br><br>Monthly Noise Surveys |
| | Planting of grass and vegetation at rehabilitated area | | | Building activities to be done during daytime working hours unless there is no heavy-duty machinery which may create a noise problem. | | |
| | Maintenance of disturbed area | | | Maintenance activities to be done during daytime working hours. | | |
| Aquatic Ecology | Shaping of landscapes | Prevent contamination of water bodies | Sedimentation as a result of bare areas of soil | a) Sediment trapping berms<br>b) Stormwater management plans<br>c) Dry season working | ECO | Monthly |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| | | | | d) Aquatic biomonitoring | | Monthly aquatic biomonitoring report<br><br>Water Quality Assessment Reports<br><br>Annual Water Liability Reports |
| | Vehicular and machinery movement | | Pollution of water resources as result of hydrocarbon spills | a) Service all vehicles and machinery Refuel in hard-park/bunded area Store hydrocarbons safely in bunded area.<br>b) Vehicle maintenance and inspection daily.<br>c) Spill kits must always be available and ready on-site. | | |
| Soil, land use and land capability | Traffic movement | Restore land to its pre-mining state | Transport of materials away from site. This will compact the soil of the existing roads and fuel and oil spills from vehicles may result in soil chemical pollution. | **a) Management and supervision of decommissioning teams**<br><br>The activities of decommissioning contractors or employees will be restricted to the planned areas. Instructions must be included in contracts that will restrict decommissioning workers to the areas demarcated for decommissioning. In addition, compliance to these instructions must be monitored.<br><br>**b) Infrastructure removal**<br><br>All buildings, structures and foundations not part of the post-closure land use plan must be demolished and removed from site<br><br>**c) Site preparation**<br><br>Once the site has been cleared of infrastructure and potential contamination, the slope must be re-graded (sloped) in order to approximate the pre-project aspect and contours. The previous infrastructure footprint area must be ripped a number of times in order to reduce soil compaction. The area must then be covered with topsoil material from the stockpiles.<br><br>**d) Seeding and re-vegetation** | ECO | Monthly |
| | Earthworks | | Earthworks will include redistribution of inert waste materials to fill the shaft as well as topsoil to add to the soil surface. These activities will not result in further impacts on land use and land capability but may increase soil compaction. | | | |
| | Handling and storage of materials | | Other activities in this phase that will impact on soil are the handling and storage of materials and different kinds of waste generated as well as accidental spills and leaks with decommissioning and rehabilitation activities. This will have the potential to result in soil pollution when not managed properly. | | | |
| | Revegetation | | With the decommissioning phase, soil surfaces are in the process of being replanted with indigenous vegetation and until vegetation cover has established successfully, all surfaces are still susceptible to potential soil erosion. | | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | | Once the land has been prepared, seeding and re-vegetation will contribute to establishing a vegetative cover on disturbed soil as a means to control erosion and to restore disturbed areas to beneficial uses as quickly as possible. The vegetative cover reduces erosion potential, slows down runoff velocities, physically binds soil with roots and reduces water loss through evapotranspiration. Indigenous species will be used for the re-vegetation, the exact species will be chosen based on research available and then experience as the further areas are re-vegetated.<br><br>**e) Prevention of soil contamination**<br><br>During the decommissioning phase, chemical soil pollution should be minimised as follows:<br><br>Losses of fuel and lubricants from the oil sumps of vehicles and equipment should be contained using a drip tray with plastic sheeting and filled with absorbent material;<br><br>o Using biodegradable hydraulic fluids, using lined sumps for collection of hydraulic fluids and recovering contaminated soils and treating them off-site;<br>o Avoiding waste disposal at the site wherever possible, by segregating, trucking out, and recycling waste;<br>o Containing potentially contaminating fluids and other wastes; and<br>o Cleaning up areas of spillage of potentially contaminating liquids and solids. | | |
| Groundwater | Decanting | Prevent contamination of water bodies | After mine closure and ceasing of dewatering, shaft is likely to decant. Once | a) Identify decant areas and raise topography to increase time to decant; | ECO | Monthly |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
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| | | | the mine starts to decant, it is not expected to stop naturally. Pollution from WRDs on groundwater quality will continue in perpetuity, even after mine closure.<br><br>Seepage and decant is expected to have a serious impact and require management and rehabilitation measures to prevent irreplaceable impacts. If the pH is acidic, dissolved metals and sulphates will remain is solution. | b) Plan underground mining so that the perimeters follow the surface contours along the lowest side of the shaft and not cut directly across streams;<br>c) Monitoring groundwater levels, decant rates and qualities;<br>d) Revegetated WRD as quickly as possible to minimize recharge rates;<br>e) Divert all clean runoff away from, the shaft through a series of berms;<br>f) Re-evaluate impact of decant after end of life, once monitoring information is available; and<br>g) Treat seepage and decanted water using passive or active means to meet the recommended standards. | | Water Quality Assessment Reports<br><br>Annual Water Liability Reports |
| Surface water | Mine rehabilitation | Prevent contamination of water bodies | Pollution of surrounding watercourses as a result of activities during the decommissioning phase | a) The perimeter stormwater management measures should remain in place and should only be removed once rehabilitation of other activities has been completed. This will capture most of the sediment produced from rehabilitation activities and any spills from removal of hydrocarbon and chemical storage;<br><br>b) Credible contractors should be used for the cessation of the mining and decommissioning of all infrastructure. | ECO | Monthly<br><br>Monthly aquatic biomonitoring report<br><br>Water Quality Assessment Reports<br><br>Annual Water Liability Reports |
| | Post closure | | Rehabilitation of the site post mining will result in a positive impact on surface water quantity when completed. | Rehabilitation will result in a positive improvement as surface water drainage patterns will be restored to a state similar to pre-mining which is likely to result in an improvement in catchment yield after land profiling and cover having been restored. | | |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| Traffic Impact | Removal of rubble and other materials from site | To avoid adding to frustration of other road users or compromising road safety | Added traffic on the road network | Road network able to support additional trucks. | ECO | Monthly |
| Heritage | Ripping and shaping of compacted areas | Report any suspicion of unmarked graves or artefacts to SAHRA and Provincial Heritage Resource Agency | Ripping and shaping all compacted areas to be free draining, followed by re-vegetation might expose human remains or archaeological artefacts | a) If any heritage sites are identified, appropriate steps as per the Heritage Resources Act will be undertaken<br>b) Education and training on heritage resources will be given to mine employees. | ECO | Monthly |
| Socio-Economic | Mine closure | To implement the conditions of the SLP | The impact may be reversible over time as workers and job-seekers leave the area, consequences such crime and other social pathologies will be permanent. | a) Effect retrenchments according to procedures stipulated in approved SLP;<br>b) The Mine's SLP should provide strategies and measures that prevent job loss;<br>c) Support economic diversification through development of alternative markets;<br>d) Develop a Mine Closure Plan;<br>e) Proactively and effectively implement mine closure plan;<br>f) Collaborate with adjacent mining companies to develop and implement sustainable community;<br>g) Develop alternative and sustainable livelihoods;<br>h) Alternatives to save jobs/avoid downscaling should be investigated beforehand;<br>i) Proactively assess and manage the social and economic impacts on individuals, regions and economies where retrenchment and/or closure of the mine are certain; and<br>j) Partner with the relevant government departments, to jointly manage Closure process. | ECO | Monthly<br><br>Annual Review of SLP |
| Waste management | Mine closure | To prevent contamination of soil and water resources by acid, salts or metals and to practises 3Rs of waste management | Wastes expected to result from the decommissioning and rehabilitation activities include scrap metals, building rubble, oils, lubricants, paints, solvents, | a) Identify areas of possible soil contamination, sample such areas, analyse and determine degree of soil contamination. Remove and | ECO | Weekly |

| Environmental Aspect | Activity | Objective | Potential Impacts | Mitigation Measures | Responsible Person | Monitoring Frequency and Reports |
|---|---|---|---|---|---|---|
| | | | contaminated soils, PCD dam silt and liners, waste rock dumps and potentially recyclable materials such as steel, wood, plastics, glass and tiles. If stored or discarded on open ground, hydrocarbons will cause soil contamination and possibly groundwater pollution, an impact rated as low. | dispose of soil with contamination levels exceeding then prevailing standards/guidelines;<br>b) Remove silt, synthetic liners and contaminated non-synthetic liner materials from PCD and dispose at appropriately licenced landfill. Liner materials and building rubble with contamination levels below prevailing standards/guidelines may be backfilled into the last portion of the shaft void;<br>c) Sort the remaining wastes and store in separate skips or other containers for hydrocarbons, recyclable materials and non- recyclable materials. Recyclable materials should be sorted into wood, steel, glass, plastic, paper and used oil, and stored in separate containers;<br>d) Have recyclable wastes removed by responsible recyclers; and<br>e) Have non-recyclable wastes removed by reputable contractors for disposal at appropriately licensed landfills. | | |

# 24 FINANCIAL PROVISION

## *24.1 Closure Objectives*

Closure objectives identified in this report include:

a) Topography
   - To ensure that the final elevation will result in the continuation of the pre-mining surface drainage pattern, albeit that topographical changes on site, such as the mine residue facility, will be altered permanently.

b) Soil, Land Capability and Land Use
   - To ensure that soil types are replaced in correct sequence, subsoil followed by topsoil, and at appropriate depths.
   - To ensure post-mining land capability is at least similar to pre-mining which is grazing and some arable lands.
   - To ensure that the land capability is self-sustaining.
   - To ensure that pre-mining land uses can continue.

c) Surface Water
   - To ensure that no dirty water from the site enters the surrounding surface water systems.
   - To maintain flow in downstream rivers to prevent deterioration of downstream ecological status.

d) Groundwater
   - To ensure that possible plumes originating from the mining areas do not impact significantly on the surface water features or surrounding users' boreholes.
   - To ensure that groundwater users that are impacted have alternative sustainable water sources of the similar quality and quantity.

e) Flora and Fauna
   - To ensure that vegetation growth and cover on the rehabilitated areas is sustainable.
   - To ensure that alien invasive growth is eradicated until the closure certificate is granted.
   - To encourage surrounding animals to return into the rehabilitated areas to maintain the surrounding biodiversity.

f) Aquatic Ecosystems
   - To ensure that aquatic ecosystems are maintained as close as possible to that of the pre-mining environment.

g) Wetlands
   - To minimise the disturbance on wetlands.
   - To ensure that the adjacent wetland conditions are similar to that of the pre-mining Present Ecological State.

## *24.2 Confirm Specifically That the Environmental Objectives in Relation to Closure Have Been Consulted with Landowner and Interested and Affected Parties.*

All registered I&APs and landowners were invited to comment on this draft EIR. Furthermore, this draft EIA/EMPr is available to I&APs and landowners for a 30-day review period.

## *24.3 Calculate and State the Quantum of the Financial Provision Required to Manage and Rehabilitate the Environment in Accordance with The Applicable Guideline.*

The closure costs of the aspects linked with the project have been determined using the Mineral Resources (DMR) Guideline Document for the Evaluation of the Quantum of Closure-Related

Financial Provisions Provided by a Mine (2005). The closure costs are based solely on the premature closure of Mining Area only, as this would be the only area that would have been impacted upon within one year of operation.

The approach to calculating the closure quantum as specified in the DMR Guideline is summarised as follows and is reported in Table 2-2 of the guideline:

a) Step 1: Determine the Mineral Mined which is coal.
b) Step 2A: Determine Primary Risk Class.
c) Step 3: Environmental Sensitivity has been determined by reference to Table B.4 of the DMR Guideline
d) Step 4.1: Determine level of information
e) Step 4.2: Determine the closure components and associated rates –the rates have been escalated with the Consumer Price Index since the inception of the guidelines.
f) Step 4.3: Determine the unit rates for closure components. The rates used in the assessment are based on the original 2005 rates included in the guideline, with these rates inflated by the Consumer Price Index (CPI).
g) Step 4.4: Determination of weighting factors:
    - Weighting Factor 1: The nature of the terrain where the operation is located.
    - Weighting Factor 2: The proximity of the operation to an urban centre.

Step 4.5: Identify areas of disturbance as illustrated in **Table 36**

**Table 36: Areas of disturbance**

| Infrastructure | Year 1 of Operation |
|---|---|
| | |
| **Shaft Rehabilitation** | |
| Shaft Rehabilitation | 10 |
| | |
| **Rehabilitation of Overburden and Spoils** | |
| Overburden Dump & ROM Stockpile | 58 |
| | |

| Infrastructure | Year 1 of Operation |
|---|---|
| **Demolition of Steel Buildings and Structure** | |
| Plant Area | 0,06 |
| | |
| **Demolition of Dams** | |
| Non-Polluting Dams | 0,5 |
| | |
| **Demolition of Reinforced Concrete Buildings and Structures** | |
| Mine Infrastructure/Mine Office | 0,658 |
| | |
| **Rehabilitation of Access Roads** | |
| Haul Roads and Access Roads (333,3 X 15=5000m2) | 0,5 |
| | |
| **Total Area ha** | **69,718** |

h) Step 4.6: Identify closure costs from Specialists.

Step 4.7: Proposed closure costs for the Project as indicated in **Table 37**.

**Table 37: Quantum Calculation**

**CALCULATION OF THE QUANTUM (REAL RATES)**

| | | | |
|---|---|---|---|
| Applicant: | **Tenbosch Mining (Pty) Ltd** | **Ref No.:** | **MP30/5/1/2/2/10259 MR** |
| Evaluators: | **Kimopax (Pty) Ltd** | **Date:** | **2023/06/23** |

| No. | Description | Unit | A | B | C | D | E=A*B*C*D |
|---|---|---|---|---|---|---|---|
| | | | Quantity | Master Rate | Multiplication factor | Weighting factor 1 | Amount (Rands) |
| | | | | | | | |
| **1** | Dismantling of processing plant and related structures (including overland conveyors and powerlines) | **m3** | 600 | 16,59 | 1 | 1 | 9954 |
| **2 (A)** | Demolition of steel buildings and structures | **m2** | 1000 | 231,09 | 1 | 1 | 231090 |
| **2(B)** | Demolition of reinforced concrete buildings and structures | **m2** | 800 | 340,55 | 1 | 1 | 272440 |
| **3** | Rehabilitation of access roads | **m2** | 500 | 41,35 | 1 | 1 | 20675 |
| **4 (A)** | Demolition and rehabilitation of electrified railway lines | **m** | 0 | 401,36 | 1 | 1 | 0 |
| **4 (A)** | Demolition and rehabilitation of non-electrified railway lines | **m** | 0 | 218,92 | 1 | 1 | 0 |
| **5** | Demolition of housing and/or administration facilities | **m2** | 500 | 462,17 | 1 | 1 | 231085 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | Opencast rehabilitation including final voids and ramps | **ha** | 0 | 235221,83 | 1 | 1 | 0 |
| **7** | Sealing of shafts adits and inclines | **m3** | 40 | 124,06 | 1 | 1 | 4962,4 |
| **8 (A)** | Rehabilitation of overburden and spoils | **ha** | 15 | 161517,37 | 1 | 1 | 2422760,55 |
| **8 (B)** | Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential) | **ha** | 0,5 | 201116,96 | 1 | 1 | 100558,48 |
| **8 ( C )** | Rehabilitation of processing waste deposits and evaporation ponds (polluting potential) | **ha** | 0 | 584284,21 | 1 | 1 | 0 |
| **9** | Rehabilitation of subsided areas | **ha** | 0 | 135246,47 | 1 | 1 | 0 |
| **10** | General surface rehabilitation | **ha** | 40 | 127949 | 1 | 1 | 5117960 |
| **11** | River diversions | **ha** | 0 | 127949 | 1 | 1 | 0 |
| **12** | Fencing | **m** | 20 | 145,95 | 1 | 1 | 2919 |
| **13** | Water management | **ha** | 1 | 48649,81 | 1 | 1 | 48649,81 |
| **14** | 2 to 3 years of maintenance and aftercare | **ha** | 40 | 17027,43 | 1 | 1 | 681097,2 |
| **15 (A)** | Specialist study | **Sum** | 0 | 0 | 1 | 1 | 0 |
| **15 (B)** | Specialist study | **Sum** | 0 | 0 | 1 | 1 | 0 |
| | | | | | Sub Total 1 | | **9144151,44** |

| | | | | |
|---|---|---|---|---|
| 1 | Preliminary and General | 1097298,173 | **weighting factor 2**<br>1 | **1097298,173** |

| | | | |
|---|---|---|---|
| 2 | Contingencies | 914415,144 | **914415,144** |
| | | Subtotal 2 | **11155864,76** |
| | | VAT (15%) | **1561821,07** |
| | | **Grand Total** | **12717686** |

### *24.4 Confirm that the Financial Provision will be Provided as Determined*

Financial Provision, to the amount of R 12 717 686 be made by way of a guarantee acceptable to the DMR, as per the Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations .

# 25 MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON, INCLUDING:

### *25.1 Monitoring of Impact Management Actions*

Refer to Section 23.16.

### *25.2 Monitoring and reporting frequency*

Refer to Section 23.16.

### *25.3 Responsible persons*

Refer to Section 23.16.

### *25.4 Time period for implementing impact management actions*

Refer to Section 23.15

### *25.5 Indicate the Frequency of the Submission of the Performance Assessment Report*

The Environmental Performance Report will be submitted to the DMR after every 2 years.

# 26 ENVIRONMENTAL AWARENESS PLAN

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

#### 26.1.1 Training Needs

A training needs analysis is to be performed through all levels of the organization including those within the administration, plant and mining worker sectors. Each of the categories/levels of the organization have different responsibilities and roles, accordingly, different knowledge requirements are applicable. A training needs analysis is to be performed through all levels of the organization including those within the administration, plant and mining worker sectors. Each of the categories/levels of the organization have different responsibilities and roles, accordingly, different knowledge requirements are applicable.

#### 26.1.2 General Awareness Training

The Human Resources Development (HRD) Manager, together with the SHE Manager, will be responsible for the development of, or facilitating the development of the required general SHE induction and awareness training. A general environmental awareness training module will be developed and integrated into the general induction programme. The general awareness training must include the Environmental Policy, a description of the environmental impacts and aspects and the importance of conformance to requirements, general responsibilities of Tenbosch Mining personnel and contractors with regard to the environmental requirements and a review of the emergency procedures and corrective actions; and

A Training Practitioner or the Environmental Officer (EO) will conduct the general awareness training. The training presenter will keep a record of the details of all persons attending general awareness training. Such attendance registers shall indicate the names of attendants and their organisations, the date and the type of training received.

## *26.2 Manner in Which Risks will be Dealt With in Order to Avoid Pollution or the Degradation of the Environment*

Training will address the specific measures and actions as listed in the EIA and EMP. In this way each staff member will be provided the knowledge required for their job to firstly prevent impact and secondly identify if an impact is likely to occur and then to report the possibility of risk or impact immediately so as to ensure immediate response.

The following is a list of the most likely potential environmental emergencies, followed by basic summary of procedures (the mine will develop detailed SOPs, which will incorporate detailed requirements under the MPRDA Regulations, for emergency events:

a) Fires
b) Chemical/hydrocarbon spill or leak
c) Explosions

In the case of environmental emergencies, the remedial measures and actions as listed in the Emergency Response Plan should be followed, in addition the relevant authorities should be contacted.

### 26.2.1 Fire

Veld fires and fires resulting from other sources must be handled with extreme caution. Fire extinguishers should be placed around the mine at accessible locations and needs to be frequently inspected and maintained in working condition. The following procedures apply in the event of a fire:

a) An alarm should be activated to alert all employees and contractors.
b) Identify the type of fire and the appropriate extinguishing material. For example, water for a grass fire, and mono ammonium phosphate-based fire extinguisher for chemical and electrical fires.

c) In the event of a small fire, the fire extinguishers placed around the mine should be used to contain and extinguish the fire.
d) In the event of a large fire, the fire department will be notified.
e) All staff will receive training in response to a fire emergency on site, including evacuation procedures.
f) A Fire Association should be set up with the mine and surrounding landowners to facilitate communication during fire events and assist in fighting fires, where necessary. If such an association exists, then the mine will join such an association.
g) If possible, all surrounding drains, such as storm water drains need to be covered and or protected to prevent any contaminated water from entering the drains.
h) In case of a chemical or petroleum fire, run-off from the area should be contained as far as possible using the most appropriate measures e.g. spill absorbent cushions, sand or a physical barrier.
i) Contaminated run-off must be diverted into an oil sump or cleaned up.

### 26.2.2 Hydrocarbon/Chemical Spill

Hydrocarbons such as diesel, petrol, and oil, which are used as fuel for mine machinery will be kept on site; therefore, there is the possibility that spillage may occur. Further, any chemicals contained on site, such as those associated with explosives may also be detrimental to the environment if spills occur. In the event of a spillage, procedures must be put into place to ensure that there are minimal impacts to the surrounding environment. The following procedure applies to a hydrocarbon/chemical spill:

a) The incident must be reported to the Environmental coordinator immediately.
b) The Environmental Coordinator will assess the situation from the information provided and set up an investigation team. Included in this team could be the Mine Manager, Chief Safety Officer, the employee who reported the incident and any individual responsible for the incident.
c) When investigating the incident, priority must be given to safety.
d) Once the situation has been assessed, the Environmental Coordinator must report back to the Mine Manager.

e) The Mine Manager and the investigation team must make a decision on what measures can be taken to limit the damage caused by the incident, and if possible, any remediation measures that can be taken.
f) In the event of a small spillage, the soil should be treated in situ, using Hazmat clean up kits and bioremediation.
g) Every precaution should be taken to prevent the spill from entering the surface water environment.
h) In the event of a large spillage, adequate emergency equipment for spill containment or collection, such as additional supplies of booms and absorbent materials, will be made available and if required, a specialised clean-up crew will be called in to decontaminate the area. The soil should be removed and treated at a special soil rehabilitation facility.
i) Reasonable measures must be taken to stop the spread of spills and secure the area to limit access.
j) Dispatch necessary services.

### 26.2.3 Explosion

Other than explosion incidents related to mining, explosions can occur in the workshop areas when working with gas cylinders and chemicals. These could result in large numbers of employees being injured and requiring medical assistance. The procedure to be followed is:

a) Safe evacuation routes should be devised in the event of an uncontrolled explosion and all staff trained on relevant evacuation routes and assembly points.
b) Once safe to do so, first responders may provide first aid to injured parties.
c) All relevant emergency response units must be notified, and hospitals informed of incoming patients.

DMR to be notified of the incident.

# 27 IMPLEMENTATION PLAN

It is recommended that the EMP be implemented and monitored through regular audits conducted by an independent environmental practitioner. It is suggested that the audits be conducted annually, starting from the commencement of the mining operations up to rehabilitation phase. The audit reports must be submitted to the competent authority.

### *27.1 Responsibility for EMPr Implementation*

Tenbosch Mining remains ultimately accountable for the site and remains liable for any environmental damage caused by activities undertaken on the site. It is from this point of view that Tenbosch Mining sets out a range of requirements in terms of the management of the environmental aspects for the site, to which Contractors must adhere as a prerequisite to their appointment.

It is the responsibility of Tenbosch Mining to ensure that the principles of integrated environmental management, in terms of the requirements of Chapter 5 of NEMA, are implemented and maintained on the site and that environmentally sustainable practices are undertaken on the site. Tenbosch Mining has to ensure that an approved EMPr and the conditions of the Environmental Authorisation (EA) be supplied to the Contractor for the activities undertaken on the site and also monitor the Contractor's compliance to the requirements set out in the EMPr and EA and take disciplinary action for non-compliance.

## 28 UNDERTAKING

The EAP herewith confirms

**a)** the correctness of the information provided in the reports ☒

**b)** the inclusion of comments and inputs from stakeholders and I&APs; ☒

**c)** the inclusion of inputs and recommendations from the specialist reports where relevant; ☒ and

**d)** the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒

**Signature of the EAP DATE: 18 August 2023**

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