ENVIRONMENTAL & ENGINEERING

# REPORT

# OPTIMUM COAL MINE (PTY) LTD - BOSCMANSPOORT 159 IS

## INTEGRATED ENVIRONMENTAL AUTHORISATIONS IN SUPPORT OF A SECTION 102 AMENDMEND APPLICATION

## DRAFT BASIC ASSESSMENT REPORT

**REPORT REF: 22-1890-AUTH (OPTIMUM COLLIERY_BOSCHMANSPOORT BAR IWUL WL)**

**DMRE REF: MP 30/5/1/2/3/2/1 (267) MR / S102 REF: MP-00174-MR/102**

**MINING OF COAL IN RESPECT OF PORTION 8 OF THE FARM BOSCHMANSPOORT 159 IS, STEVE TSHWETE LOCAL MUNICIPALITY, NKANGALA DISTRICT MUNICIPALITY, MPUMALANGA PROVINCE**

VERSION BB

07 April 2023

## Document and Quality Control:

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The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge, as well as available information. Information utilised and contained in this report is based on data/information supplied to Eco E by the client and other external sources (including previous site investigation data and external specialist studies).

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# EXECUTIVE SUMMARY

## Background

Optimum Coal Mine (Pty) Ltd (hereinafter Optimum Colliery) is applying for a Section 102 amendment to the existing Mining Right held by Optimum Colliery. Previous underground mining activities took place at Boschmanspoort, but the proposed area was never mined and it is the intention of Optimum Colliery to opencast mine the area previously earmarked for underground mining. Optimum Colliery intends on using the existing infrastructure at Boschmanspoort in order to optimise the area for resource extraction. The area is located on a portion of Portion 8 of the Farm Boschmanspoort 159 IS in the Mpumalanga Province of South Africa.

**Table 1-1.1: Basic Assessment Timeline**

| Date | Aspect |
|---|---|
| N/A | S102 application amendment on SAMRAD. |
| 15/12/2022 | S102 amendment application acceptance received from DMRE. |
| 21/04/2023 | Advert Placed in Middelburg Observer |
| TBD | Interested and Affected Parties notified via email and SMS. |
| 21/04/2023 | 30-day Public Participation started for the NEMA Basic Assessment Process. |
| TBD | Submission of the final Basic Assessment Report. |

The obtaining of an amendment to a Mining Right from the Department of Mineral Resources and Energy (DMRE) is governed by the Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA). The MPRDA requires compliance with related legislation, specifically the National Environmental Management Act (Act 107 of 1998) (NEMA). This Basic Assessment Report (BAR) includes, amongst others, the following information as required in terms of the NEMA:

- A description of the environment likely to be affected by the proposed prospecting activities;
- An assessment of potential impacts on the environment, socio-economic conditions, and cultural and heritage aspects;
- A summary of the potential significance of identified impacts;
- Proposed mitigation and management measures to minimise adverse impacts and to optimise benefits; and
- Planned monitoring and performance assessment of the EMP (Environmental Management Plan) and Rehabilitation measures of areas disturbed during prospecting.

## Project Description

**Table 1-2: Project description**

| | |
|---|---|
| **Farm Name:** | Portion 8 Of Boschmanspoort, 159 IS |
| **Application area (Ha)** | 180.73 ha. |
| **Magisterial district:** | Steve Tshwete Local Municipality<br>Nkangala District Municipality |
| **Distance and direction from** | +/- 20 km North of Hendrina and 7km East of the N11. |

| | |
|---|---|
| **nearest town** | |
| **21 digit Surveyor General Code for each farm portion** | T0JS00000000015900008 |
| **Description of the overall activity. (Indicate Mining Right, Mining Permit, Prospecting right, Bulk Sampling, Production Right, Exploration Right, Reconnaissance permit, Technical co-operation permit, Additional listed activity)** | Application for Environmental Authorisation submitted in support of the application for a Section 102 Mining Right Amendment for the Mining of Coal.<br>Optimum Colliery consists of four sections, namely Optimum (which includes Schoonoord and Boschmanspoort), Kwagga, Eikeboom, and Klipbank. The mine is a multi-product mine which produces coal destined for the export market and coal for Eskom Hendrina Power station.<br>Mining started in 1969 and the mine is scheduled for closure in 2032. Optimum Colliery covers a large area of approximately 37 000 ha and current active mining areas are:<br>• Pullenshope Section O/C and U/G<br>• Kwagga Central and North Sections<br>• Zevenfontein West Section<br>• Boschmanspoort Section<br>Mining activities to the North of Boschmanspoort are largely opencast. Underground mining had been undertaken at the Boschmanspoort section however, the proposed area was not mined underground, and it is now proposed that this section be opencast mined instead.<br>Beneficiation of the RoM (Run of Mine) will take place on the new proposed Optimum Plant North-East of the Boschmanspoort operations, which is not part of this application. |

## Project Schedule

The Basic Assessment (BA) process should be undertaken for project activities that are included under Listing Notices 1 and 3. Impacts of these activities are more generally known and can often be mitigated or easily managed. The BA process is generally shorter and less onerous than the Scoping and Environmental Impact Assessment (S&EIA) process. The BA process must follow the procedure as prescribed in Regulations 19 to 20 of NEMA EIA Regulations 2014, as amended.

## Registered Landowner

The registered landowners of the farms were listed as follows:

### Table 1-3: Landowners

| Farm | | | Ptn | Owner |
|---|---|---|---|---|
| BOSCHMANSPOORT | 159 | IS | 8 | OPTIMUM COAL MINE (PTY) LTD |

Surrounding landowners are listed below:

| Farm | | | Ptn | Owner |
|---|---|---|---|---|
| BOSCHMANSPOORT | 159 | IS | 0 | OPTIMUM COAL MINE (PTY) LTD |
| BOSCHMANSPOORT | 159 | IS | 31 | JAN AUGUSTINUS BREEDT |
| BOSCHMANSPOORT | 159 | IS | 24 | JAN AUGUSTINUS BREEDT |
| BOSCHMANSPOORT | 159 | IS | 6 | JAN AUGUSTINUS BREEDT |
| BOSCHMANSPOORT | 159 | IS | 4 | SCHEEPERS FAMILIE TRUST |
| BOSCHMANSPOORT | 159 | IS | 20 | DRIEPAN BOERDERY TRUST |
| BOSCHMANSPOORT | 159 | IS | 21 | DRIEPAN BOERDERY TRUST |
| BOSCHMANSPOORT | 159 | IS | 28 | DRIEPAN BOERDERY TRUST |
| BOSCHMANSPOORT | 159 | IS | 18 | REYNIER VAN TONDER |
| BOSCHMANSPOORT | 159 | IS | 9 | ANTON PELSER EIENDOMS TRUST |
| BOSCHMANSPOORT | 159 | IS | 10 | ANTON PELSER EIENDOMS TRUST |

| Farm | | | Ptn | Owner |
|---|---|---|---|---|
| BOSCHMANSPOORT | 159 | IS | 22 | DOLANTAL PLASE CC |
| BOSCHMANSPOORT | 159 | IS | 18 | REYNIER VAN TONDER |
| GROOT DRAKENSTEIN | 157 | IS | 2 | HENDRIK JOHANNES JOSEFUS MEYER / PREMIMODE PTY LTD |
| VLAKFONTEIN | 179 | IS | 1 | S DE LANGE TRUST |
| BOSMANSPAN | 180 | IS | 1 | SUSANNA MAGRIETA STEYN |

## Details of the Public Participation Process followed

Section 41 of NEMA Regulation 982 set out the Legal and Regulatory Requirement for Public Participation. The Public Participation Process (PPP) aims to involve the authorities and Interested and Affected Parties (IAPs) in the project process, and determines their needs, expectations and perceptions which in turn ensures a complete and comprehensive environmental study. An open and transparent process has and will be followed at all times and is based on reciprocal dissemination of information. The following will be undertaken during the PPP:

1. Identification of I&APs;
2. Notification of IAPs regarding the proposed project;
3. Gathering comments, issues and concerns from IAPs;
4. Responding to IAP comments, issues and concerns;
5. Compilation and submission of results of consultation report to the DMR; and
6. Providing IAPs with the opportunity to review and comment on the basic assessment report.

## Location

The proposed mine is situated on Portion 8 of farm Boschmanspoort 159 IS, located approximately 20 km north of Hendrina and about 2.5km east of the N11 between Hendrina and Middelburg. The study area falls within the Nkangala District Municipality and the eMalahleni Local Municipality in the Mpumalanga Province. The site falls within the quarter degree square 2629BA.

## Impacts

The impacts were assessed, and key impacts rated as Moderate to High after mitigation or as a cumulative impact are summarised below:

### Table 1-4: Moderate to High Impact Summary

| Activity | Aspect | Impact | Phase | +/- | SU | +/- | SM |
|---|---|---|---|---|---|---|---|
| **Groundwater** | | | | | | | |
| Box cut opening. | Dewatering. | Decrease in water level should the pit floor be lower than the water level. | Construction | Negative | Med-High | Negative | Med-High |
| Pit dewatering | Dewatering | The water infiltrating the pit will be removed for safe mining, causing a decrease in the water level. | Operation | Negative | High | Negative | High |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Backfilling of pit | Backfilling of the pit and no more dewatering. | Recovery of the water level in the pit as dewatering ceases. In the case of acid generation, the plume will start to move away from the pit as the water level recovered. Decanting may occur once the water level has recovered to the decanting elevation. | Residual | Negative | High | Negative | High |
| **Surface Water and Wetlands** | | | | | | | |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | The source of this impact includes the compaction of soil, the removal of vegetation and surface water redirection. Intercepting lateral interflow by mining upslope will result in changes to water volumes available to support specialised downstream floodplain wetland habitats, which is located within the DWS 500 m regulated area. | Changing the quantity and fluctuation properties of the wetlands by restricting water flow or increasing flood flows | Design and if approved, construction, operation and closure | Negative | High | Negative | Med-High |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount). Construction and operational activities will result in earthworks and soil disturbance, as well as the removal of natural vegetation. This could result in the loss of topsoil, sedimentation of the watercourse and increase the turbidity of the water. Possible sources of the impacts include:<br>• Earthwork activities during construction<br>• Clearing of surface vegetation will expose the soils, which in rainy events would wash through the watercourse, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soils.<br>• Disturbance of soil surface.<br>• Disturbance of slopes through creation of roads and tracks adjacent to the watercourses.<br>• Erosion (e.g. gully formation, bank collapse). | Changes in sediment entering and exiting the system. | Design and if approved, construction, operation and closure | Negative | Med-high | Negative | Med |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | Disturbance of soil/water processes upslope from the wetlands may cut off interflow that feeds downslope wetlands | Loss and disturbance of wetland habitat and fringe vegetation. | Design phase, construction, operation and closure | Negative | High | Negative | High |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | Construction and operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in wetland function. This includes wind-blown coal dust during the operational phase as well as the inappropriate disposal of waste water. The risk and potential treatment of acid mine drainage should be assessed by a specialist in that field and is not addressed here since it falls outside our area of expertise. Impact scores should be revised | Changes in water quality due to pollution. | Construction and edge effects of operation | Negative | Med-High | Negative | Med |
| **Vegetation** | | | | | | | |
| Closure | Lack of rehabilitation | No natural vegetation | Closure | Negative | Med-High | Negative | Med |
| Site establishment Edge effects | Removal of surface vegetation in moist grasslands/wetlands / watercourses | Soil erosion could lead to increased sedimentation<br>Polluted water or sediment containing water reaching the watercourse and moist grassland<br>Reduced water holding capacity | Design phase, construction and operation | Negative | High | Negative | Med |
| Site establishment edge effects | Construction and mining | Removal / Destruction of protected plants and plants of conservation concern<br>Destruction of sensitive species habitat<br>Impact on sensitive species pollinators and ecological processes | Construction and edge effects of operation | Negative | Med-High | Negative | Med |
| **Air Quality** | | | | | | | |
| Hauling of Material Offsite | Air quality | Fugitive dust and particulate matter emissions | Operational | Negative | Med-High | Negative | Med-High |

| Social Economic | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mine establishment | Mining operations | Employment and income opportunity. | Construction and Operation Phase | Positive | Med | Negative | Med |
| Mining operations | Mine closure | Job losses. | Decommissioning and Closure | Negative | Med-High | Negative | Med |
| Mining operations | Mine Closure | Decrease/termination of community investment funds and support to local communities. | Decommissioning and Closure | Negative | Med-High | Negative | Med |

## Reasoned opinion

The EAP believes that the authorisation for the activity on the portion of Portion 8 of Boschmanspoort 159IS should be granted. The site area is located in a modified area and is in close proximity of other mining operations. The risks of the proposed mining activity are minimal and can be mitigated by following the mitigation measures stipulated in the EMP, which will reduce impacts significantly to acceptable levels.

## Conditions that must be included in the authorisation

- Adhere to all recommendation and management measures contained in the EMP.
- All relevant permits and authorisation must be obtained prior to construction commencing.
- Adhere to all monitoring requirements.
- A Water Use License (WUL) must be obtained prior to any water uses undertaken on site.
- As archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the development and construction phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Should skeletal remains be exposed during development and construction phases, all activities must be suspended, and the relevant heritage resources authority contacted.
- From a palaeontological perspective – the possibility exists that fossiliferous significant material (plants, insects, bone, coal) may be exposed during the development (construction & operational phase). These materials generally occur below the surface and is of palaeontologic significance. In cases where such material is found, all activities must be suspended pending further palaeontological investigations by a qualified palaeontological scientist.
- Methods of handling the potential decant should be investigated, approved, and set in place prior to mine closure.
- All acoustic screening measures must be in place before commissioning the mining activities.
- No off-road driving, hunting, poaching, or fires should be permitted on the property.
- An incident and complaints register must be present on site and submitted to the Municipality on quarterly basis.
- The applicant must have dust fallout monitoring points around the proposed mining area and have the monitoring reports submitted to the Municipality on quarterly basis.

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## Definition of Terms

| | |
|---|---|
| **Audit** | a systematic, independent and documented review of operations and practises to ensure that relevant requirements are met. Qualified professionals with relevant auditing experience should conduct audits and, where possible, independent external auditors should also be used. |
| **Borehole** | is a narrow shaft bored in the ground, either vertically or horizontally. A borehole may be constructed for many different purposes, including the extraction of water or other liquid (such as petroleum) or gases (such as natural gas), as part of a geotechnical investigation, environmental site assessment, mineral exploration, temperature measurement, as a pilot hole for installing piers or underground utilities, for geothermal installations, or for underground storage of unwanted substances, e.g. in Carbon capture and storage. |
| **Clean Water** | clean water is any water that has maintained the chemical, physical, and biological integrity of the waters by preventing point and nonpoint pollution sources. |
| **Compliant** | a full achievement of the performance requirement of a particular condition of the license or programme |
| **Conservation** | in relation to a water resource means the efficient use and saving of water, achieved through measures such as water saving devices, water-efficient processes, water demand management and water rationing; |
| **Construction** | the time period that corresponds to any event, process, or activity that occurs during the Construction phase (e.g., building of site, buildings, and processing units) of the proposed project. This phase terminates when the project goes into full operation or use. |
| **Corrective Action Plan** | an action plan developed by the proponent, contractor, or facility owner and approved by the external auditor that describes how the contractor or facility owner intends to resolve the non-conforming item. The Corrective Action Plan should be specific, measurable, achievable, realistic, and timely. |
| **Director-General** | means the Director-General of the Department; |
| **Effluent** | is defined by the United States Environmental Protection Agency as "wastewater - treated or untreated - that flows out of a treatment plant, sewer, or industrial outfall. Generally, refers to wastes discharged into surface waters". The Compact Oxford English Dictionary defines effluent as "liquid waste or sewage discharged into a river or the sea".<br>Effluent in the artificial sense is in general considered to be water pollution. |
| **Environmental Audit Report** | a summary report prepared after an environmental audit that describes the attributes of the audit and the audit findings and conclusions. |
| **Environmental Authorisation** | is an environmental authorisation issued by a state department. |
| **Environmental Component** | an attribute or constituent of the environment (i.e., air quality; marine water; waste management; geology, seismicity, soil, and groundwater; marine ecology; terrestrial ecology, noise, traffic, socio-economic) that may be impacted by the proposed project. |
| **Environmental Impact** | a positive or negative condition that occurs to an environmental component as a result of the activity of a project or facility. This impact can be directly or indirectly caused by the project's different phases (i.e., Construction, Operation, and Decommissioning). |
| **Groundwater** | is the water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water. The depth at which soil pore spaces or fractures and voids in rock become completely saturated with water is called the water table. Groundwater is recharged from, and eventually flows to, the surface naturally; natural discharge often occurs at springs and seeps, and can form oases or wetlands |
| **Non-conformance** | constitutes a non-compliance or an action plan or initial actions taken without tangible deliverables. Non-conformance may also be associated with activities breaching legislation. Non-Conformance findings therefore have a high priority and mitigation measures are mandatory. |
| **Operation** | the time period that corresponds to any event, process, or activity that occurs during the Operation (i.e., fully functioning) phase of the proposed project or development. (The Operation phase follows the Construction phase, and then terminates when the project or development goes into the Decommissioning phase.) |
| **Partially Compliant** | achievement with shortcomings (such as documented proof and or work in progress) and achievement where there is an obvious shortcoming in the delivery of the performance requirement. |
| **Pollution** | is the introduction of contaminants into the natural environment that cause adverse change. Pollution can take the form of chemical substances or energy, such as noise, heat or light. Pollutants, the components of pollution, can be either foreign substances/energies or naturally occurring contaminants. Pollution is often classed as point source or nonpoint source pollution. |
| **Protection** | in relation to a water resource, means -<br>(a) Maintenance of the quality of the water resource to the extent that the water resource may be used in an ecologically sustainable way;<br>(b) Prevention of the degradation of the water resource; and<br>(c) the rehabilitation of the water resource; |
| **Proponent** | the person, company, or agency that is the primary responsible party for a development project and that is the permit applicant/holder for the project. |
| **Rehabilitation** | is the act of restoring something to its original state; |
| **Responsible Authority** | in relation to a specific power or duty in respect of water uses, means -<br>(a) if that power or duty has been assigned by the Minister to a catchment management agency, that catchment management agency; or<br>(b) if that power or duty has not been so assigned, the Minister; |
| **Water Resource** | includes a watercourse, surface water, estuary, or aquifer; |

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

## Abbreviations

| | |
|---|---|
| **BA:** | Basic Assessment |
| **BAR**: | Basic Assessment Report |
| **CARA:** | Conservation of Agricultural Resources Act, 43 of 1983 |
| **DFFE:** | Department of Forestry, Fisheries and Environment |
| **DMRE:** | The Department of Mineral Resources and Energy |
| **DWS:** | Department of Water and Sanitation |
| **EA:** | Environmental Authorisation |
| **ECO**: | Environmental Control Officer |
| **EIA:** | Environmental Impact Assessment |
| **EIR:** | Environmental Impact Report |
| **ELCA:** | Environmental Legal Compliance Assessment |
| **EMP:** | Environmental Management Plan |
| **EMPPA**: | Environmental Management Programme Performance Assessment |
| **EMPR :** | Environmental Management Programme |
| **EMS:** | Environnemental Management System |
| **GM:** | General Manager |
| **GN:** | Government Notice |
| **I&AP:** | Interested & Affected Parties |
| **IEM:** | Integrated Environmental Management Series |
| **ISO:** | International Standards Organisation |
| **IWUL:** | Integrated Water Use License |
| **IWULA:** | Integrated Water Use Licence Application |
| **IWWMP:** | Integrated Water and Waste Management Plan |
| **KG**: | Knowledge Gap |
| **MOC:** | Management of Change |
| **MPRDA:** | Mineral and Petroleum Resources Development Act, 28 of 2002 |
| **MR**: | Mining Right |

| | |
|---|---|
| **MWP:** | Mine Works Programme |
| **N/R:** | Applicable, but not required at the time of the audit |
| **NC:** | Non-conformance |
| **NEMA:** | National Environmental Management Act, 107 of 1998 |
| **NEMAQA:** | National Environmental Management: Air Quality Act, 39 of 2004 |
| **NEMBA:** | National Environmental Management: Biodiversity Act, 10 of 2004 |
| **NEMWA:** | National Environmental Management: Waste Act, 59 of 2008 |
| **NHRA:** | National Heritage Resources Act, 25 of 1999 |
| **NWA:** | National Water Act, 36 of 1998 |
| **PCD:** | Pollution Control Dam |
| **PWP:** | Prospecting Works Programme |
| **ROM:** | Run of Mine |
| **RWD**: | Return Water Dam |
| **SAHRA:** | South African Heritage Resources Authority |
| **SHEQ:** | Safety, Health, Environment and Quality |
| **SLP:** | Social and Labour Plan |
| **SOP:** | Standard Operating Procedure |
| **SR:** | Scoping Report |
| **SWMP:** | Storm Water Management Plan |
| **WSA:** | Water Services Act, 108 of 1997 |
| **WUL*:*** | Water Use Licence |

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

# DRAFT BASIC ASSESSMENT REPORT
# AND
# ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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**: **Optimum Coal Mine (Pty) Ltd**

**TEL NO:** 013 010 4100

**FAX NO:** 013 296 5108

**POSTAL ADDRESS:** Optimum Coal Mine
Private Bag X1201
Pullenshope
1095

**PHYSICAL ADDRESS:** N11 Hendrina Road,
Pullenshope,
Mpumalanga,
1096

**FILE REFERENCE NUMBER SAMRAD:** MP 30/5/1/2/3/2/1/267 MR

**RECORD NUMBER:** MP-00174-MR/102

## 1. IMPORTANT NOTICE

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

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

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

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

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

## 2. OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

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

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

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

    ii. the degree to which these impacts—

aa. can be reversed.
bb. may cause irreplaceable loss of resources; and
cc. can be managed, avoided or mitigated.
e. through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—

    i. identify and motivate a preferred site, activity and technology alternative;

    ii. identify suitable measures to manage, avoid or mitigate identified impacts; and

    iii. identify residual risks that need to be managed and monitored.

# PART A

# SCOPE OF ASSESSMENT AND DRAFT BASIC ASSESSMENT REPORT

# 3. CONTACT PERSON AND CORRESPONDENCE ADDRESS

## 3.1 DETAILS OF THE EAP

Name of The Practitioner: Riana Panaino

Tel No.: 012 807 0383

e-mail address: Riana@ecoe.co.za

### Expertise of the EAP

**Figure 3-1: The qualifications of the EAP**

| Name and Surname | Riana Panaino |
|---|---|
| Company | Eco Elementum (Pty) Ltd |
| Position | Environmental Assessment Practitioner |
| Location | 361 Oberon Ave, Glenfield Office Park, Nika Building, 1st Floor, Faerie Glen, Pretoria 0081 |
| Email | riana@ecoe.co.za |

Please refer to the CV attached in Appendix A.

#### *3.1.1.1 Summary of the EAP's past experience.*

Riana Panaino has an Honours degree in Biodiversity and Conservation, is EAPASA and SACNASP Registered, and has more than 10 years' experience in Environmental Consulting. Refer to Appendix 6 for the CVs of the author and reviewer.

## 3.2 LOCATION OF THE OVERALL ACTIVITY

**Table 3-1: Location of the activity**

| | |
|---|---|
| **Farm Name:** | Portion 8 of Boschmanspoort, 159 IS |
| **Application area (Ha)** | 180.73 ha. |
| **Magisterial district:** | Steve Tshwete Local Municipality |
| **Distance and direction from nearest town** | Nkangala District Municipality |
| **21 digit Surveyor General Code for each farm portion** | +/- 20 km North of Hendrina and 7km East of the N11. |
| **Description of the overall activity. (Indicate Mining Right, Mining Permit, Prospecting right, Bulk Sampling, Production Right, Exploration Right, Reconnaissance permit, Technical co-operation permit, Additional listed activity)** | Application for Environmental Authorisation submitted in support of the application for a Section 102 Mining Right Amendment for the Mining of Coal.<br>Optimum Colliery consists of four sections, namely Optimum (which includes Schoonoord and Boschmanspoort), Kwagga, Eikeboom, and Klipbank. The mine is a multi-product mine which produces coal destined for the export market and coal for Eskom Hendrina Power station.<br>Mining started in 1969 and the mine is scheduled for closure in 2032. Optimum Colliery covers a large area and current active areas are:<br>• Pullenshope Section O/C and U/G |

| | |
|---|---|
| | • Kwagga Central and North Sections<br>• Zevenfontein West Section<br>• Boschmanspoort Section<br>The Boschmanspoort Optimum Colliery is situated on Portion 8 of Boschmanspoort, 159/IS, South-East of Middelburg and +/- 15 km North of Hendrina.<br>Mining activities to the North of Boschmanspoort are largely opencast. Underground mining has commenced at the Boschmanspoort section however the proposed area indicated in Figure 3-2 was not mined underground and it is now proposed that this section be opencast mined instead.<br>Additional environmental impacts will be assessed which is not part of this application. by qualified environmental specialist. All report will be submitted with the environmental reports and submitted to all interested and affected parties.<br>Beneficiation of the ROM will take place on the new proposed Optimum Plant North-East of the Boschmanspoort operations which is not part of this application. |

## 3.3 LOCALITY MAP

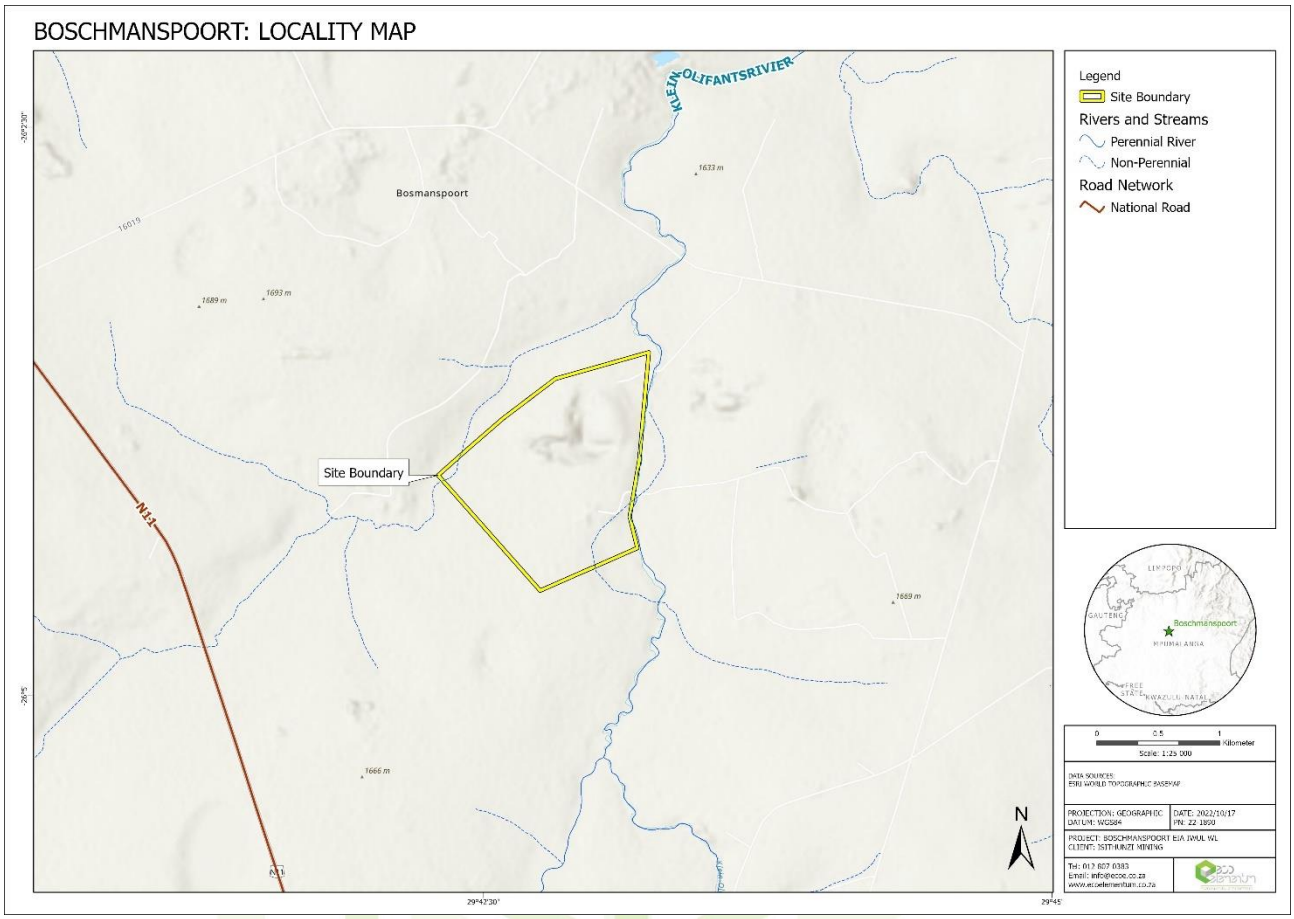



**Figure 3-2: Locality Map**

## 3.4 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY.

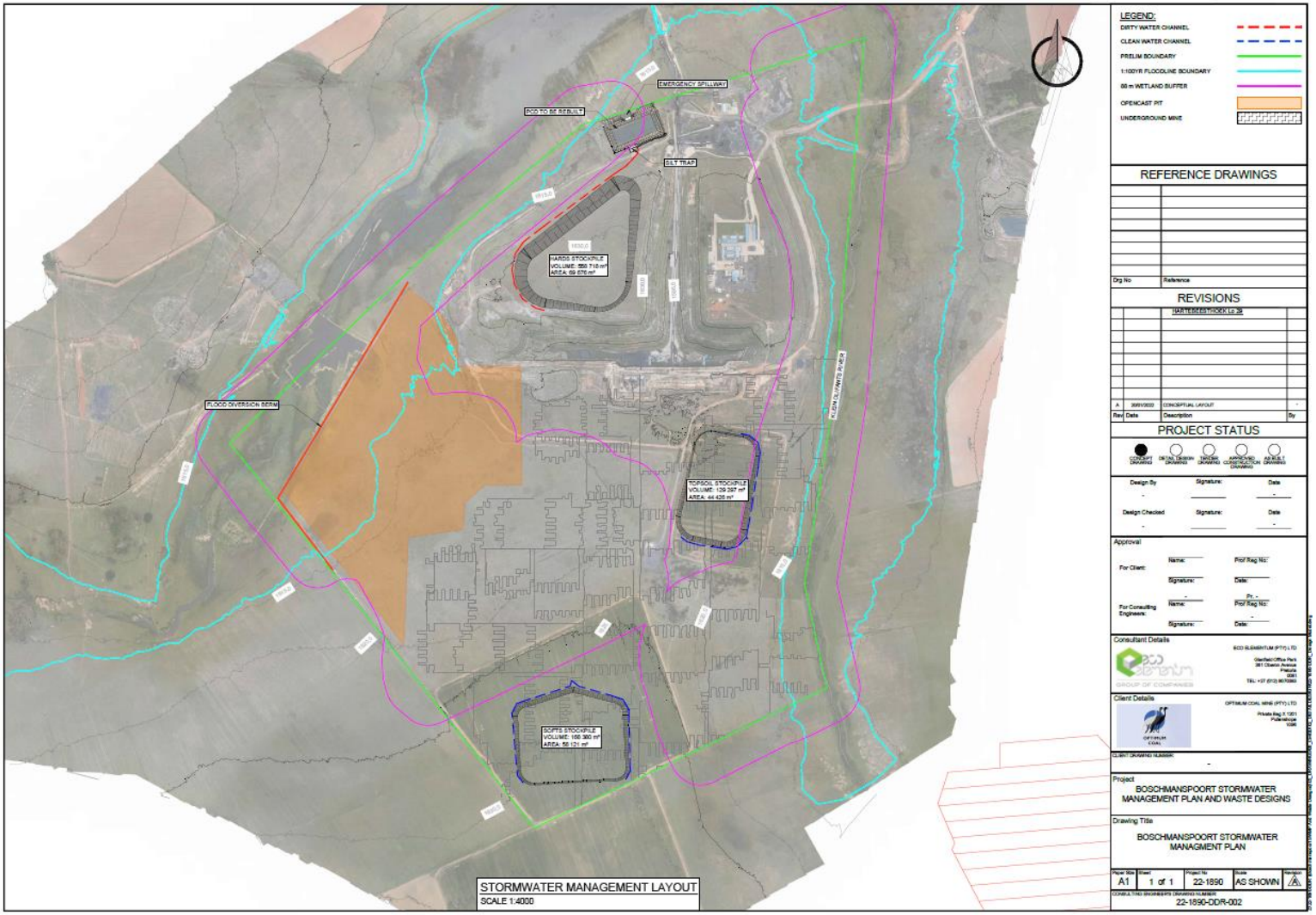



**Figure 3-3: Activities Map**

## Listed and specified activities

Section 16 of the MPRDA, 2002 requires, upon request by the Minister that an EMP be submitted, and that the applicant must notify and consult with Interested and Affected Parties (I&APs). Section 24 of the NEMA requires that activities, which may impact on the environment must obtain an environmental authorisation from a relevant authority before commencing with the activities. Such activities are listed under Regulations Listing Notice 1. Please refer to the following table for the details in terms of the listed activities.

**Table 3-2: Listed and specific activities**

| APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985; as amended). | | Name of Activity | Aerial extent of the Activity Ha or m² | Waste Management Authorisation |
|---|---|---|---|---|
| **Listing Notice 1 (GNR 983)** | | | | |
| **21D** | Any activity including the operation of that activity which requires an amendment or variation to a right or permit in terms of section 102 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment. | Amendment to existing mining right. | 25ha | Yes |
| **9** | The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water-<br>(i) with an internal diameter of 0.36 metres or more; or<br>(ii) with a peak throughput of 120 litres per second or more;<br>excluding where-<br>(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or<br>(b) where such development will occur within an urban area. | Storm water management structures. | >1,000 metres | No |
| **10** | The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes-<br>(i) with an internal diameter of 0.36 metres or more; or<br>(ii) with a peak throughput of 120 litres per second or more,<br>excluding where-<br>(a) such infrastructure is for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or<br>(b) where such development will occur within an urban area. | Process / Waste / Return Water pipeline infrastructure. | >1,000 metres | No |
| **MPRDA** | Section 22<br>Mining Right/Mining Permit/Prospecting Right/Section 102 EMP Amendment<br>(Refer to NEMA Activities above). | Authorisation Required | | |

## Description of Activities to be Undertaken

Optimum Colliery intends to mine coal resources on a 30ha portion of portion 8 of the farm Boschmanspoort, 159IS as indicated on figure 3.2. The resource will be mined via opencast roll over mining. The following activities will be undertaken on site:

- Box cut opencast mining with a roll over rehabilitation sequence;
- Hauling, access road, haul road;
- Mobile office;
- Mobile sanitation and change house;
- Mobile fuel storage;
- Pollution control facility/dam(s);
- Clean and dirty water separation system;
- Topsoil, subsoil, overburden, ROM stockpiles;
- Weighbridge; and
- Waste management.

### Site Preparation

Site preparation mainly deals with the stripping and stockpiling of topsoil prior to the mining activities commencing as this might affect the quality and quantity of available valuable topsoil resources. The main objectives of soil management are to:

- Minimal removing and stockpiling of topsoil due to historical mining activities;
- Optimise the preservation and recovery of topsoil for rehabilitation;
- Identify soil resources and stripping guidelines;
- Identify surface areas requiring stripping (to minimise over clearing);
- Manage topsoil reserves to not degrade the resource;
- Identify stockpile locations and dimensions; and
- Identify soil movements for rehabilitation use.

In accordance with the objective of providing sufficient stable soil material for rehabilitation and to optimise soil recovery, the following strategies have been adopted:

- Stockpiles to be located outside proposed mine disturbance areas;
- Construction of stockpiles by dozers rather than scrapers to minimise structural degradation;
- Construction of stockpiles with a “rough” surface condition to reduce erosion hazard, improve drainage and promote revegetation; and
- Revegetation of stockpiles with appropriate fertiliser and seed to minimise weed infestation, maintain soil organic matter levels, soil structure and microbial activity and maximise the vegetative cover of the stockpile depending on the exposure timeframes.

Disturbance areas will be stripped progressively (i.e. only as required) to reduce erosion and sediment generation, to reduce the extent of topsoil stockpiles and to utilise stripped topsoil as soon as possible for rehabilitation. Rehabilitation of disturbed areas (i.e. roads, embankments and stripped mining footprint) will be undertaken as practicable after these structures are completed or as areas are no longer required. Soil surveys over the open cut area, beneath proposed mine waste locations and other infrastructure areas will determine the depth of topsoil. It should be noted that it is important that for topsoil recovered from the areas it is required that underlying material is not inadvertently collected since it is unsuitable for reuse in rehabilitation.

A general protocol for soil handling is presented below and includes soil handling measures which optimise the retention of soil characteristics (in terms of nutrients and micro-organisms) favourable to plant growth:

- The surface of the completed stockpiles will be left in a "rough" condition to help promote water infiltration and minimise erosion prior to vegetation establishment;
- Topsoil stockpiles to have a maximum height of 3 m to limit the potential for anaerobic conditions to develop within the soil pile;
- Topsoil stockpiles to have an embankment grade of approximately 1V:4H (to limit the potential for erosion of the outer pile face);
- Topsoil stockpiles will be seeded and fertilised; and
- Soil rejuvenation practices will be undertaken if required prior to re-spreading as part of rehabilitation works.

### Box Cut Opencast Mining with a Roll-over Rehabilitation Sequence

Opencast mining using the truck and shovel lateral sequential rollover mining method will be undertaken. Mining will commence from the initial box cut. A haul road that will be extended from the nearby existing road will be used as access to the mining area.

The soft overburden will be removed by mechanical methods. The hard overburden will be drilled and blasted and then removed by mechanical methods. The coal will be drilled and blasted prior to removal.

Replacement of overburden materials into the mining pit will be according to the following sequence:

1. Placement of hard overburden at base of pit;
2. Placement of soft overburden; and
3. Final cover of topsoil (minimum 500 mm).

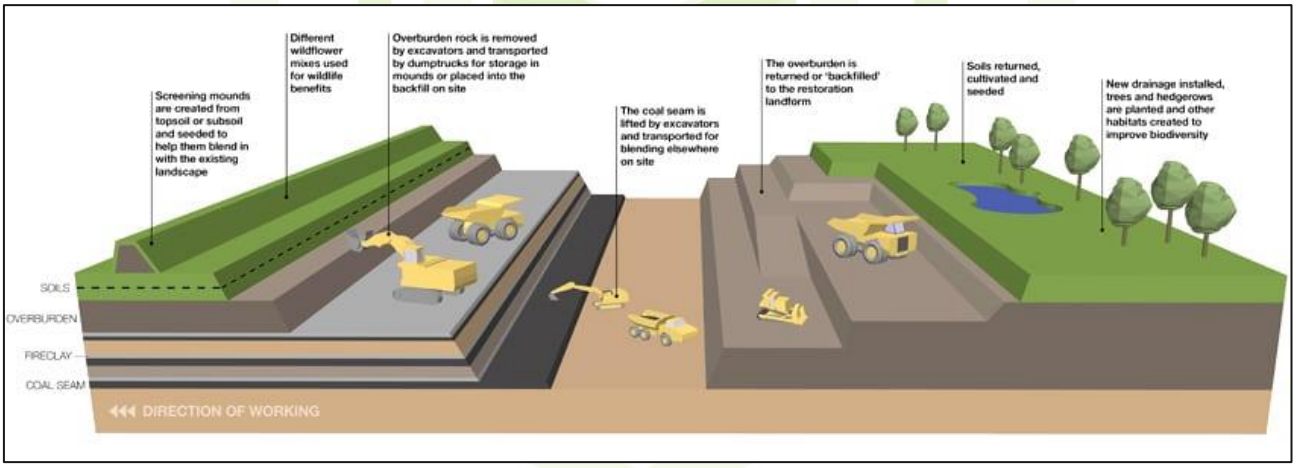



**Figure 3-4: Typical Opencast Concurrent Roll Over Rehabilitation Mining Technique**

### ROM Coal

The Run of Mine (RoM) will be handled in pit with a mobile crushing and screening station.

### Access and Haul Roads Construction

The dirt road will be upgraded to the applicable standards which includes a gravel road leading into the mine. The road will be used to access the mine offices, ablution facilities, workshop complex, and mining area. Coal transportation trucks will also use this road to enter and exit the mine premises, including travelling to the weighbridge.

### Semi Temporary Site and Security Offices

The site offices for the project, including a small security hut (existing) will consist of container-type site offices that is commercially available as off the shelve products, as illustrated in the image below. Upon project commencement, the

applicant will explore the possibility of upgrading the existing facilities on site to further ensure minimal construction requirements on site and also minimal footprint. Keeping the disturbance area minimal and ensuring ease of mine closure and rehabilitation after life of mine make the temporary offices ideal, especially considering the short duration of the proposed activities and requirement of these offices.

Figure 3-5: Typical semi temporary site offices

## Semi Temporary Sanitation and Change House

Similar to the structure indicated in the section above, will the semi temporary sanitation and change house also be container type facilities which can easily be brought to site and also removed after life of mine. For the change house and ablution facility a septic tank system will be implemented which is temporary of nature and can also be decommissioned easily. The septic tank system will ensure a 'honey-sucker' type sewage removal vehicle can remove and dispose of sewage at an appropriate facility off site. This ensures no major construction and approval is required for a full-scale sewage treatment facility. Mobile chemical toilets will also be used where necessary and supplied by an approved contractor who will be responsible for the management of these toilets. Water requirements relating to ablutions and drinking water are expected to be minimal and if water cannot be sourced on site from a borehole it will be brought in by a tanker. As mentioned above the applicant will explore the opportunity to make use of the existing facilities on site.

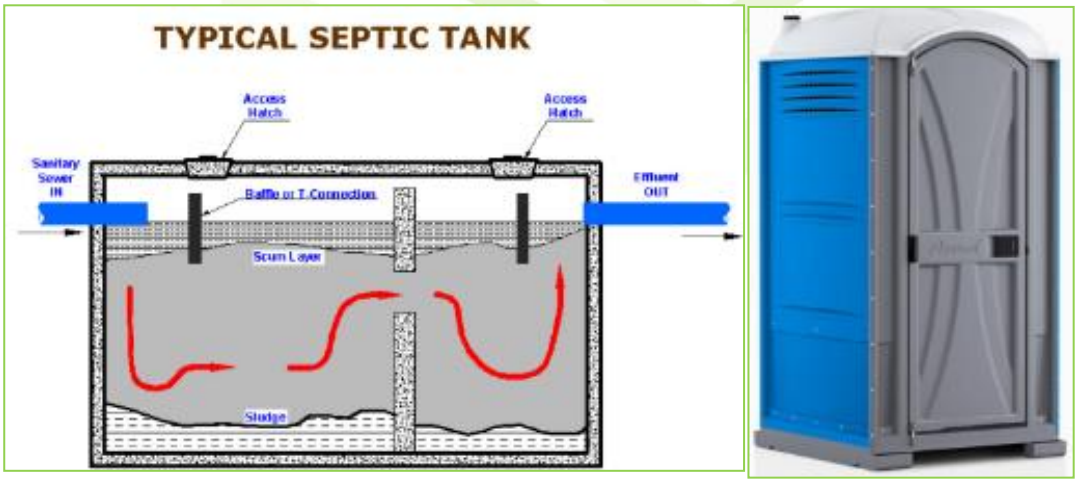



Figure 3-6: Typical septic tank cross section and chemical toilet illustration

## Mobile Fuel Storage

The main fuel storage will be diesel in a mobile fuel storage tank with a drip tray designed to hold 110% the capacity of the tanks. The fuel bowser will be stored off site.

Figure 3-7: Typical mobile fuel storage trailer with bunded tray

### Pollution Control Facility/Dam (Evaporation and Dust Suppression Usages)

Pollution control dams (PCDs) form an integral and important part of the water management systems on a mine. Different types of PCDs may exist on a mine site, such as process water dams, storm water dams, evaporation dams and other dams, possibly including excess mine water dams and natural pans.

The purpose of PCDs for the mine and in the water management circuits are to:

- Minimise the impact of polluted water on the water resource;
- Minimise the area that is polluted as far as possible, by separating out clean and dirty catchments; and
- Capture and retain the dirty water contribution to the PCDs that cannot be discharged to the water resource, due to water quality constraints, and manage this dirty water through recycling, reuse, evaporation and/or treatment and authorised discharge.

The proposed project will make use of the existing PCD on site which will be upgraded to ensure minimal water pollution as well as efficient clean and dirty catchments.

The image below is an illustration of the typical PCD that will be constructed.

Figure 3-8: Lined PCD illustration

Boschmanspoort mining operations will require a lined Pollution Control Dam (PCD) to contain dirty water runoff from the newly proposed hards stockpile. There is currently an unlined PCD located on site. This PCD will be refurbished to function as the new PCD. The methodology described below will outline requirements and steps that must be followed to adequately refurbish the PCD.

A geotechnical investigation, detailed water balance study, waste classification, wetland and floodline study will be conducted to determine the current soil conditions as well as the determining the required PCD capacity, required barrier system and location. The geotechnical investigation will involve excavation of test pits around the existing PCD, soil profiling of the test pits and conducting laboratory analysis on soil samples taken from site. The water balance study considers all the inflows and outflow from the PCD as well as the allowable spilling rate which is once in 50-years. The waste classification analyses the type of material that will be stored on top of the hards platform that drains into to PCD. The wetland and floodline studies will provide barriers outside which the PCD must be located.

After these studies have been conducted a detailed design will follow. The design will consider the current ground conditions and elevation and if there is enough clay material on site with low enough permeabilities as stated in the Minimum Requirements for Waste Disposal by Landfill by DWAF, Second Edition 1998. The waste classification will indicate the type of waste to be contained inside the PCD as per Regulation 635 as well as the barrier requirements as per Regulation 636. The expected Life of Mine will be two (2) years. This will also have an impact on thickness of the HDPE Geomembrane to be used as part of the barrier system.

The PCD will be designed with an emergency spillway large enough to accommodate the 1:100yr flood as per General Notice 704. To prevent siltation of the PCD a silt trap will be designed between the dirty water channel outlets and the PCD to trap any silt before it spills into the PCD. The silt trap will also be fitted with a ramp to allow access for cleaning out the silt. The base of the silt trap will be sized to accommodate the 1:10yr flood and the silt trap overflow weir will be sized to accommodate the 1:50yr flood.

### Clean and Dirty Water Separation

A detailed surface water management plan will be drawn up as part of the Water Use License Application (WULA) including the determination of flood lines, identification of sensitive receptors and existing surface water systems and flow paths, and civil engineering design reports for the required trenches and water management facilities. The Geohydrological investigation will also feed into these designs as the anticipated pollution will be modelled. Trenching around the mining area forms part of the clean and dirty water separation and is to a large extent based on the water balance as calculated by the civil engineering team. The image below is a typical illustration of aspects to consider during the calculation of the opencast mining area water balance.

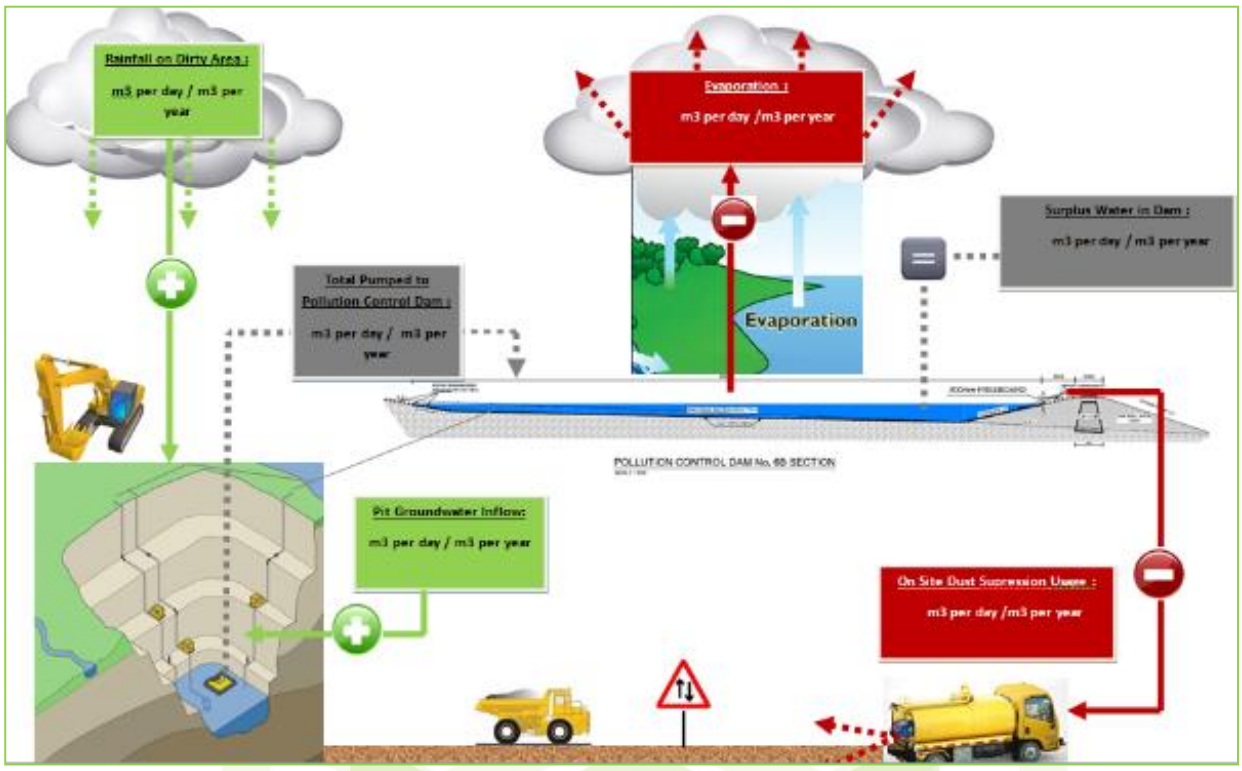



**Figure 3-9: Typical water balance considerations during the design of a clean and dirty water separation system**

Further images for clarification purposes have been provided below to indicating cross sections of both the dirty water and clean water diversion trenches which will be constructed around the mining area. These designs will also form part of the final master plan to be implemented during the WULA.

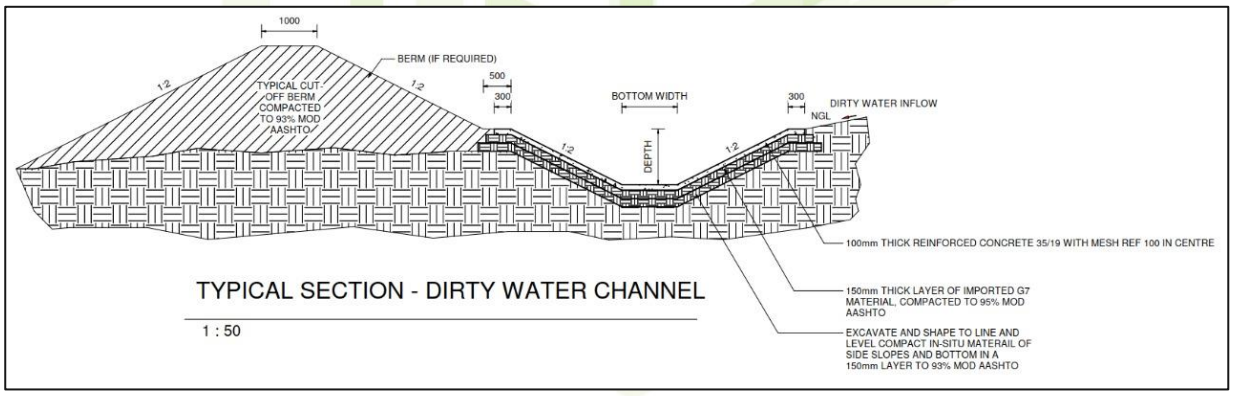



**Figure 3-10: Typical Channel / Berm Cross Section for Polluted Water Diversion**

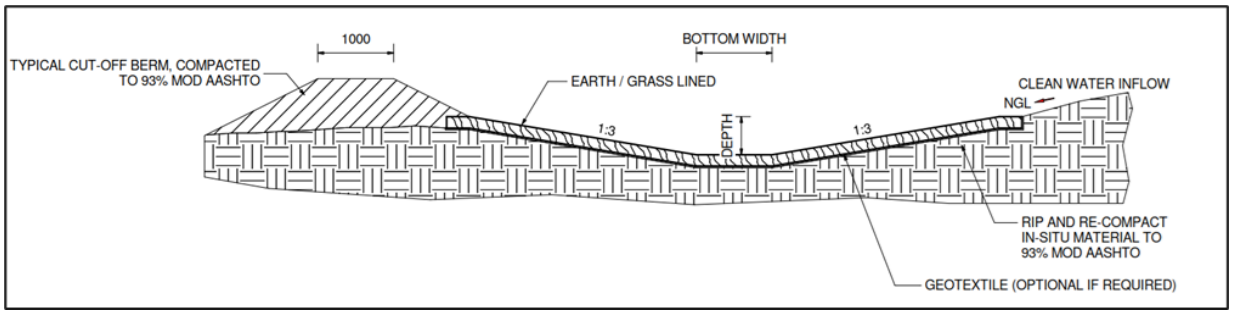



**Figure 3-11: Typical channel/berm cross section for clean water diversion**

## Fencing

Fencing of the entire mining area will be required as a means of ensuring safety and also keeping trespassers at bay. Fences will be clearly demarcated, and appropriate signage will be displayed, similar to the signs in the images below. Fencing of the sensitive receptors such as wetlands will also take place ensuring no mining personnel will enter these areas and that it will remain protected for the duration of the project. Sites of archaeological and heritage importance will also need to be fenced off while safe access to these sites will be provided. The necessary signage will also be erected at sites of archaeological and/or heritage importance to ensure visitors can easily and safely access the premises.


Figure 3-12: Typical mine fence signage

## Staff and Visitors Parking

Existing and proposed designated parking areas will be upgraded and constructed by compaction of the subsoil after removal, storage and preservation of the valuable layer of topsoil. Storm water management control around these areas will be implemented while the necessary signage will be erected to ensure optimal safety while reverse parking will be implemented at all parking bays. The necessary waste receptacles as well as oil spill kits will be provided at these sites in case of accidental spillage or leakage of hydrocarbon fuel/oil/greases from the vehicles.

## Drilling and Blasting

Blasting of mine overburden to allow efficient recovery of the underlying coal can have impacts on the surrounding community. These impacts mainly include vibration through the air (overpressure) and earth (ground vibration) along with the generation of dust and fume. Overpressure and ground vibration limits in place for private residences and heritage structures are prescribed by government based on standards. Blasts are designed and managed to minimise the risk of exceeding these limits, and to minimise impacts they have on the community, surrounding structures and environment.

Due to the nature of the activities associated with open cast activities, blasting might occur during the construction phase of the initial box cut, however, subsequent blasting to remove overburden and gain access to the mineral reserve will also take place during the life of mine. A suitably qualified blasting contractor will be appointed to construct a blasting design and conduct blasting activities. There will be no explosives magazine on site and the blasting contractor will be required to supply the explosives and consumables required to blast if blasting is required.

## Topsoil, Subsoil, Overburden Stockpiles

All topsoil, subsoil and overburden material will be removed during the mining operation and stockpiled separately for the purpose of backfill rehabilitation. The topsoil stockpiles will not exceed a height of six meters which is high enough to reduce leaching impacts of stockpiled topsoil. The subsoil and overburden stockpiles will however exceed this height.

## Waste Management

Waste will be generated from the start to the decommissioning of the project. It is proposed that the waste that would be generated on site would be managed by reducing, reusing and recycling as far as possible. A certified and approved external contractor will be responsible for the removal and disposal of the waste at a registered landfill.

## 3.5 Policy and Legislative Context

**Table 3-3: Policy and legislative table**

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT<br>(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process. | REFERENCE WHERE APPLIED | HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT?<br>(E.g., In terms of the National Water Act a Water Use License has/ has not been applied for.) |
|---|---|---|
| **Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)** | The project requires a Mining Right authorisation from the Department of Mineral Resources. | A mining right was granted on 17/09/2014, Ref. MP 30/5/1/2/3/2/1/267 MR. |
| **NEMA Environmental Impact Assessment (EIA) Regulations, as Amended 2017** | This Basic Assessment and Environmental Management Plan to be conducted. Specialist environmental information of the project area will be assessed. Mitigation measures and recommendations where provided according to best practice standards. | An Application for Environmental Authorisation will be submitted to the Mpumalanga DMRE with the mining right application lodgement on SAMRAD. |
| **The South African Constitution**<br>**The South African Constitution (Act 108 of 1996) constitutes the supreme law of the country and guarantee the rights of all people in South Africa** | Applied at potential impacts identification as well as mitigation measures and public participation. | A public participation process is followed and consultations are accordingly undertaken. An EMP and awareness plan will be designed according to the issues raised during this process. |
| **National Environmental Management: Waste Act** | Provisions of the waste act were consulted to determine whether a waste license was required for any aspect of the proposed development. | The mine does not plan to store general or hazardous waste on site. |
| **Section 38 of the National Heritage Resources Act (Act No. 25 of 1999)** | Legislation consulted during the impact assessment process, to determine what legal requirements with regards to the management of national heritage resources were relevant to this application. | An upload of the BAR will be done on the SAHRIS online system for comment. |
| **National Environmental Management Biodiversity Act**<br>The National Environmental Management Biodiversity Act (NEM:BA), 2004 (Act No.10 of 2004), provides for: | Baseline review of the biodiversity on the site | SANBI database will be used to determine conservancy status as well as mitigation measures for alien invasive species encroaching the project area. |

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT<br>(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process. | REFERENCE WHERE APPLIED | HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT?<br>(E.g., In terms of the National Water Act a Water Use License has/ has not been applied for.) |
|---|---|---|
| (i) the management and conservation of South Africa`s biodiversity within the framework of the National Environmental Management Act, 1998;<br>(ii) the protection of species and ecosystems that warrant national protection;<br>(iii) the sustainable use of indigenous biological resources;<br>(iv) the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources;<br>(v) the establishment and functions of a South African National Biodiversity Institute; | | |
| **National Water Act**<br>The NWA (Act No. 36 of 1998) | The proposed activities do require a water use license. | The department has been notified of the proposed project and comments will be addressed. An IWULA in terms of the NWA Section 21 water uses is being applied for in a separate standalone process. The IWULA will be applied for as part of the project. |
| **National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004);** | Dust monitoring on site during the operation. | As part of the EMP dust suppression methods will be used. |
| **Mine Health and Safety Act, 1996 (Act No. 29 of 1996);** | Health and Safety Policy. | Risk Impact Assessment to be conducted. |
| **National Development Plan (2012)**<br>**The National Development Plan outlines what we should do to eradicate poverty, increase employment and reduce inequality by 2030. The Plan has the target of developing people's capabilities to be to improve their lives through education and skills development, health care, better access to public transport, jobs, social protection, rising income, housing and basic services, and safety.** | Used to identify project Need and Desirability and alignment with National Policy. | To form part of the project background and socio-economic evaluation. |

| APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT<br>(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process. | REFERENCE WHERE APPLIED | HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT?<br>(E.g., In terms of the National Water Act a Water Use License has/ has not been applied for.) |
|---|---|---|
| **Municipal Systems Act, 2000 (Act No. 32 of 2000)**<br>**Section 100 of the Mineral and Petroleum Resources Development Act (MPRDA) tasks the Minister to establish, assess and where necessary, revise the framework and targets for the entry and ongoing participation of historically disadvantaged South Africans into the sector** | The project must be tested against the local and district IDP and SDF. | Used to assess the need and desirability of the project. |
| **Mining Charter**<br>**Section 100 of the Mineral and Petroleum Resources Development Act (MPRDA) tasks the Minister to establish, assess and where necessary, revise the framework and targets for the entry and ongoing participation of historically disadvantaged South Africans into the sector** | The project must align itself with the principles of the Charter. | The project will align itself with the principals of the charter. Where possible, the project will aim to employ the local community and engage the community throughout project inception. |
| **Mpumalanga SDF** | Used in the BAR to identify Need and Desirability. | Guideline considered during the assessment of the need and desirability of the proposed development, at the provincial scale. |
| **Nkangala District Municipality** | Source of background demographic and socio-economic information. | Utilized as a source of demographic and socio-economic information for the Nkangala District. |

## 3.6 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 sector has been described as the "Continuous Sunrise Sector" by President Cyril Ramaphosa at the 'Investing in African Mining Indaba' in Cape Town during May 2022, due to the significant contribution which the sector continues to have on the country's economy. Despite the many challenges created by the Covid-19 Pandemic, the mining sector continues to contribute substantially to export earnings, is a critical source of foreign direct investment and provides employment for a considerable number of people.

As the economic effects of the Covid-19 Pandemic begin to subside, the mining sector has significantly contributed to the recuperation of South Africa's economy. In 2021, the mining sector registered a growth of 11.8%, the largest grown seen across all the industries in the economy. The sector was able to recover production close to pre-covid conditions.

In 2019 StatsSA provided a report detailing the statistics on mineral production, finances, employment, and exports and imports. The results of the census conducted revealed the importance of the South African Mining Industry.

The industry is a critical pillar of our economy, with R527,5 billion in total sales generated in 2019. Of this, 61% (R323,8 billion) was sourced from outside the country through exports. Coal dominates production in South African. It covers about 75% of the total mass of all minerals produced in SA. In 2019, 306 million metric tons of coal was produced. Almost two-thirds of mining sales are from abroad, with 39% of coal produced being exported.

The extracting and processing of minerals requires a great deal of machinery and workforce. The South African mining industry employed 514 859 individuals in 2019, with 39% employed in the platinum group metals sector, 21% in the coal sector and 20% employed in the gold sector.

Recent statistics note that mining in South Africa still directly employs over half a million people post-covid. At the 4$^{th}$ South African Investment Conference in 2022, investments of approximately R46 billion was pledged towards mining and mineral beneficiation, showing investor confidence in South Africa's mining potential and operations.

## 3.7 MOTIVATION FOR THE OVERALL PREFERRED SITE, ACTIVITIES AND TECHNOLOGY ALTERNATIVE.

The area is located within the Witbank Coal Field. The site is preferred due to the area already being approved for mining, albeit underground. Due to this being a Section 102 amendment to existing Rights, the areas available for mining is limited.

The alternative to open cast mining is underground mining, which is already approved for the proposed area. The decision to apply for an amendment is due to the resource being shallower and therefore more coal can be abstracted in a safer manner through opencast mining.

In terms of the technologies and activities proposed, roll-over mining is seen as the most efficient way to undertake concurrent rehabilitation as mining progresses, therefore also reducing the cost required for rehabilitation after cessation of mining activities.

The option of not approving the activities will result in the continued loss of employment on a mine where many people very abruptly lost their jobs and income.

## 3.8 FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ALTERNATIVES WITHIN THE SITE.

### Details of the development footprint alternatives considered.

With reference to the site plan provided in Figure 3-2 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

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

The portion 8 of Boschmanspoort, 159 IS is located +/- 20 km North of Hendrina and East of the N11. The area was chosen due to it being already approved for underground mining The surrounding areas within the Mining Right had already been mined in the deeper laying coal seems, and therefore only this shallower section in this area is still available.

b) The type of activity to be undertaken;

The alternative to open cast mining is underground mining, which is already approved for the proposed area. The decision to apply for an amendment is due to the resource being shallower and therefore more coal can be abstracted in a safer manner through opencast mining.

c) The design or layout of the activity;

Location of infrastructure on site will be based on the most effective and cost sensitive way to handle clean and dirty water separation as well as the location of the coal resource, previously undermined areas, and surrounding wetlands.

d) The technology to be used in the activity

The technology proposed will be the most economically viable technology for the proposed operation.

e) The operational aspects of the activity; and

Opencast roll-over mining is seen as the most efficient way to undertake concurrent rehabilitation as mining progresses, therefore also reducing the cost required for rehabilitation after cessation of mining activities.

f) The option of not implementing the activity.

The option of not approving the activities will result in the continued loss of employment on a mine where many people very abruptly lost their jobs and income.

### 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.)

Section 41 of NEMA Regulation 982 (as amended) set out the Legal and Regulatory Requirement for Public Participation. The Public Participation Process (PPP) aims to involve the authorities and I&APs in the project process, and determines their needs, expectations and perceptions which in turn ensures a complete and comprehensive environmental study. An open and transparent process has and been followed at all times and is based on reciprocal dissemination of information. The following will be undertaken during the PPP:

1. Identification of Interested and Affected Parties (IAPs);
2. Notification of IAPs regarding the proposed project;

3. Gathering comments, issues and concerns from IAPs;
4. Responding to IAP comments, issues and concerns;
5. Compilation and submission of results of consultation report to the DMRE; and
6. Providing IAPs with the opportunity to review and comment on the basic assessment report.

## Landowner and property detail

The registered owners of the farms were listed as follows:

### Table 3-4: Directly affected landowners

| Farm | | | Ptn | Owner |
|---|---|---|---|---|
| BOSCHMANSPOORT | 159 | IS | 8 | OPTIMUM COAL MINE (PTY) LTD |

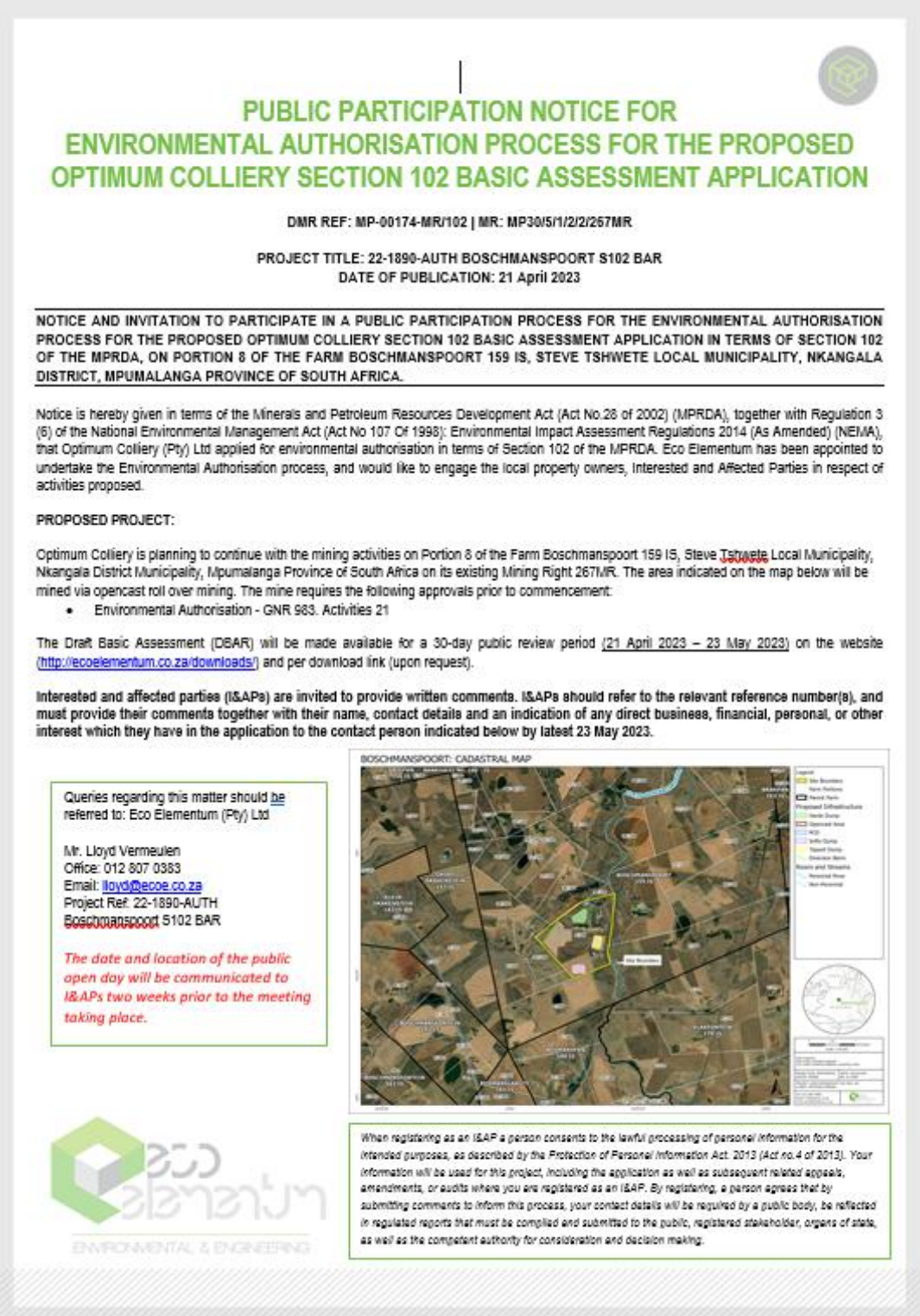
Surrounding landowners are listed below:

### Table 3-5: Adjacent landowners

| Farm | | | Ptn | Owner |
|---|---|---|---|---|
| BOSCHMANSPOORT | 159 | IS | 0 | OPTIMUM COAL MINE (PTY) LTD |
| BOSCHMANSPOORT | 159 | IS | 31 | JAN AUGUSTINUS BREEDT |
| BOSCHMANSPOORT | 159 | IS | 24 | JAN AUGUSTINUS BREEDT |
| BOSCHMANSPOORT | 159 | IS | 6 | JAN AUGUSTINUS BREEDT |
| BOSCHMANSPOORT | 159 | IS | 4 | SCHEEPERS FAMILIE TRUST |
| BOSCHMANSPOORT | 159 | IS | 20 | DRIEPAN BOERDERY TRUST |
| BOSCHMANSPOORT | 159 | IS | 21 | DRIEPAN BOERDERY TRUST |
| BOSCHMANSPOORT | 159 | IS | 28 | DRIEPAN BOERDERY TRUST |
| BOSCHMANSPOORT | 159 | IS | 18 | REYNIER VAN TONDER |
| BOSCHMANSPOORT | 159 | IS | 9 | ANTON PELSER EIENDOMS TRUST |
| BOSCHMANSPOORT | 159 | IS | 10 | ANTON PELSER EIENDOMS TRUST |
| BOSCHMANSPOORT | 159 | IS | 22 | DOLANTAL PLASE CC |
| BOSCHMANSPOORT | 159 | IS | 18 | REYNIER VAN TONDER |
| GROOT DRAKENSTEIN | 157 | IS | 2 | HENDRIK JOHANNES JOSEFUS MEYER / PREMIMODE PTY LTD |
| VLAKFONTEIN | 179 | IS | 1 | S DE LANGE TRUST |
| BOSMANSPAN | 180 | IS | 1 | SUSANNA MAGRIETA STEYN |

## Site Notices

Site notices (Figure 3-13) were placed around the proposed mining site in accordance with Regulation 41(2)(a), (3) and (4) of the Environmental Impact Assessment Regulations Published under Government Notice R982 in *Government Gazette* 38282 of 4 December 2014 (as amended).



PUBLIC PARTICIPATION NOTICE FOR
ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED
OPTIMUM COLLIERY SECTION 102 BASIC ASSESSMENT APPLICATION

DMR REF: MP-00174-MR/102 | MR: MP30/5/1/2/2/267MR

PROJECT TITLE: 22-1890-AUTH BOSCHMANSPOORT S102 BAR
DATE OF PUBLICATION: 21 April 2023

**NOTICE AND INVITATION TO PARTICIPATE IN A PUBLIC PARTICIPATION PROCESS FOR THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED OPTIMUM COLLIERY SECTION 102 BASIC ASSESSMENT APPLICATION IN TERMS OF SECTION 102 OF THE MPRDA, ON PORTION 8 OF THE FARM BOSCHMANSPOORT 159 IS, STEVE TSHWETE LOCAL MUNICIPALITY, NKANGALA DISTRICT, MPUMALANGA PROVINCE OF SOUTH AFRICA.**

Notice is hereby given in terms of the Minerals and Petroleum Resources Development Act (Act No.28 of 2002) (MPRDA), together with Regulation 3 (6) of the National Environmental Management Act (Act No 107 Of 1998): Environmental Impact Assessment Regulations 2014 (As Amended) (NEMA), that Optimum Colliery (Pty) Ltd applied for environmental authorisation in terms of Section 102 of the MPRDA. Eco Elementum has been appointed to undertake the Environmental Authorisation process, and would like to engage the local property owners, Interested and Affected Parties in respect of activities proposed.

**PROPOSED PROJECT:**

Optimum Colliery is planning to continue with the mining activities on Portion 8 of the Farm Boschmanspoort 159 IS, Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province of South Africa on its existing Mining Right 267MR. The area indicated on the map below will be mined via opencast roll over mining. The mine requires the following approvals prior to commencement:

- Environmental Authorisation - GNR 983. Activities 21

The Draft Basic Assessment (DBAR) will be made available for a 30-day public review period (21 April 2023 – 23 May 2023) on the website (http://ecoelementum.co.za/downloads/) and per download link (upon request).

**Interested and affected parties (I&APs) are invited to provide written comments. I&APs should refer to the relevant reference number(s), and must provide their comments together with their name, contact details and an indication of any direct business, financial, personal, or other interest which they have in the application to the contact person indicated below by latest 23 May 2023.**

Queries regarding this matter should be referred to: Eco Elementum (Pty) Ltd

Mr. Lloyd Vermeulen
Office: 012 807 0383
Email: lloyd@ecoe.co.za
Project Ref: 22-1890-AUTH
Boschmanspoort S102 BAR

*The date and location of the public open day will be communicated to I&APs two weeks prior to the meeting taking place.*

BOSCHMANSPOORT: CADASTRAL MAP

*When registering as an I&AP a person consents to the lawful processing of personal information for the intended purposes, as described by the Protection of Personal Information Act. 2013 (Act no.4 of 2013). Your information will be used for this project, including the application as well as subsequent related appeals, amendments, or audits where you are registered as an I&AP. By registering, a person agrees that by submitting comments to inform this process, your contact details will be required by a public body, be reflected in regulated reports that must be compiled and submitted to the public, registered stakeholder, organs of state, as well as the competent authority for consideration and decision making.*

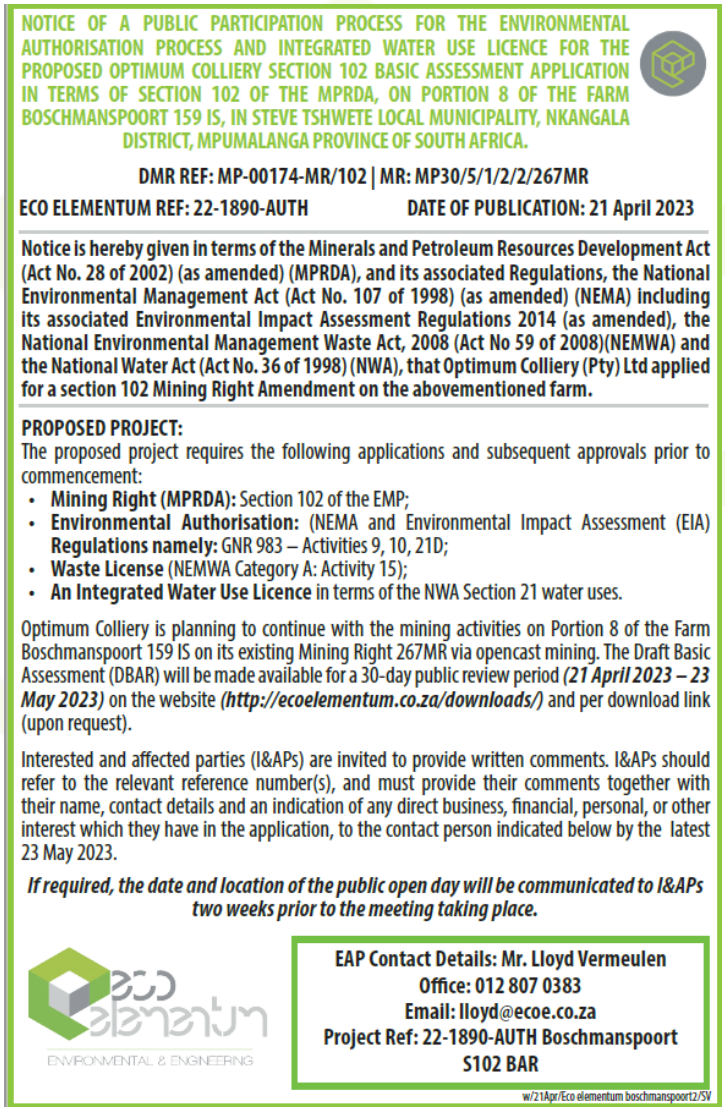
**Figure 3-13: Mining Permit Site Notice prepared for the project**

## Background Information Document

A Background Information Document (BID) was compiled and sent to I&APs in accordance with Regulation 41(2)(b) and (3) of the Environmental Impact Assessment Regulations Published under Government Notice R982 in *Government Gazette* 38282 of 4 December 2014 (as amended).

## Advert placement

An Advert was placed in Middelburg Observer and will be published Friday 21 April 2023 in accordance with Regulation 41(2)(c) and (3) of the EIA Regulations Published under Government Notice R982 in *Government Gazette* 38282 of 4 December 2014 (as amended).



**NOTICE OF A PUBLIC PARTICIPATION PROCESS FOR THE ENVIRONMENTAL AUTHORISATION PROCESS AND INTEGRATED WATER USE LICENCE FOR THE PROPOSED OPTIMUM COLLIERY SECTION 102 BASIC ASSESSMENT APPLICATION IN TERMS OF SECTION 102 OF THE MPRDA, ON PORTION 8 OF THE FARM BOSCHMANSPOORT 159 IS, IN STEVE TSHWETE LOCAL MUNICIPALITY, NKANGALA DISTRICT, MPUMALANGA PROVINCE OF SOUTH AFRICA.**

**DMR REF: MP-00174-MR/102 | MR: MP30/5/1/2/2/267MR**

**ECO ELEMENTUM REF: 22-1890-AUTH** **DATE OF PUBLICATION: 21 April 2023**

**Notice is hereby given in terms of the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (as amended) (MPRDA), and its associated Regulations, the National Environmental Management Act (Act No. 107 of 1998) (as amended) (NEMA) including its associated Environmental Impact Assessment Regulations 2014 (as amended), the National Environmental Management Waste Act, 2008 (Act No 59 of 2008)(NEMWA) and the National Water Act (Act No. 36 of 1998) (NWA), that Optimum Colliery (Pty) Ltd applied for a section 102 Mining Right Amendment on the abovementioned farm.**

**PROPOSED PROJECT:**
The proposed project requires the following applications and subsequent approvals prior to commencement:

- **Mining Right (MPRDA):** Section 102 of the EMP;
- **Environmental Authorisation:** (NEMA and Environmental Impact Assessment (EIA) **Regulations namely:** GNR 983 – Activities 9, 10, 21D;
- **Waste License** (NEMWA Category A: Activity 15);
- **An Integrated Water Use Licence** in terms of the NWA Section 21 water uses.

Optimum Colliery is planning to continue with the mining activities on Portion 8 of the Farm Boschmanspoort 159 IS on its existing Mining Right 267MR via opencast mining. The Draft Basic Assessment (DBAR) will be made available for a 30-day public review period ***(21 April 2023 – 23 May 2023)*** on the website ***(http://ecoelementum.co.za/downloads/)*** and per download link (upon request).

Interested and affected parties (I&APs) are invited to provide written comments. I&APs should refer to the relevant reference number(s), and must provide their comments together with their name, contact details and an indication of any direct business, financial, personal, or other interest which they have in the application, to the contact person indicated below by the latest 23 May 2023.

***If required, the date and location of the public open day will be communicated to I&APs two weeks prior to the meeting taking place.***

ENVIRONMENTAL & ENGINEERING

**EAP Contact Details: Mr. Lloyd Vermeulen**
**Office: 012 807 0383**
**Email: lloyd@ecoe.co.za**
**Project Ref: 22-1890-AUTH Boschmanspoort S102 BAR**

w/21Apr/Eco elementum boschmanspoort2/SV

Figure 3-14: Proof of advert

## Proof of notification

### Email

An email notifying the I&APs of the proposed project, the public participation process, draft report review and how to comment, will be sent to all identified I&APs.

### SMS

A SMS notifying the I&APs of the proposed project, the public participation process, draft report review and how to comment, will be sent to all identified I&APs.

### Submission of Draft Basic Assessment Report

The Draft Report will be submitted to the following Commenting Authorities for comment:

| Department | Attention to | Delivery Method |
|---|---|---|
| Mpumalanga Provincial Government DARDLEA. | Pamela Ntuli / Dineo Tswai | Courier |
| Nkangala District Municipality. | Charles Makula | Courier |
| Steve Tshwete Local Municipality | Ms D Lambrecht | Courier |
| Mpumalanga Tourism and Park Agency. | Phumla Nkosi / Komilla Narasoo | Courier |
| Department of Agriculture forestry and fisheries. | Doreen Sithole | Courier |
| Department of Mineral Resources and Energy. | Registry | NA |
| Department of Water and Sanitation | Mcineka Nonkanyiso Zakithi | Courier |
| South African Heritage Resources Agency. | Online submission | NA |

Summary of issues raised by I&APs

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

*The inputs from I&APs will be provided and issues raised will be addressed by the EAP. This section will be completed after the initial commenting period.*

The Environmental attributes associated with the alternatives.

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

### *3.8.1.1 Baseline Environment*

#### *3.8.1.1.1 Type of environment affected by the proposed activity.*

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

#### CLIMATE

The Boschmanspoort mining area is situated in a summer rainfall region. The area is known to have warm summers and cold to moderate winters. "The mean daily maximum temperature for this region is approximately 27.2ºC in January (mid-summer) and 18.4ºC in July (mid-winter). The average daily minimum temperature is 13.7ºC in January and -1.7ºC in July. The area receives most of its annual rain during the period from November to January however rainfall is common from October through to April. Optimum Colliery falls within the B12A rainfall zone, which has a mean annual precipitation range of 600 – 800mm (Midgley et al. 1994b). The Carolina weather station, which is one of the weather stations in the region, has a record of 625mm for mean annual precipitation, occurring as showers and thunderstorms. The winter months of June, July and August are dry, and their combined rainfall comprises only ±3% of the total annual precipitation", (Jones & Wagener, 2009). The long-term average total annual rainfall ranges from 670 mm to 710 mm. For the purpose pf this study the MAP will be taken as 690 mm/a. The mean annual pan evaporation is approximately 1 728 millimetres (mm).

## Regional Geology

The Boschmanspoort mining area is underlain by rocks from the Karoo Supergroup. The site is also situated in the Witbank Coalfields which is the most important coal-producing coalfields in South Africa (Figure 6). Five coal seams exist in the coalfield, but not all are economically viable. These coal seams are hosted in Vryheid Formation the middle Ecca Group sediments. The number 1 seam is the lowest or deepest while the 5 seam is the uppermost coal seam. The number 2 and 4 seams are the most exploited throughout the Witbank Coalfields. At Boschmanspoort mining will be conducted down to the 4 seam.

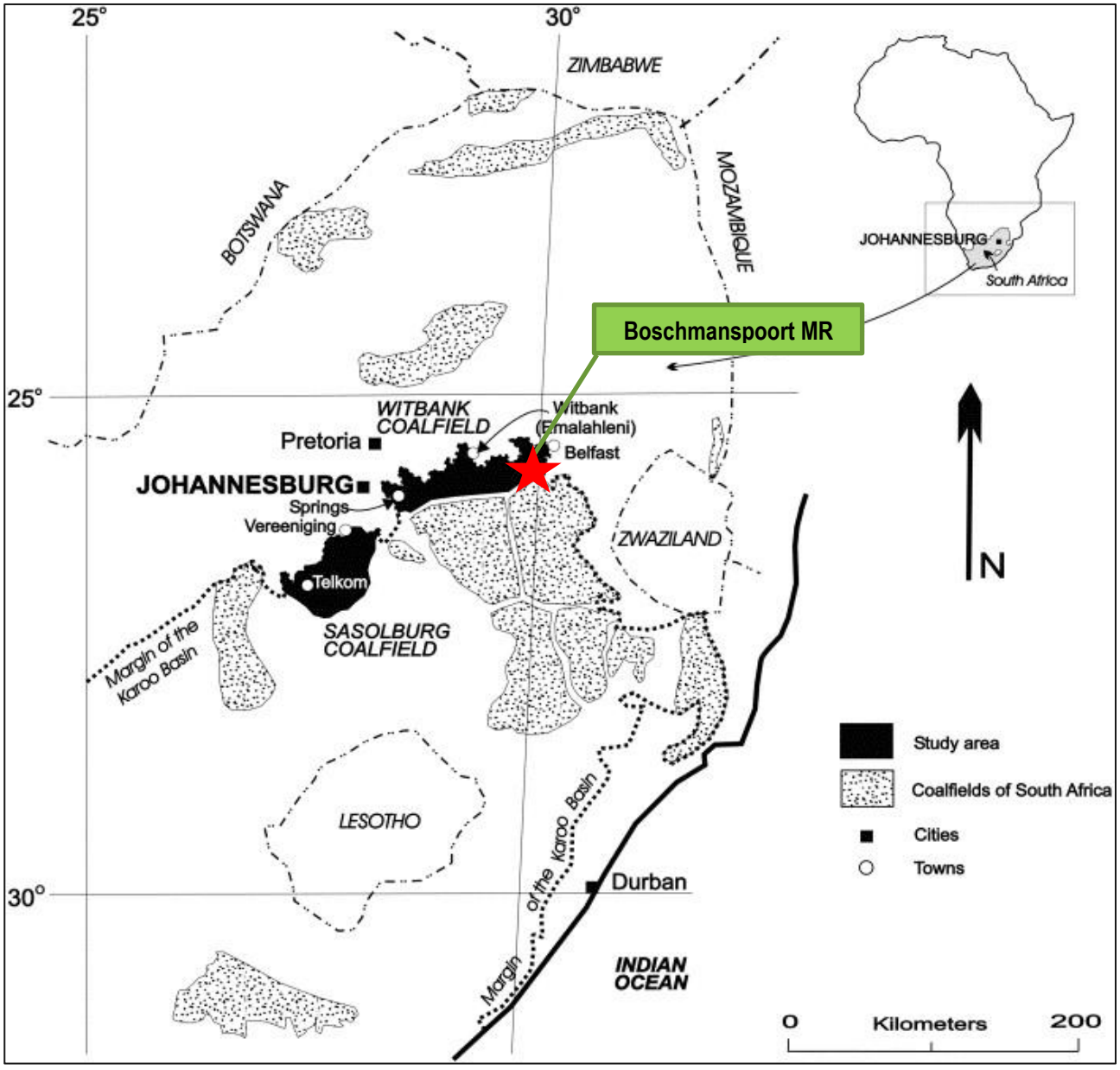



**Figure 3-15: Witbank Coalfields and position of the study area in relation to it (Denis et.al., 2007).**

The Karoo Supergroup mainly consists of sedimentary successions of sandstone, shale and coal. The Ecca Group is underlain by the Dwyka Formation which consists of tillites and diamictites. Geological features such as dykes (dolerite intrusions) and faults are commonly found in the coalfield. The dolerite intrusions typically act as groundwater flow barriers

due to their low permeability, while the contact zone of the intrusions acts as flow pathways due to cracks and faults leading to higher flow rates along these contact zones.

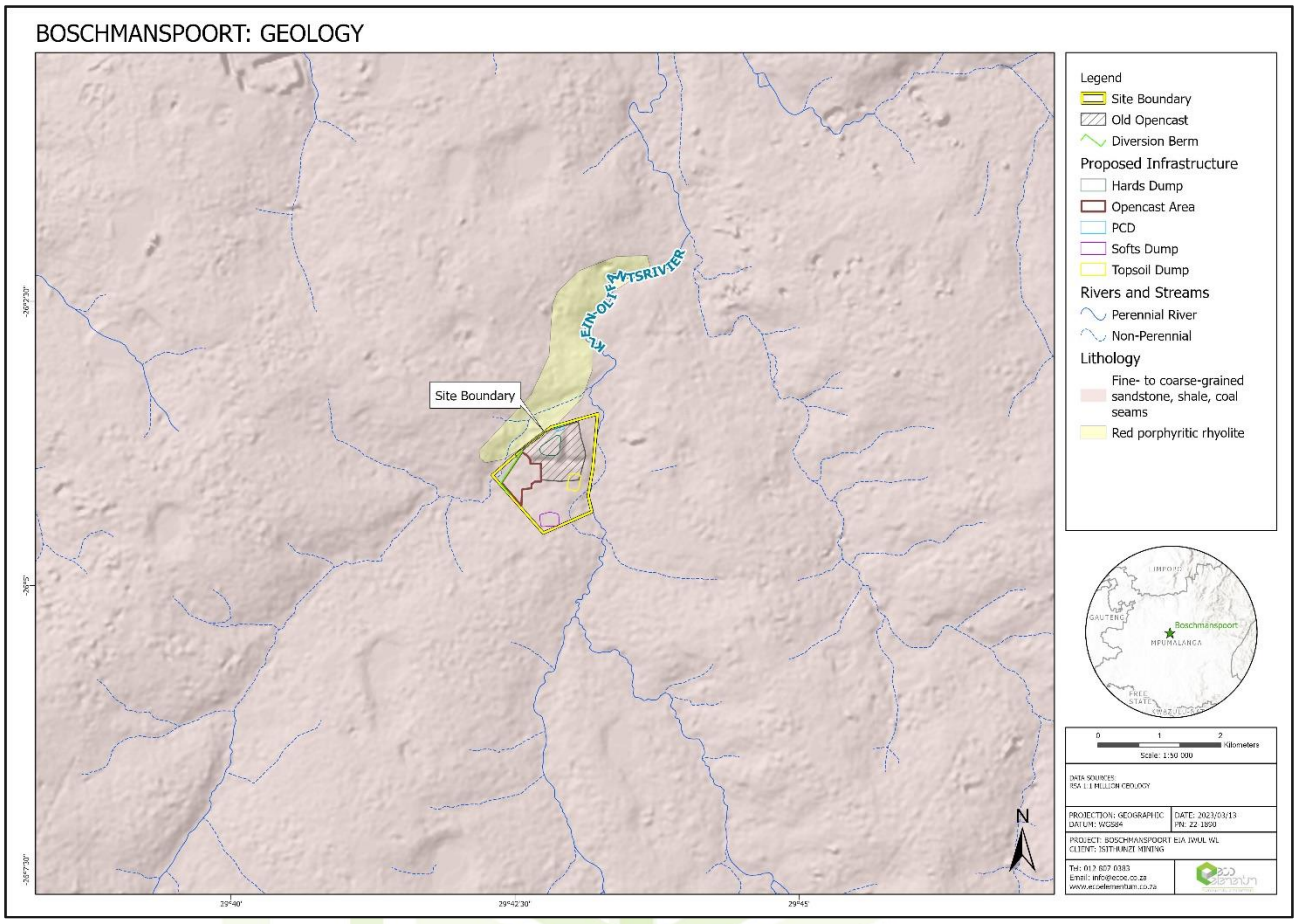



**Figure 3-16: Boschmanspoort simplified geology**

## Local Geology

In the Boschmanspoort project area, borehole data revealed the intersection of five coal seams. The coal seams intersected at Boschmanspoort are the 2UU, 2UL, 2S, 4L, and 4U seams. These come in a variety of thicknesses, with some being thin, sporadic, and of lower quality. Only the 2S -Seam has been resourced as it has economic potential out of the five intersected seams.

The 4U seam, with varying seam thicknesses ranging from 0.5 to 2 m, is only developed in the central and lower parts of the Boschmanspoort project area (Figure 3-17a). Thicker 4U seam thicknesses occur only in the project area's central region and range between 1.5 m and 2 m. The 4L seam is poorly developed in the project area, occurring only in the southern and eastern sections (Figure 3-17b). In the southern section, the thickness of the 4L seam ranges from 0.5 m to 2 m. The 4L seam thickness ranges from 0.5 m to approximately 1.3 m in the eastern section.

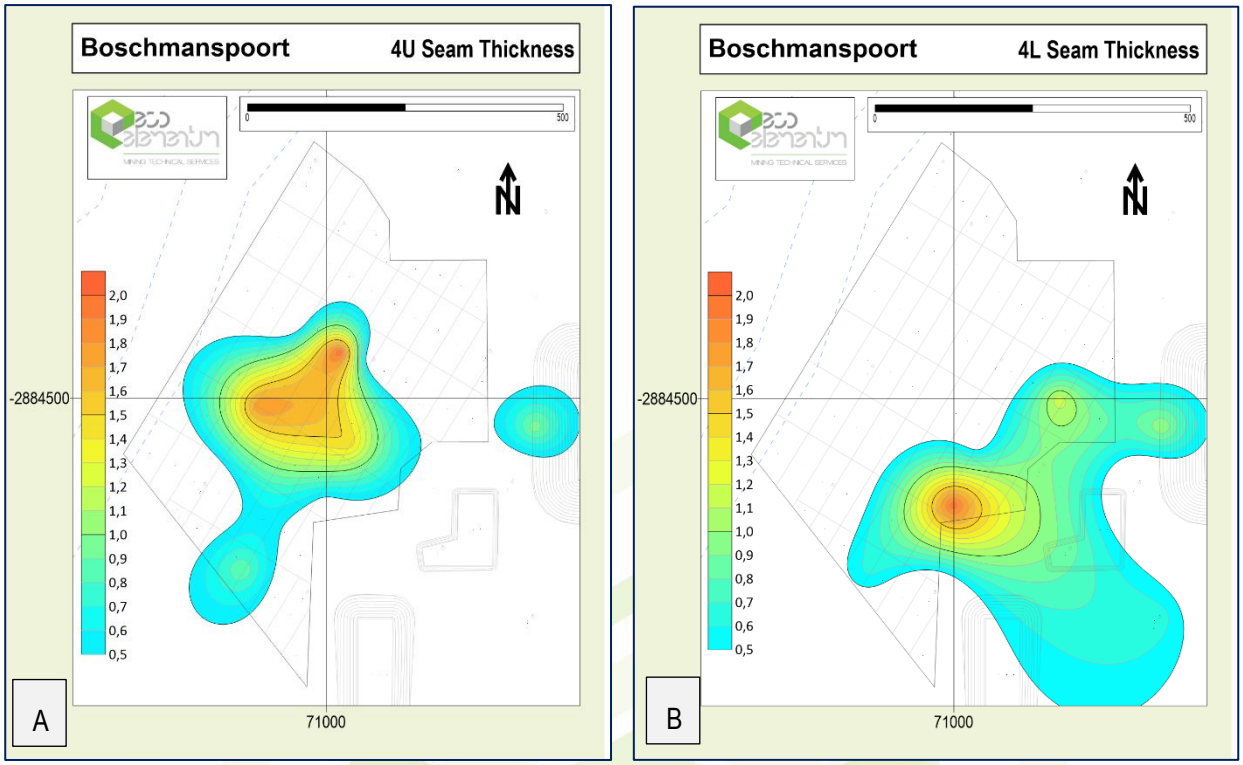



**Figure 3-17: Boschmanspoort North pit 4-Seam thicknesses. A) 4U Coal seam, B) 4L Coal seam**

The 2U seam, with varying thicknesses ranging from 0.5 m to approximately 2 m, is only found in the project's southern areas (Figure 3-18a). The economically potential 2S-Seam is well developed throughout the Boschmanspoort North project area. (Figure 3-18b). The 2S-Seam is the thickest of the five intersected coal seams, with thicknesses ranging from 2.2 m to 8.2 m. Furthermore, the thicknesses of the 2S-seam are lowest in the northern section of the project area and increase towards the southern section. Top of coal intersections of the 2S-Seam occur at deeper depths in the area towards the south-eastern direction, with depths ranging from approximately 22 m in the north-eastern section to 42 m in the south-eastern section. The strip ratios vary between 4.4 and 8.8 in the Boschmanspoort North project area.

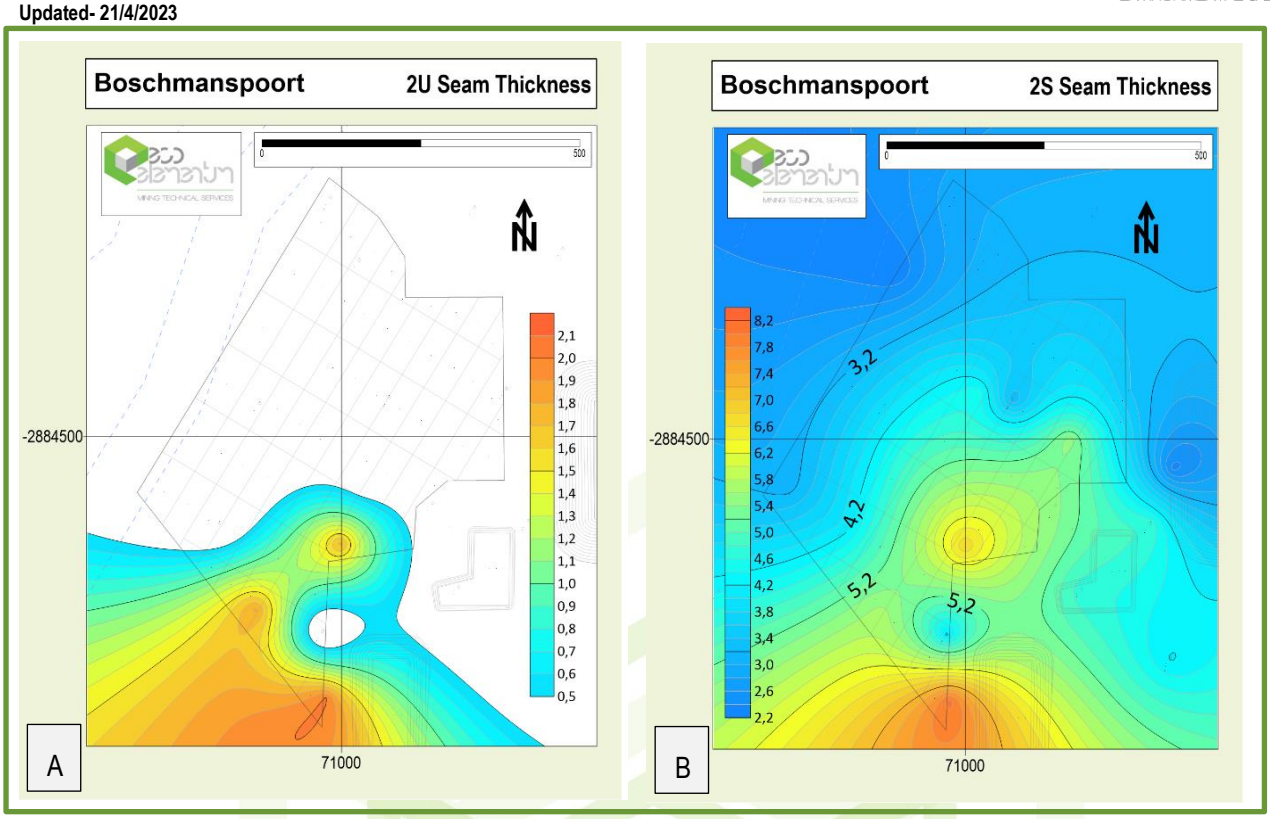



**Figure 3-18: Boschmanspoort North pit 4-Seam thicknesses. A) 2U Coal seam, B) 2S Coal seam**

## HYDROGEOLOGY

### Unsaturated Zone

The unsaturated zone is the zone between the ground surface and the static water table. In the unsaturated zone the pores between the ground particles are filled with air and water- thus below saturation. The characteristics of the unsaturated zone such as the thickness and permeability will typically determine the infiltration rate of water, runoff volumes and ultimately the recharge percentage to the underlying aquifer. Undisturbed, static water levels in the region of the proposed Boschmanspoort mining area as obtained from the hydrocensus and monitoring boreholes, range between 1.6 and 18.1 mbs. The thickness of the unsaturated zone in the area of the proposed Boschmanspoort mining area can therefore also vary from 1.6 to 18.1 m in depth.

The materials forming the unsaturated zone will also have an influence on mass transport from potential surface contamination sources to the underlying aquifer. The unsaturated zone may consist of soil, weathered bedrock, and even solid bedrock from the sandstone and shale of the Ecca Group.

### Saturated Zone

The saturated zone is that part of the earth's crust that is situated beneath the groundwater table or piezometric surface where all pores and fractures are filled with water at a pressure greater than atmospheric pressure. Infiltrating water or contaminants entering the saturated zone will move laterally primarily as a result of the bulk movement or transport of groundwater due to advection.

The depth of the saturated zone in the Boschmanspoort mining area is, therefore, more than 1.6 to 18.1 mbs. From studies compiled in the larger region of the Boschmanspoort Mining area, the saturated zone mainly consists of two aquifer systems.

- Firstly, the weathered, unconfined aquifer that typically occurs on the transition between soil and weathered bedrock. Typically at Boschmanspoort, the weathered aquifer can consist of sandstone, shale and coal. The groundwater flow closely mimics the surface topography. Groundwater levels are usually shallow in the low-lying topographical regions and may even daylight on a surface which is referred to as springs. The weathered aquifer is more prominent in the wet season because it is located on top of solid bedrock or clayey layers. This aquifer normally has a low yield.
- The second aquifer is known as the deeper, confined aquifer. Flow in this aquifer mainly occurs along with fractures, bedding planes and other groundwater flow paths. The presence of fractures generally decreases with depth in this aquifer. The secondary aquifer, due to its heterogeneous nature, may be higher yielding than the weathered aquifer. Due to the longer residence time of the groundwater in this aquifer, the salt load may be higher than that of the weather aquifer.

An aquifer at great depth may occur within the pre-Karoo geology (Transvaal Group), underlying the Dwyka-tillites. Very little information about this aquifer in the area is available since very few boreholes have been drilled to this great depth. The water quality in quantity in this aquifer may be inferior to that of the overlying Karoo aquifers. Where dolomite underlays the Karoo geology, the yields of this aquifer may be significantly higher.

### Hydraulic conductivity

Hydraulic conductivity refers to the ease with which water passes through a porous medium at a certain time under a hydraulic gradient (m/d). Hydraulic Conductivity (K) can be determined as:

$$K = \frac{\text{Transmissivity (T)}}{\text{Aquifer thickness (d)}}$$

The aquifer characteristics in the area are expected to correspond with other similar Karoo Aquifers. The hydraulic conductivity range can vary anywhere between 10-4 to 10-2. It is expected that:

- The hydraulic conductivity will decrease with depth.
- That the fracture zones, also along the dykes, will have a higher hydraulic conductivity than the surrounding rock matrix. These zones will act as preferred groundwater flow paths along which potential contamination will migrate at a higher rate than in the surrounding rock matrix.
- The dykes are expected to have a significantly lower hydraulic conductivity and will therefore in most cases act as groundwater flow barriers.
- The coal seams can also have a higher hydraulic conductivity than the surrounding rock matrix.

### Groundwater levels

Groundwater level information is available for the Boschmanspoort area from the 2023 Eco Elementum hydrocensus boreholes. Groundwater levels varied between 1.6 and 18.1 mbs in the boreholes recorded. The results are indicated in Table 3-6.

**Table 3-6: Summary of water levels in the boreholes**

| Borehole ID | WGS84 – LO29 | | Elevation (mamsl) | Water levels (mbs) | Water Level Elevation (mamsl) |
|---|---|---|---|---|---|
| | X-coord | Y-coord | | | |
| Kruger1 | 70536 | -2885857 | 1640 | 2.44 | 1637.6 |

| Borehole ID | WGS84 – LO29 | | Elevation (mamsl) | Water levels (mbs) | Water Level Elevation (mamsl) |
|---|---|---|---|---|---|
| | X-coord | Y-coord | | | |
| Stolz | 69803 | -2882622 | 1659 | 1.65 | 1657.4 |
| OomJan1 | 70556 | -2882195 | 1652 | 18.08 | 1634 |
| OomJan3 | 70557 | -2882010 | 1656 | 1.83 | 1654.2 |

The water levels in the Karoo aquifers of South Africa typically follow the surface topography and under natural conditions, the groundwater level elevations correlate very well with the surface topography. The available groundwater level information is too scarce to do an accurate correlation between topography and water level elevations.

## Groundwater potential contaminants

Acid generation is a common response to the coal mining environment. Coal and carbonaceous material contain a mineral known as pyrite, an iron-sulphide mineral, which is the main contributor to acid rock drainage (ARD). After being exposed to oxygen and water the sulphide minerals react to form an acid. Bacteria, which increase with exposure to water and oxygen often accelerate the acidification process. The reaction can however also occur abiotically.

The general equation of pyrite oxidation is as follows:

$$2FeS_2 + 7O_2 + 2H_2O \rightarrow 2Fe^{2+} + 4SO_4^{2-} + 4H^+$$

Ferrous iron is oxidised to ferric iron:

$$4Fe^{2+} + O_2 + 4H^+ \rightarrow 4Fe^{3+} + 2H_2O$$

As mentioned previously these two reactions can occur abiotically or with the catalisation by micro-organisms. These organisms arise from the oxidation reactions. The ferric cations reduce to ferrous ions:

$$FeS_2 + 14Fe^{3+} + 8H_2O \rightarrow 15Fe^{2+} + 2SO_4^{2-} + 16H^+$$

The release of H+ lowers the pH. At the lower pH, the solubility of the ferric ion is continuous which increases the acid generation.

## Acid generation capacity

Two composite samples were taken from exploration boreholes at Boschmanspoort for waste assessment. These samples were combined into a Carbonaceous Shale sample and an Over- & Inter-burden sample. No coal was available for analysis at the time of this report. The locations of the core drilling boreholes from which the sampled was compiled is indicated in Figure 3-19.

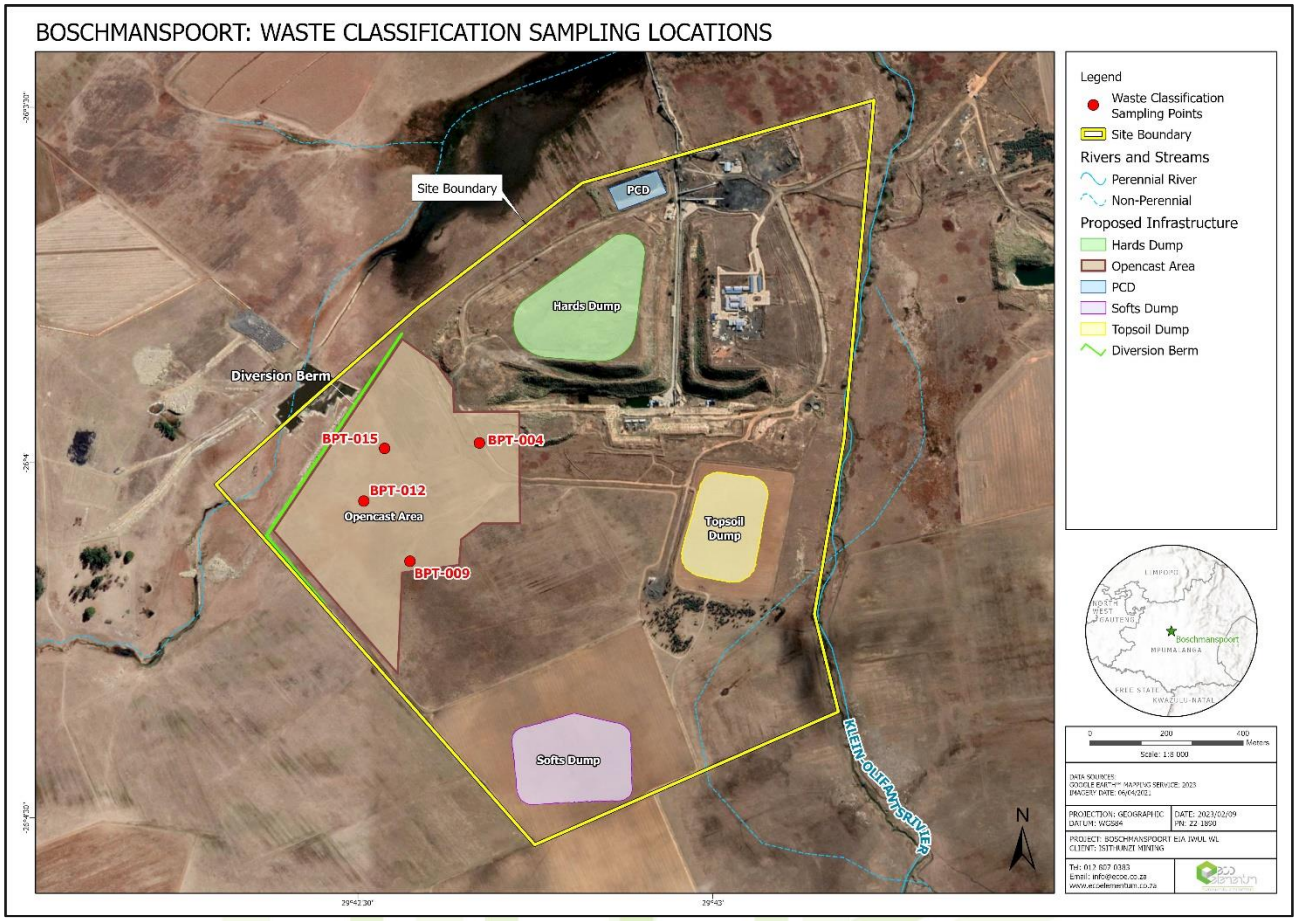



**Figure 3-19: Positions of core drilling boreholes from which the samples was compiled**

## TERMINOLOGY (SYNONYMS)

- Acid Potential (AP); *Synonyms*: Maximum Potential Acidity (MPA).

**Method**: Total S (%) (Leco Analyzer) x 31.25.

- Neutralization Potential (NP); *Synonyms:* Gross Neutralization Potential (GNP); *Syn*: Acid Neutralization Capacity (ANC) (The capacity of a sample to consume acid).

**Method**: Fizz Test; Acid-Base Titration (Sobek & Modified Sobek (Lawrence) Methods).

- Nett Neutralization Potential (NNP); *Synonyms:* Nett Acid Production Potential (NAPP).

**Calculation:** NNP = NP – AP; NAPP = ANC – MPA.

- Neutralising Potential Ratio (NPR).

**Calculation:** NPR = NP: AP.

## CLASSIFICATION ACCORDING TO NETT NEUTRALISING POTENTIAL (NNP)

iv. If NNP (NP – AP) < 0, the sample has the potential to generate acid.

v. If NNP (NP – AP) > 0, the sample has the potential to neutralise acid produced.

Any sample with NNP < 20 is potential acid-generating, and any sample with NNP > -20 might not generate acid (Usher *et al*., 2003).

## ROCK CLASSIFICATION

| | | |
|---|---|---|
| TYPE I | Potentially Acid Forming. | Total S(%) > 0.25% and NP:AP ratio 1:1 or less. |

| | | |
|---|---|---|
| TYPE II | Intermediate. | Total S(%) > 0.25% and NP:AP ratio 1:3 or less. |
| TYPE III | Non-Acid Forming. | Total S(%) < 0.25% and NP:AP ratio 1:3 or greater. |

**CLASSIFICATION ACCORDING TO NEUTRALISING POTENTIAL RATIO (NPR)**

Guidelines for screening criteria based on ABA are indicated below (Price *et al*., 1997; Usher *et al*., 2003).

| Potential for ARD | Initial NPR Screening Criteria | Comments |
|---|---|---|
| Likely | < 1:1 | Likely AMD generating. |
| Possibly | 1:1 – 2:1 | Possibly AMD generating if NP is insufficiently reactive or is depleted at a faster rate than sulphides. |
| Low | 2:1 – 4:1 | Not potentially AMD generating unless significant preferential exposure of sulphides along fracture planes, or extremely reactive sulphides in combination with insufficiently reactive NP. |
| None | >4:1 | No further AMD testing is required unless materials are to be used as a source of alkalinity. |

**CLASSIFICATION ACCORDING TO SULPHUR CONTENT (%S) AND NEUTRALISING POTENTIAL RATIO (NPR)**

For sustainable long-term acid generation, at least 0.3% Sulphide-S is needed. Values below this can yield acidity but it is likely to be only of short-term significance. From these facts, and using the NPR values, a number of rules can be derived:

1. Samples with less than 0.3% Sulphide-S are regarded as having insufficient oxidisable Sulphide-S to sustain acid generation.
2. NPR ratios of >4:1 are considered to have enough neutralising capacity.
3. NPR ratios of 3:1 to 1:1 are considered inconclusive.

NPR ratios below 1:1 with Sulphide-S above 3% are potentially acid-generating. (Soregaroli & Lawrence, 1998; Usher et al., 2003).

ABA tests were conducted for the Boschmanspoort on the samples submitted to Waterlab in Pretoria.

According to the results of the ABA tests (Table 3-7):

- Over- & Inter-Burden Composite = Non-acid forming; and
- Carbonaceous Shale Composite = Intermediate acid forming potential.

**Table 3-7: ABA results for Boschmanspoort**

| Acid – Base Accounting Modified Sobek (EPA-600) | Sample Identification | |
|---|---|---|
| | Carbonaceous Shale Composite | Over- & Inter-Burden Composite |
| Paste pH | 7,2 | 7,1 |
| Total Sulphur (%) (LECO) | 0,14 | 0,08 |

| Acid – Base Accounting Modified Sobek (EPA-600) | Sample Identification | |
|---|---|---|
| | Carbonaceous Shale Composite | Over- & Inter-Burden Composite |
| Acid Potential (AP) (kg/t) | 4,50 | 2,49 |
| Neutralization Potential (NP) | 3,75 | 3,25 |
| Nett Neutralization Potential (NNP) | -0,753 | 0,756 |
| Neutralising Potential Ratio (NPR) (NP: AP) | 0,833 | 1,30 |
| Rock Type | II | III |
| **Acid Forming Potential** | **Intermediate Acid Forming potential.** | **Non-Acid Forming potential.** |

* Negative NP values are obtained when the volume of NaOH (0.1N) titrated (pH: 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 – 2.5. Any negative NP values are corrected to 0.00.

## WASTE CLASSIFICATION

A waste classification should be conducted in accordance with the National Environmental Management: Waste Act (NEM: WA) Regulations (2013). The assessment is undertaken by comparing the samples' leachate concentration (LC) to the leachable concentration threshold (LCT), and the total concentration (TC) to the total concentration thresholds (TCT). The results will indicate the type of waste and the type of liner, if any, required for the potential source.

Generally, the results below are expected for the coal mining environment (Figure 3-20). Please note that these are only indicative and may differ from site to site.

- Coal material:
    - The coal samples are generally classed as Type 3 waste (hazardous) and according to the NEM: WA guidelines should be disposed of at a Class C landfill site (Table 3-8) or a site designed with the prescribed liner requirements; and
    - The short-term storage of the coal material on stockpiles and good storm water management should ensure that environmental impacts are kept to a minimum and contained to the stockpile sites. Based on these management protocols the liner prescribed in the attached Hydrogeology report should be sufficient, however the decision lies with the Department of Environmental Affairs.
- Waste rock material:
    - Waste rock are generally also classed as Type 3 waste and should be disposed of at Class C landfill sites or sites designed with prescribed liner requirements.

Table 3-8: Waste Classification Criteria

| Waste Type | Disposal |
|---|---|
| 0 | Not allowed |
| 1 | Class A or Hh:HH landfill |
| 2 | Class B or GLB+ landfill |
| 3 | Class C or GLB- landfill |
| 4 | Class D or GLB- landfill |

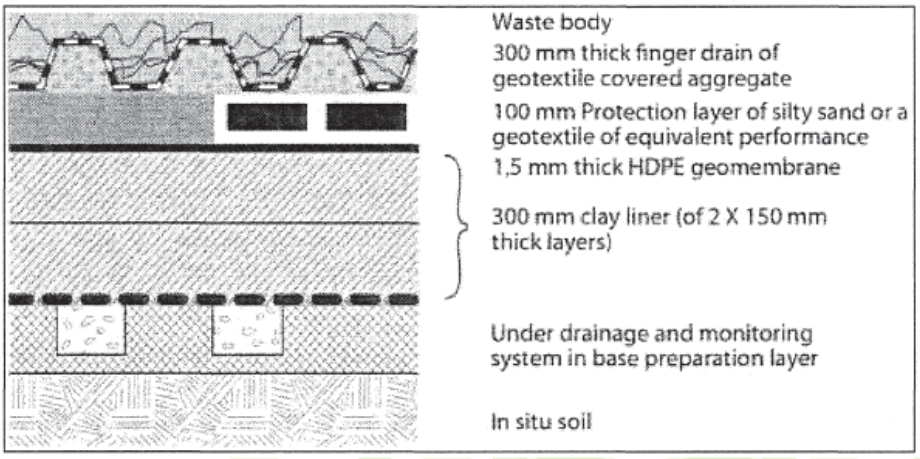



Figure 3-20: Class C landfill site liner requirements.

## Conclusions and Recommendations

The following conclusions can be drawn from the findings of the waste classification of the material sampled at the Boschmanspoort:

- The XRD results for the Boschmanspoort samples are presented in Table 3. The results confirm the domination of:
  - Quartz – Over- & Inter-burden composite sample, ($SiO_2$);
  - Kaolinite – Carbonaceous Shale, ($Al_2Si_2O_5(OH)_4$).

- The following trace elements exceedances were observed for the Boschmanspoort samples:
  - Carbonaceous Shale Composite: Pb >TCT0 & As, Pb > LCT0;
  - Over- & Inter-Burden Composite: Ba, Pb > TCT0 & As, Pb > LCT0.
- According to the results of the ABA tests:
  - Over- & Inter-Burden Composite = Non-acid forming;
  - Carbonaceous Shale Composite = Intermediate acid forming potential.

| Boschmanspoort Samples | GNR635 | ARD Generation Potential | Barrier Type |
|---|---|---|---|
| Carbonaceous Shale Composite. | Type 3 | Intermediate Acid Forming potential. | Class C |
| Over- & Inter-Burden Composite | Type 3 | Non-Acid Forming potential. | Class C |

According to the GNR635 the waste material of Boschmanspoort was assessed to be Type 3 waste, which is considered to pose a low risk towards the environment. Low-risk wastes have a low potential for contaminant release but do require some level of control and ongoing management to protect health and the environment.
Type 3 waste may only be disposed of at a Class C barrier system designed in accordance with Section 3(1) and 3(2), or, subject to Section 3(4), may be disposed of at a site designed and operated in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).

## WETLANDS

Examination of the National Freshwater Ecosystem Priority Areas (NFEPA) database were undertaken for the area. The NFEPA project aims to produce maps which provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. They were identified based on a range of criteria dealing with the maintenance of key ecological processes and the conservation of ecosystem types and species associated with rivers, wetlands and estuaries (MacFarlane et al., 2009). Identification of FEPA Wetlands are based on a combination of special features and modelled wetland conditions that include expert knowledge on features of conservation importance as well as available spatial data on the occurrence of threatened frogs and wetland-dependent birds.

Flat NFEPA wetlands were identified within 500 m of the mining area during the desktop assessment (Figure 3-21). However, ground-truthing the existence and condition of NFEPA wetlands is important to understand local conditions which have an impact on the wetland system, their functional integrity and health. During the site visit these wetlands were found to be the Scrubber Dam present onsite.

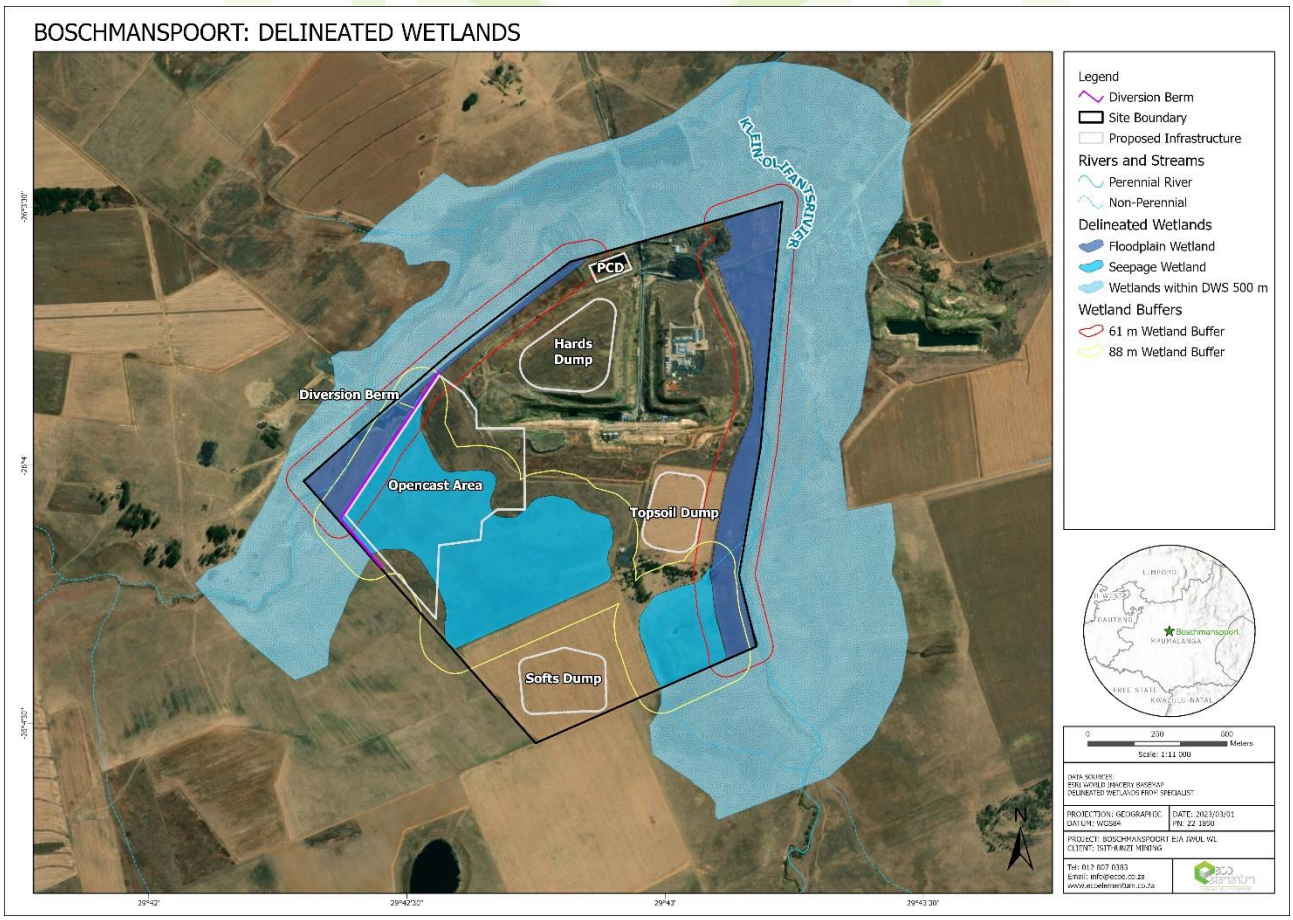



**Figure 3-21: Site wetlands**

## Wetland terrain indicator

The topography of an area is generally a good practical indicator for identifying those parts in the landscape where wetlands are likely to occur. Generally, wetlands occur as a valley bottom unit however wetlands can also occur on steep to mid slopes where groundwater discharge is taking place through seeps (DWAF, 2005). In order to classify a wetland system, the localised landscape setting must be taken into consideration through ground-truthing of the study site after initial desktop investigations (Ollis *et al*., 2014).

The study site can be characterised as having a relatively flat topography. The area ranges in altitude from 1499 m to 1581 m above sea level. A Digital Elevation Model (DEM) of the aerial photography of the site revealed slight depression in landscape south of the mining boundary (Figure 3-22). These areas identified during the desktop assessment where then assessed in more detail during the field investigation and confirmed to be **an artificial wetland system** as a result from seepage from the Scrubber Dam.

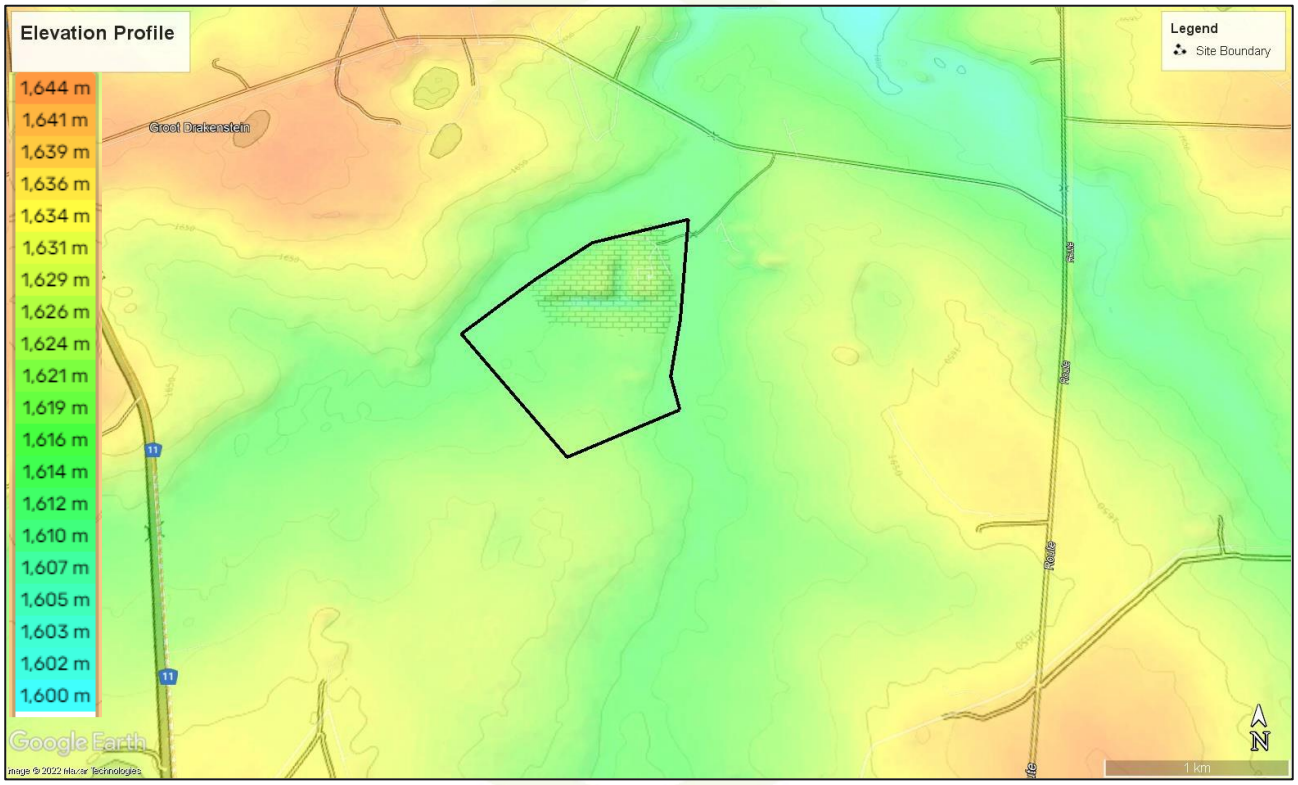



Figure 3-22: Elevation Profile of the study area

## Wetland soil wetness and soil form indicator

Pockets of artificial wetlands were delineated within the survey area. Wetland areas were identified and mainly delineated according to the presence of hydric (wetland) soil types. Hydric soils are defined as those which show characteristics (redoximorphic features) resulting from prolonged and repeated saturation. Characteristics include the presence of mottling (i.e. bright insoluble manganese and iron compounds) a gleyed matrix and/or Mn/Fe concretions.

The presence of redoximorphic features are the most important indicator of wetland occurrence, as these soil wetness indicators remain in wetland soils, even if they are degraded or desiccated (DWAF, 2005). Redoximorphic features are soil characteristics which develop as a result of prolonged and repeated saturation. It is important to note that the presence or absence of redoximorphic features within the upper 500 mm of the soil profile alone is sufficient to identify the soil as being hydric, or non-hydric (Collins, 2005).

No hydric soils were identified within the artificial wetland zones. The terrestrial soils sampled were dominated by Hutton Soils on site. Mispah soils dominated the rocky areas.

## Wetland vegetation indicator

According to DWAF (2005), vegetation is regarded as a key component to be used in the delineation procedure for wetlands. Vegetation also forms a central part of the wetland definition in the National Water Act, Act 36 of 1998. However, using vegetation as a primary wetland indicator requires an undisturbed condition (DWAF, 2005). Minor disturbances were however noted in the wetland systems making it difficult to rely solely on vegetation as a wetland indicator. Disturbances included the presence of alien invasive species, damming, mining and erosion within the area. Hydrophytic wetland vegetation *Cyperus spp.* and *Australis phragmites* were dominant. *Juncus spp*. were also noted.

## Wetland delineation

Any wetlands identified on the site were categorised according to the National Wetland Classification System for South Africa (Ollis et al., 2013). The wetland areas were classified as artificial **wetlands** based on that it possesses the vegetation properties of a wetland is as a result from the seepage from the Scrubber Dam on site (see Figure 3-23 and Figure 3-24 ).

Artificial wetlands, marshes or swamps, are generally created from human activities such as wastewater, storm water runoff or sewerage treatment facilities, which serves as habitat for wildlife. Natural wetlands act as bio-filters, removing sediments and pollutants such as heavy metals from the water, and artificial wetlands can be designed in a manner to emulate these features during a suitable rehabilitation phase.

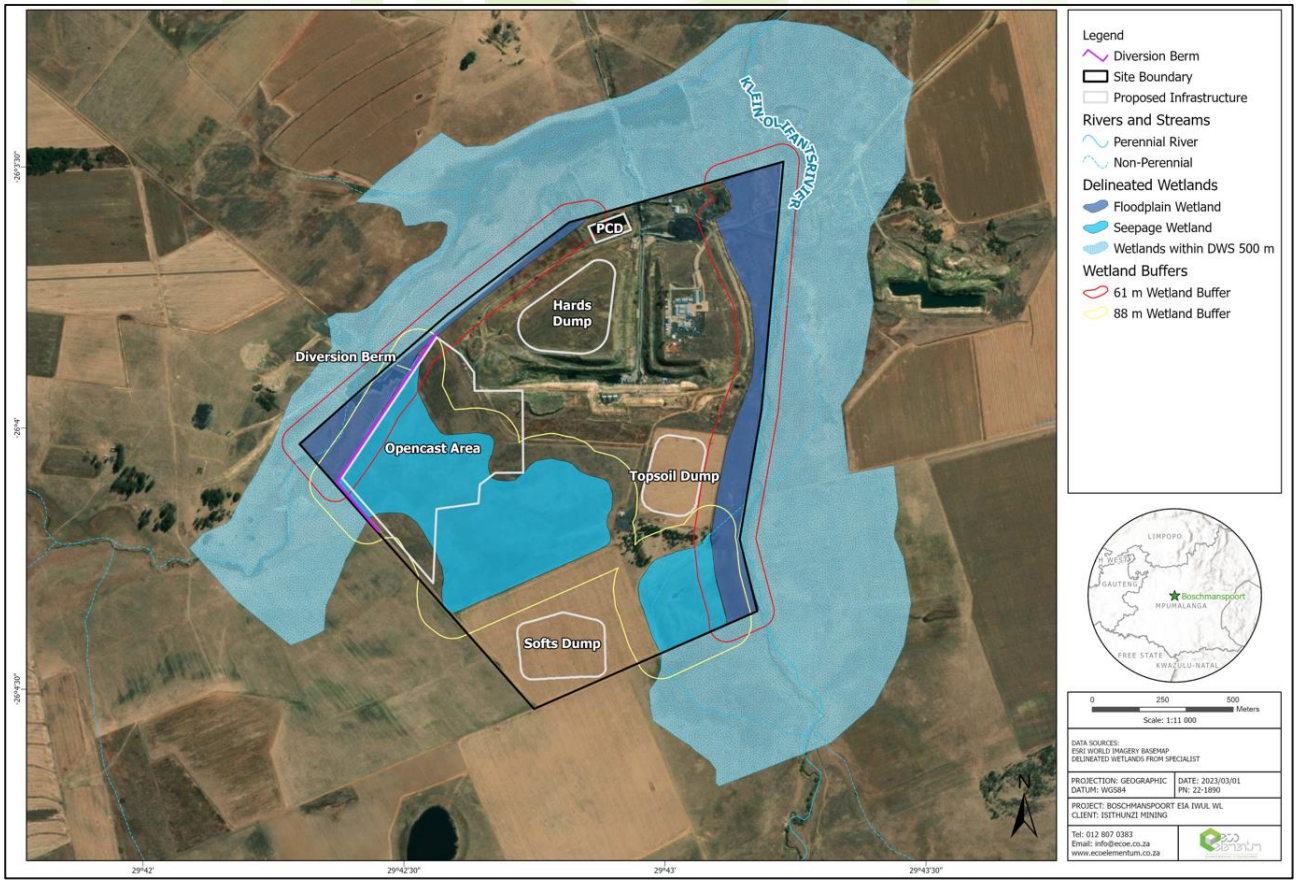



**Figure 3-23: Dam seepage creating artificial wetland conditions**

Figure 3-24: Riparian plants identified in a disturbed artificial wetland system

## Wetland/Riparian Classification and Delineation

Four wetland areas were recorded on the study site. The wetlands are classified as two Floodplain wetlands and two Seepage wetlands (Ollis et al, 2013). The eastern Floodplain wetland is known as the Klein-Olifants River, while the northern Floodplain is an unnamed tributary of the Klein-Olifants River. Both these floodplains meet at a confluence directly north of the study site. The Seepage wetlands flow into the adjacent Floodplain wetland. The development is earmarked to occur within the western Seepage wetland. The eastern Floodplain and Seepage wetland are not expected to be significantly impacted. Furthermore, several areas within the mining footprint area was dominated by trenches/drains and gullies dominated by Typha capensis these areas are considered artificial and not included in this report.

The following buffer zones were calculated for the wetlands based the generic risk categories for Open Cast Mining and Associated Infrastructure (MacFarlane et al., 2015):

- Floodplain Wetland – 61 m
- Seepage Wetland – 88 m.

It should be noted that questions were raised in the National Assembly (Appendix D) of the legality of mining operation in the property north of the current study site (Portion 24 of Farm Boschmanpoort 159 IS). Some of the activities appear to encroach into the current study site.

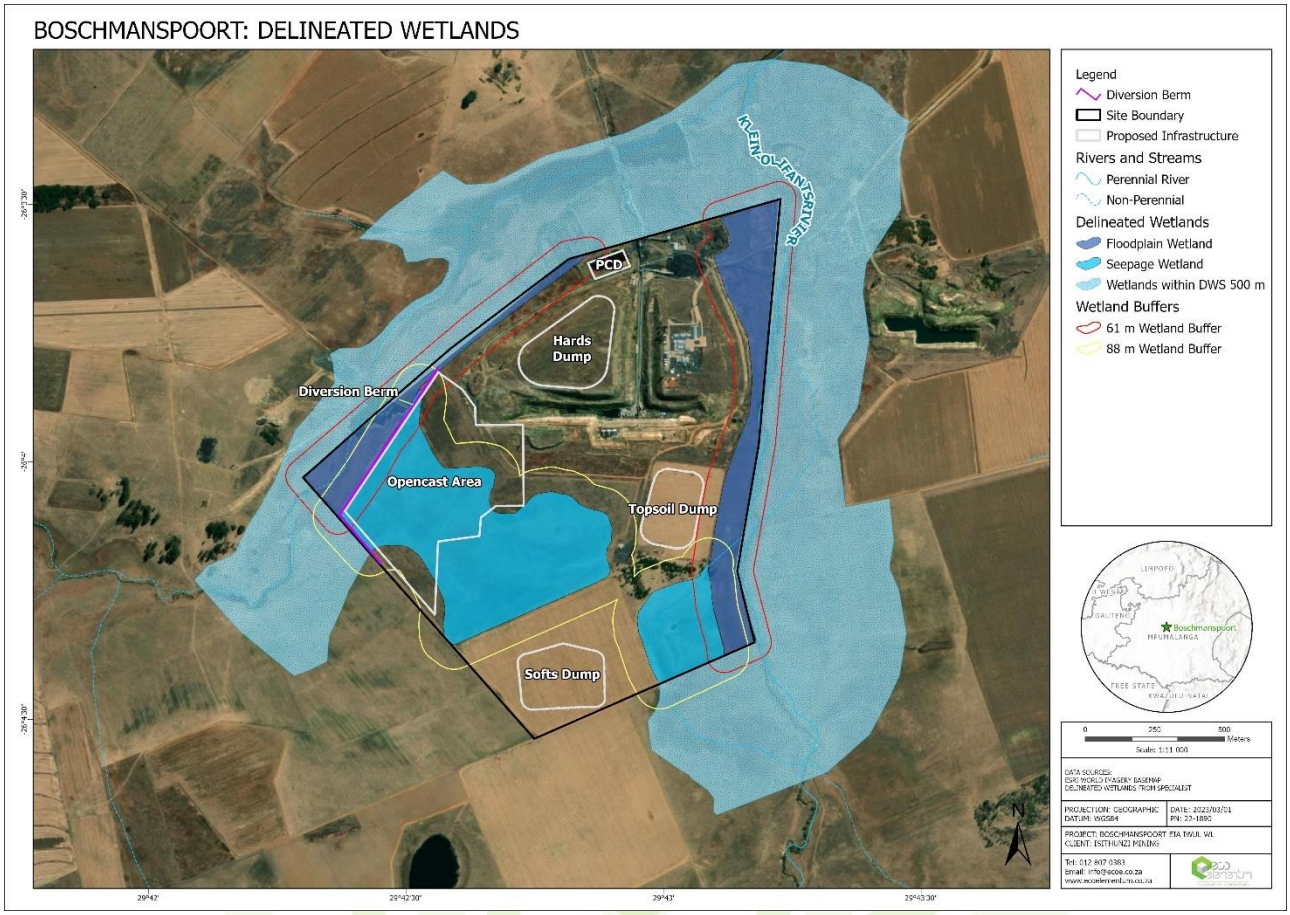



**Figure 3-25: Delineated wetland, their calculated buffers and the DWS regulated area relative to the study site.**

## Land Use, Cover and Ecological State

The elevation profile of the study site indicates a clear slope both north-south and east-west which is characteristic of a Seepage Wetland connected to the Channelled Valley Bottom Wetland in the north. An elevation profile of the study area indicates that the entire study site is located in a very low elevation compared to the surroundings. Low landscape settings are one of several tools to measure the likelihood of wetlands in the area (Ollis et al, 2013). Furthermore, historical and recent imagery indicate watercourse features in this area. The study area has been extensively used for agriculture and more recently mining, which have numerous impacts on the wetlands in the area. Various buildings and structures remain on site. A crossing over the Klein Olifants River was observed. Currently two areas of active agriculture remain, having been used for agriculture from as early as 1978. Numerous watercourses can be seen in the surrounding area including numerous pan wetlands suggesting a shallow water table in some areas.

## Present Ecological Status (PES) (Kotze et al., 2020) for the Northern Floodplain Wetland (Unnamed) and the Eastern Floodplain Wetland (Klein-Olifants River)

The Northern Floodplain wetland has been impacted by mining, agriculture and several impoundments and achieved a Combined Impact Score of 4.2 – D - Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred. The condition of this wetland is likely to deteriorate slightly over the next 5 years.

The Eastern Floodplain wetland has been less impacted compared to the northern section and has fewer impoundments and achieved a Combined Impact Score of 2.9 – C - Moderately Modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact. The condition of this wetland is likely to likely to deteriorate slightly over the next 5 years.

Some of the impacts recorded include mining within the wetland, grazing and agriculture.

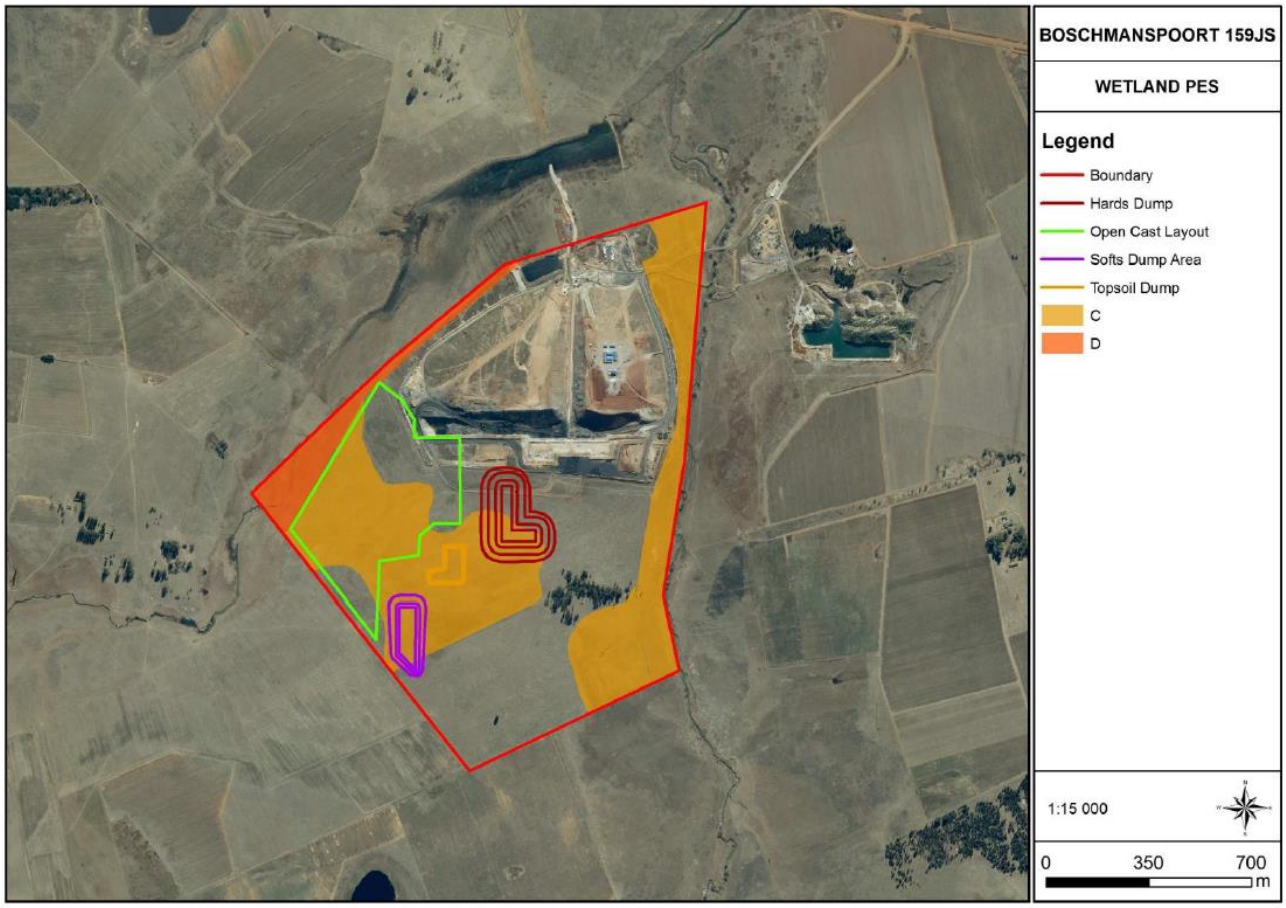



**Figure 3-26: Present Ecological Scores of the wetlands on the study site.**

**Table 3-9: Summary of the results of the WetHealth (Version 2) assessment conducted for Northern Floodplain (Unnamed).**

| PES Assessment | Hydrology | Geomorphology | Water Quality | Vegetation |
|---|---|---|---|---|
| Impact Score | 5.9 | 4.9 | 3.2 | 1.9 |
| PES Score (%) | 41% | 51% | 68% | 81% |
| **Ecological Category** | D | D | C | B |
| Trajectory of change | ↓ | ↓ | ↓ | → |
| Confidence (revised results) | Moderate | Moderate | Moderate | Moderate |
| **Combined Impact Score** | 4.2 | | | |
| **Combined PES Score (%)** | 58% | | | |
| **Combined Ecological Category** | D | | | |

Table 3-10: Summary of the results of the WetHealth (Version 2) assessment conducted for Eastern Floodplain Wetland (Klein-Olifants River).

| PES Assessment | Hydrology | Geomorphology | Water Quality | Vegetation |
|---|---|---|---|---|
| Impact Score | 3.4 | 2.8 | 3.2 | 1.9 |
| PES Score (%) | 66% | 72% | 68% | 81% |
| **Ecological Category** | C | C | C | B |
| Trajectory of change | ↓ | ↓ | ↓ | → |
| Confidence (revised results) | Moderate | Moderate | Moderate | Moderate |
| **Combined Impact Score** | 2.9 | | | |
| **Combined PES Score (%)** | 71% | | | |
| **Combined Ecological Category** | C | | | |

## Ecological Importance and Sensitivity (EIS) of the Endorheic Pan

The highest EIS score of 3.7 falls in the Very High category. These wetlands are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water in major rivers (In this case the Klein-Olifants drains into the Olifants River).

- Biodiversity maintenance importance: 2.2 (Moderate)
- Regulating services importance: 3.0 (High)
- Provisioning and cultural services importance: 3.7 (Very High)

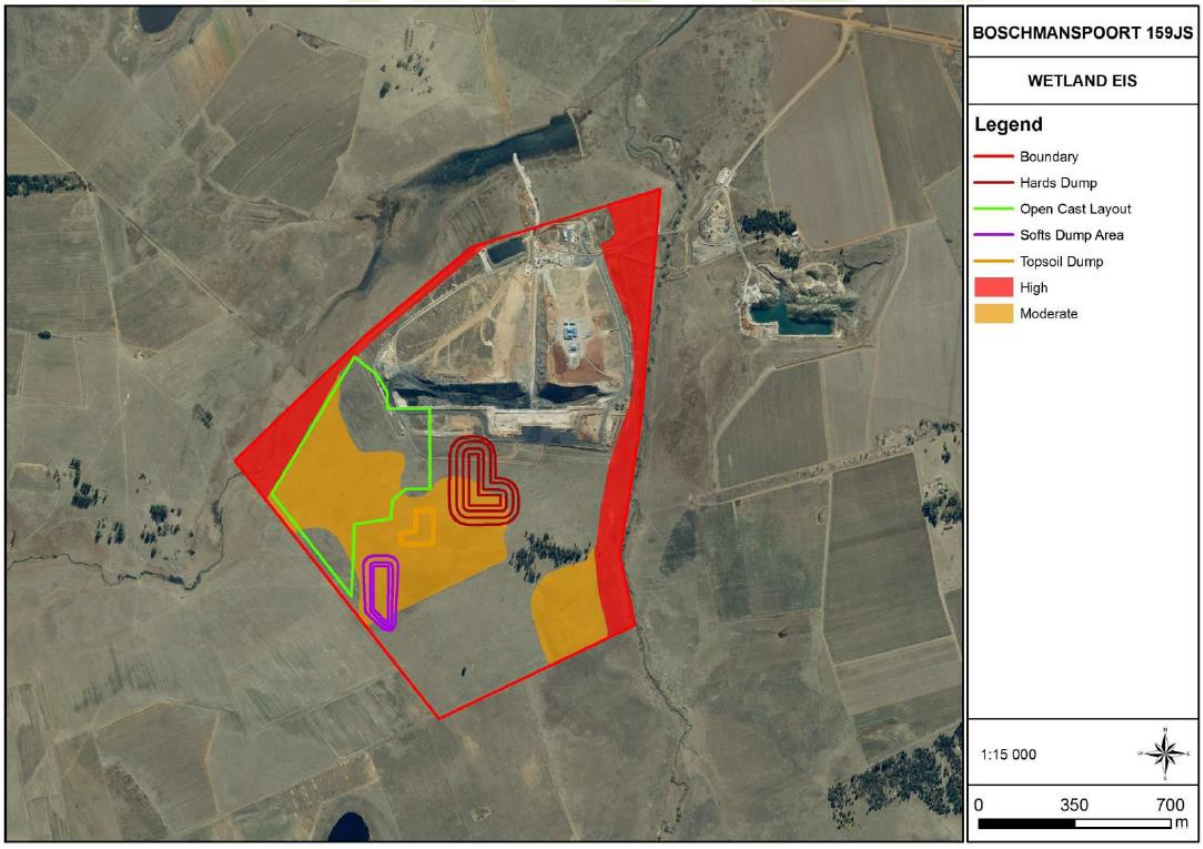



Figure 3-27: Ecological Importance and Sensitivity of the wetlands recorded on the study site.

## Recommended Ecological Category (REC) of the Endorheic Pan

Following the method set out in Rountree et al., (2013), the PES value of C and D and a Very High EIS class, leads to the identification of an REC of B and C. This means that the development should be done in such a way as to at a improve the EC values if possible.

**Table 3-11: Generic Matrix for the determination of REC and RMO for water resources**

| | | | EIS | | | |
|---|---|---|---|---|---|---|
| | | | Very high | High | Moderate | Low |
| PES | A | Pristine/Natural | A Maintain | A Maintain | A Maintain | A Maintain |
| | B | Largely Natural | A Improve | A/B Improve | B Maintain | B Maintain |
| | C | Good - Fair | B Improve | B/C Improve | C Maintain | C Maintain |
| | D | Poor | C Improve | C/D Improve | D Maintain | D Maintain |
| | E/F | Very Poor | D Improve | E/F Improve | E/F Maintain | E/F Maintain |

## Seepage Wetland

It should be noted that this wetland likely extend further than the current delineation, due to the prolonged disturbance in the soil profile in some areas as a result of prolonged agriculture. Soil and hydrophytic indicators are thus not reliable in these areas. Historical imagery is also not reliable as the earliest imagery available (1978) already show ploughed agricultural fields. Should any developments be planned in these areas it is suggested that a hydropedological study be conducted to determine the significance of the subsurface flow of water (interflow). It should however, be noted, that although some subsurface flows are expected in these areas the wetlands likely no longer provide many ecological benefits apart from water flow dynamics.

The soil indicators assessed in the current study show some redoximorphic features, although the soil profile is disturbed in some areas where the redoximorphic features are less. Several areas of the wetland indicate a shallow soil profile with hard rock, ferricrete, or dense loose rock thus creating an impermeable layer where water cannot penetrate. The soil further had a layer of organic material in the topsoil. The vegetation composition was characterised by several hydrophytic species with a few Alien Invasive Species (AIS).

The seepage wetland has several distinct zones. The inner permanent depresional wet area was characterised by deep standing water with hydrophytic sedges. The outer edge was also characterised by areas with shallow standing water in areas with drier outer edges. The dominant hydrophytic species recorded include: *Pycreus macranthus, Cyperus denudatus, Kyllinga erecta, Schoenoplectus corymbosus, Commelina diffusa, Centella asiatica, Fuirena pachyrrhiza, Juncus effuses* and *Juncus lomatophyllus*. Additional species of note include: *Helichrysum aeronitens, Limosella maior, Imperata cylindrical, Setaria sphacelata* var. *sericea, Sporobulus africanus,* and *Eragrostis sp.* The outer edge of the wetland was dominated by the AIS *Stoebe plumose.*

### Present Ecological Status (PES) (Kotze et al., 2020) for the Seepage Wetland (Associated with the Proposed Mine and Infrastructure)

The Seepage wetland achieved a Combined Impact Score of 2.7 which falls in the Ecological Category C - Moderately Modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact. The condition is likely to remain stable over the next 5 years. A deep trench exists on the western border of the Seepage wetland as well as in the east adjacent the agricultural fields. These are likely used to drain water away from the fields to disperse water. These negatively affect the hydrology of the Seepage wetland. Other impacts include overgrazing and AIS.

**Table 3-12: Summary of the results of the WetHealth (Version 2) assessment conducted for Seepage Wetland.**

| PES Assessment | Hydrology | Geomorphology | Water Quality | Vegetation |
|---|---|---|---|---|
| Impact Score | 3.6 | 3.1 | 1.4 | 2.3 |
| PES Score (%) | 64% | 69% | 86% | 77% |
| **Ecological Category** | C | C | B | C |
| Trajectory of change | → | → | → | → |
| Confidence (revised results) | Moderate | Moderate | Moderate | Moderate |
| **Combined Impact Score** | 2.7 | | | |
| **Combined PES Score (%)** | 73% | | | |
| **Combined Ecological Category** | C | | | |

### Ecological Importance and Sensitivity (EIS) of Seepage Wetland

The highest EIS score of 1.8 falls in the Moderate category. Wetlands in this category are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers. (In this case the Seepage wetland drains into a tributary of the Klein-Olifants which drains into the Olifants River).

- Biodiversity maintenance importance: 1.0 (Low)
- Regulating services importance: 0.5 (Very Low)
- Provisioning and cultural services importance: 1.8 (Moderate)

### Recommended Ecological Category (REC)

Following the method set out in Rountree et al., (2013), the PES value of C and Moderate EIS class, leads to the identification of an REC of C. This means that the development should be done in such a way as to maintain the EC values as C.

## Baseline Freshwater Aquatic Invertebrate Assessment

During the desktop assessment three sample points were identified to assess the in-situ conditions of the aquatic ecosystem. These were however negated by the adjacent mining operations on site and only two representative samples sites were placed, namely the Klein Olifants and Tributary. The sample points were placed to firstly provide in-situ conditions and secondly to serve as monitoring points to assess the impact of the development on the aquatic ecosystem. The Upper and lower sample sites were deemed to be sufficient in terms of the South African Scoring System or SASS (currently in version 5) (SASS5). The western sample site was not sampled due to the conditions being outside the SASS5 protocol.

From the in-situ water quality results the water for the select parameters little between the sites. The pH is circumneutral but at the higher range. The TDS and EC is elevated, and indicative of the Klein Olifants River system based on experience working in the system. This can be attributed to prolonged anthropogenic activities in the catchment including mining and agriculture.

### Habitat assessment using the IHAS system

The habitat assessment was completed using the SASS5 score sheet (version 2). The system sets various weight ratings based on the ecoregion description, geomorphological zonation. For the project in the Highveld Ecoregion with Transitional Zonation and Low flow was selected. The habitat assessment for the sample sites was completed for the Klein Olifants sample and for the tributary sample site. The habitat suitability score of the Klein Olifants sample site was calculated to 74% (PES=A) and 30% (PES=F) for the Tributary sample site. The low score of the Tributary sample site was due to the sample being a channelled valley bottom wetland system and the absence of stones in the sample site.

### Aquatic macroinvertebrates using the SASS 5 methodology

The average score per taxon (ASPT) of the samples was calculated to 4.7 and 5.4. The SASS score was calculated to 89 and 76 with the number of taxa 19 and 14. The variation in the number of taxa can be attributed to the variance in habitat scores- the habitat variance in combination with the water quality indicates the tributary sample site to not be representative of in situ water quality conditions.

### Site Ecological Importance

Based on the Species Environmental Assessment Guideline (SANBI, 2020) watercourses and specialised habitats should be assessed based on their Site Ecological Importance (SEI). All the watercourses examine in this report should thus be regarded as having a High Sensitivity.

**Table 3-13: Ecological Importance of all wetland areas recorded on the study site**

| Habitat | Conservation Importance (CI) | Functional Integrity (FI) | Biodiversity Importance | Receptor Resilience | Site Ecological Importance |
|---|---|---|---|---|---|
| All Watercourses | High – Confirmed occurrence of watercourses within the development footprint | Medium – Some historical impacts and AIS recorded | Medium – Based on CI and FI | Very Low – Watercourses are not easily restored without significant rehabilitation. Many species are dependent on functional wetland habitat. | Based on BI – Medium and RR – Very Low = High |

## ARCHAEOLOGICAL IMPACT ASSESSMENT

### Historical topographical maps & aerial images

The historical aerial image dating to 1956 (Figure 3-28), as well as the 1965 topographical map (Figure 3-29) show the presence of buildings and huts near the south-eastern corner of Portion 8 of the Farm Boschmanspoort 159 IS (Sites B01

– B03), while the majority of demarcated land parcel appears to be cultivated. The same detail, except for Sites B01 and B02, is evident on the 1968 aerial image (Figure 3-30). The aerial images dating to 1975, 1978, 1984, 1991, as well as the 1984 topographical map, indicate an increase in cultivated land. When the 1996 topographical map is inspected (Figure 3-31), a reduction in cultivated land is noted, while the 2005 aerial image and 2009 topographical map (Figure 3-32 and Figure 3-34) show the presence of an opencast mine on the northern section of the study area. It should also be noted that the building at Site B03 is omitted from the 2009 topographical map, but a structure, possibly a ruin, is still evident on the 2005 aerial image.

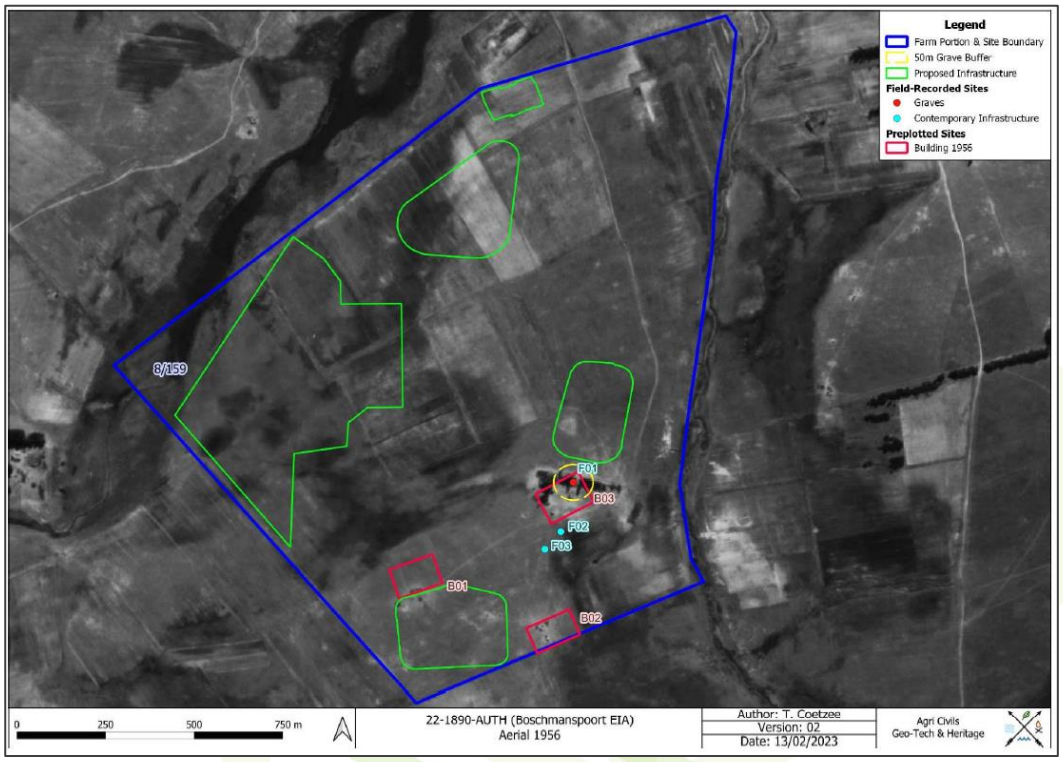



**Figure 3-28: Study area superimposed on a 1956 aerial image.**

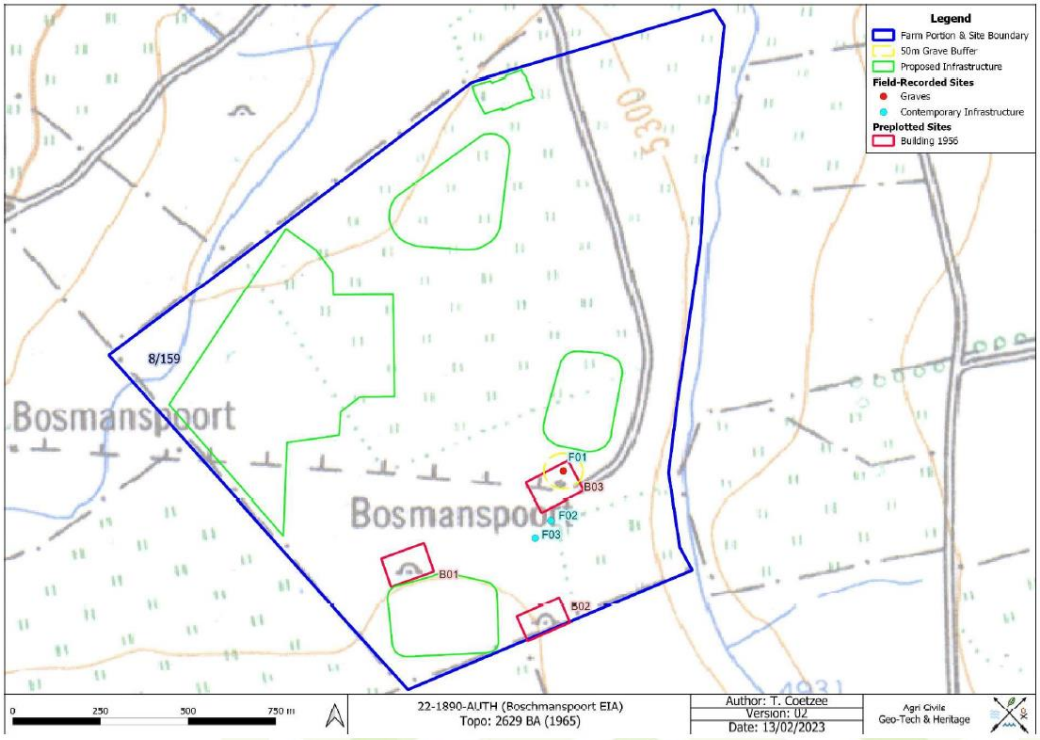



**Figure 3-29: Study area superimposed on a 1965 topographical map.**

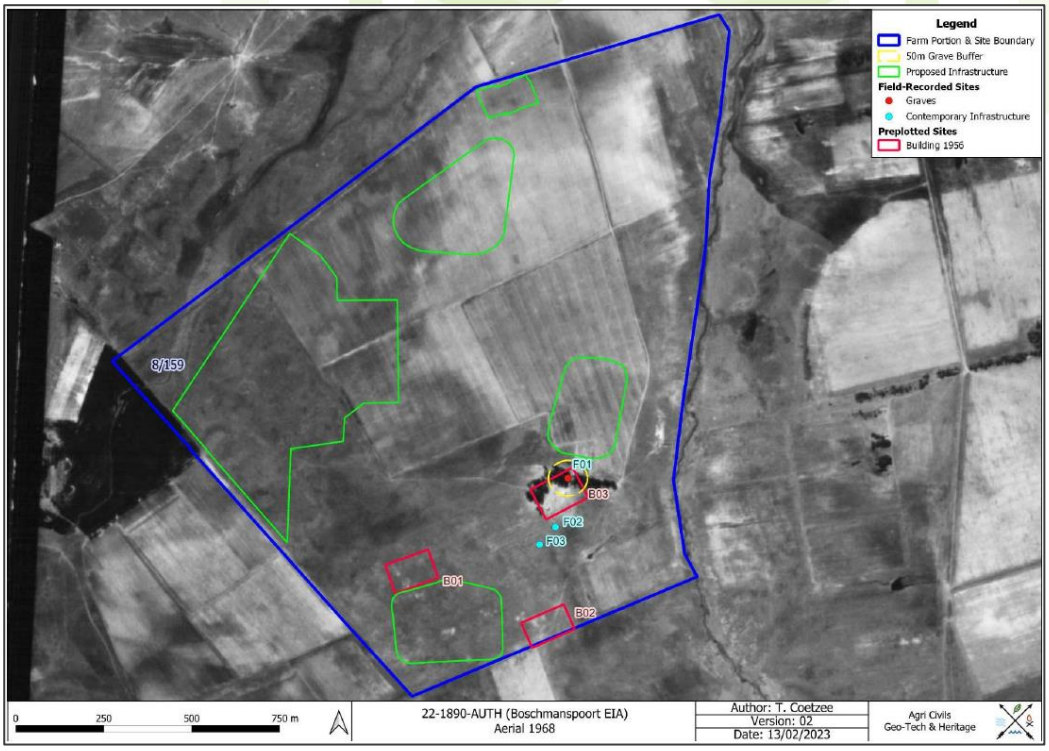



**Figure 3-30: Study area superimposed on a 1968 aerial image.**

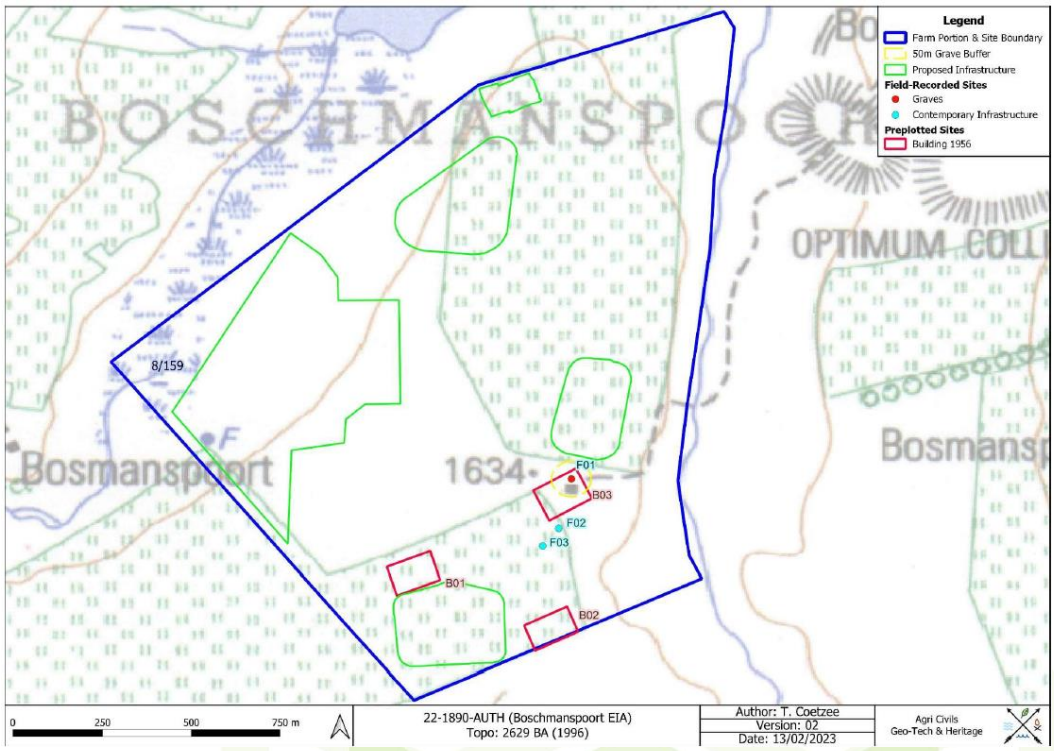



**Figure 3-31: Study area superimposed on a 1996 topographical map.**

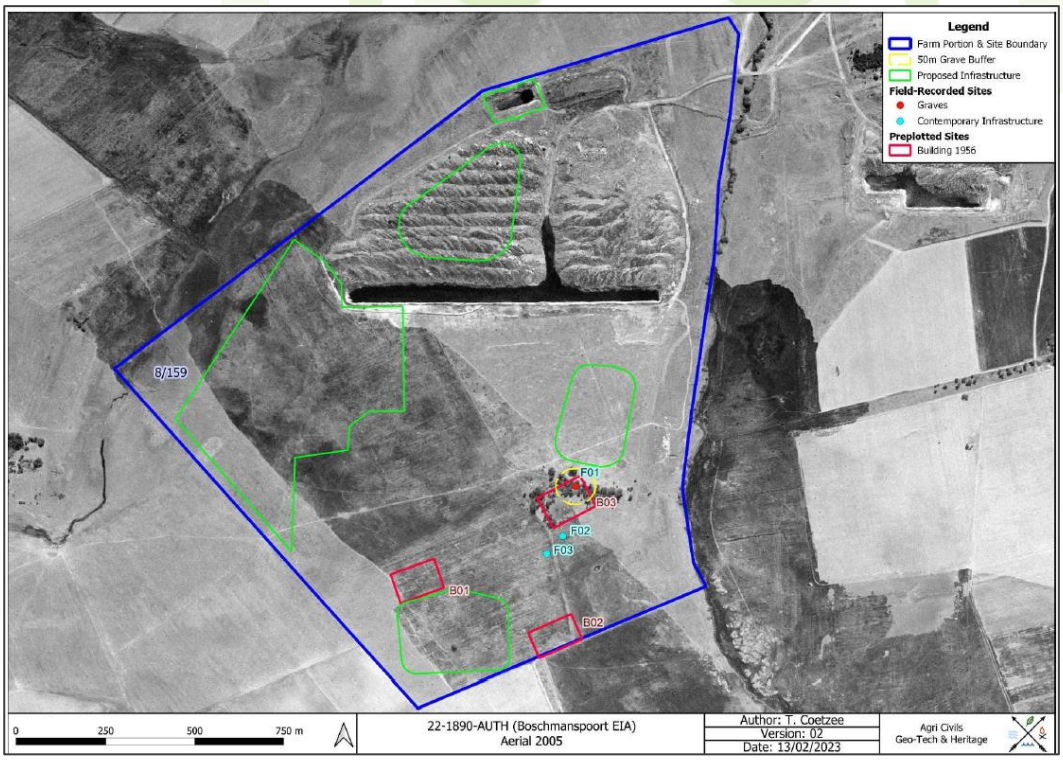



**Figure 3-32: Study area superimposed on a 2005 aerial image.**

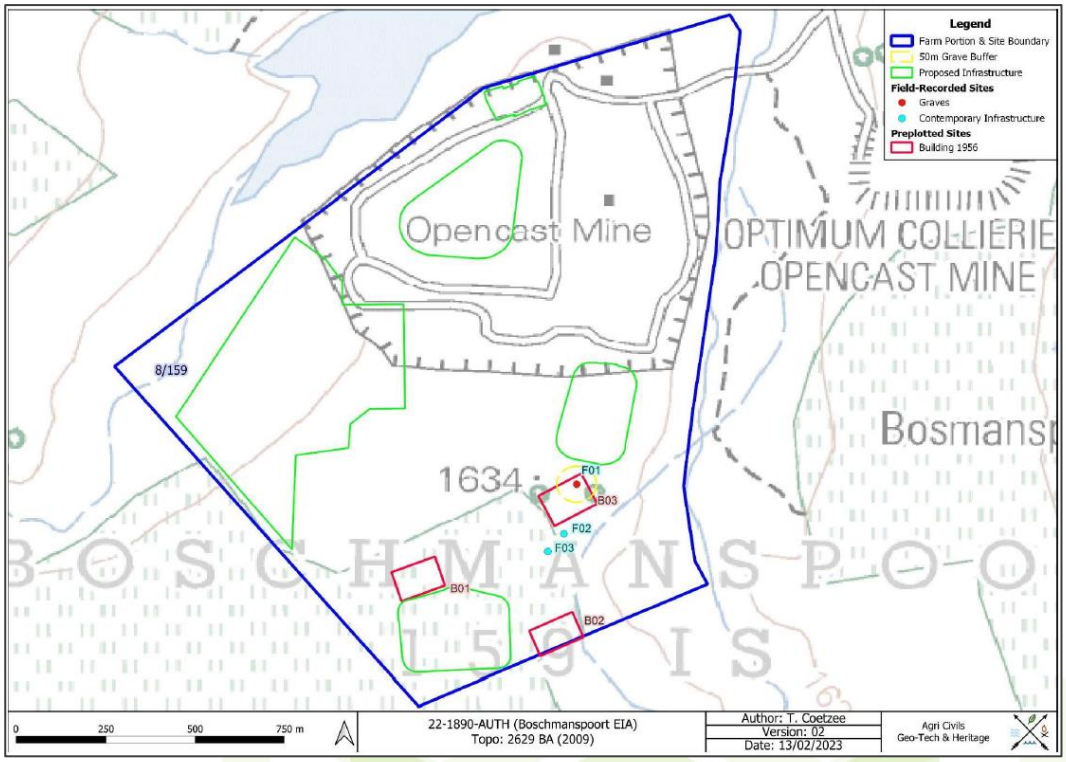



**Figure 3-34: Study area superimposed on a 2009 topographical map.**

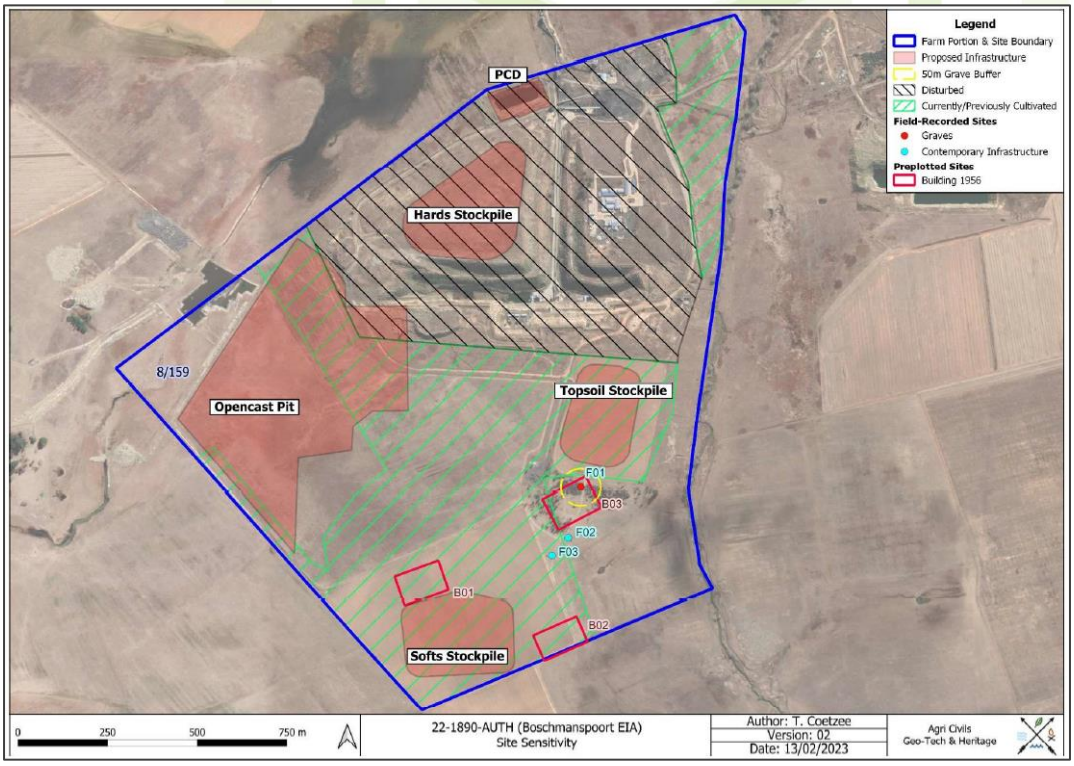



**Figure 3-33: Study area and potentially sensitive areas portrayed on a 2022 satellite image.**

## Archaeological and Historical Remains

### *Stone Age Remains*

No Stone Age archaeological remains were located within the demarcated study area. Although no Stone Age archaeological remains were located, such artefacts may occur in the general area. These artefacts are often associated with rocky outcrops or water sources. Archaeological studies conducted in the surrounding areas also did not locate Stone Age artefacts.

### *Iron Age Farmer Remains*

No Iron Age Farmer remains were located within the demarcated study area. The heritage study conducted for Forzando Coal Holdings on the Farms Weltevreden 193 IS and Halfgewonnen 190 IS located two circular homesteads that possibly date to the LIA (Huffman & Steel 1995), while Bergh (1999: 7) indicated the presence of LIA sites to the east-northeast of Bethal.

### *Historical Remains*

Three potential sites (B01 – B03) consisting of buildings were observed on the 1956 aerial image near the south-eastern corner of the study area and outside of the demarcated impact areas. Sites B01 and B02 (Figure 3-33) are also shown as huts on the 1965 topographical map, but are no longer visible on the 1968 aerial image. Sites B01 and B02 were therefore demolished between 1965 and 1968. Site B03 is still indicated as a building on the 1996 Topographical map, but was omitted from the 2009 topographical map which suggests that the building was demolished between 1996 and 2009. The site visit confirmed that the areas.

### *Contemporary Remains/Natural*

Two contemporary sites were located within the demarcated study area, but outside of the proposed impact areas. Both sites (F02 & F03) are located near the south-eastern corner of the study area. The site measures approximately 25 m² and according to Google Earth imagery, the structure was erected between 2012 and 2017.

Site F03 consists of a corrugated iron building measuring approximately 30 m². Based on Google Earth imagery, the building was constructed between 2020 and 2021. The heritage study conducted by Huffman & Steel (1995) recorded a few angular structures that might date to contemporary times. No significant sites, however, were recorded.

### *Graves*

Four unfenced graves were recorded during the site inspection (Site F01). The site is located near the building ruin at Site B03 and approximately 68 m from the nearest demarcated impact area (topsoil stockpile). Site F01 consists of one formal and 3 informal surface decorations, and is in a dilapidated state since the formal surface decoration is broken. The formal surface decoration consists of a cement feature, while the informal graves are all associated with packed stones. No headstones, inscriptions or grave goods were observed. All the graves are placed in an approximate east-west orientation, known as the Christian Western style. Due to the dilapidated state of the graves, absence of grave goods and the lack of recent burials, it is assumed that the site is no longer in use.

## PALAEONTOLOGICAL

### Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 3-35. The site for development is in the very highly sensitive Vryheid Formation (red) with a central section of moderately sensitive Quaternary sands and alluvium (green).

The Vryheid Formation contains the main coal reserves of South Africa. Coals are the product of the alteration of buried peats by heat and pressure to form amorphous organic matter. No fossil plants are visible in the coal itself but can sometimes be found in the carbonaceous lenses between and adjacent to the coal seams. Here the original plants can be seen, the Glossopteris flora. This flora is dominated by the extinct seed fern, Glossopteris, but other plants were also present such as lycopods, sphenophytes, ferns, cordaitaleans and early gymnosperms (Plumstead, 1969; Anderson and Anderson, 1985; Bamford, 2004). Vertebrate fossils are seldom found with plant fossils because they require different environments for preservation. Plants require a more reducing environment while bones need a more oxidizing environment (Cowan, 1995).

Although the Glossopteris flora is widespread in Gondwana (Adendorff, 2005), the occurrence is sporadic and difficult to predict. In this area, the Witbank Coalfield, there are usually five coal seams, from bottom to top called 1-5 (Snyman, 1988). The uppermost seam is overlain by sandstone in most areas and is 20 or meters below the lands surface (Snyman, 1998).

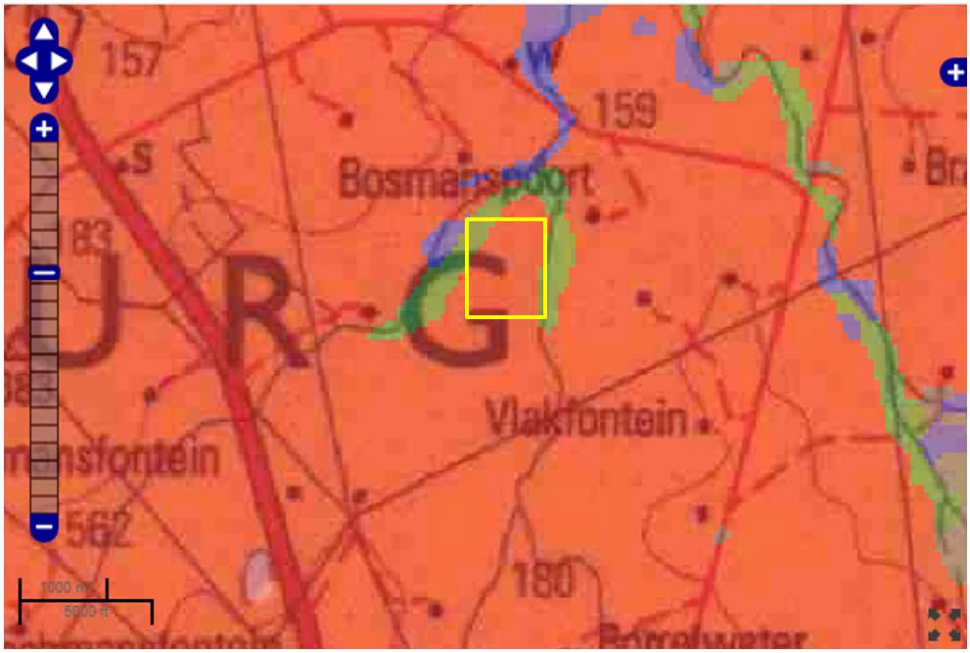



**Figure 3-35: SAHRIS palaeontology sensitivity map for the Boschmanspoort 159JS colliery expansion shown within the yellow rectangle.**

Background colours indicate the following degrees of sensitivity:

- Red = very highly sensitive;
- Orange/yellow = high;
- Green = moderate;
- Blue = low;
- Grey = insignificant/zero.

## Site visit observations

The area was walked through by palaeontologists Bailey Weiss and Rick Tolchard on 15 November 2022. They searched for rocky outcrops because soils do not preserve fossils. The area has been disturbed by earlier clearing, ploughing and cultivation of crops so is a generally flat and featureless grassland. The grass was thick and the ground very muddy in places because of the recent rains. There were no shale outcrops or fossils visible on the surface and no fossils in the few rocky exposures because there were dolerite or coarse sandstone.

No fossils and no rocky outcrops of shales that could preserve fossils were visible in the unmined areas. These fields have been cleared, ploughed and planted in the past. They have deep sandy soils covering the underground strata so they remain invisible. Only a few sandstone outcrops were seen but they did not have any fossil plant impressions on the surfaces. No shales or carbonaceous shales were evident in the area, and no fossils were seen.

## TERRESTRIAL FAUNA ASSESSMENT

No desktop features of significance to terrestrial fauna were identified on site. The site is between two Important Bird Areas (IBAs) and may be utilised periodically by migrant or wondering birds, although the site is unlikely to serve as a significant satellite habitat or area of conservation to such species.

The site was assessed on the 18 November 2022. The development area is composed largely of disturbed moist grasslands (to be confirmed by wetland specialist) and old pastures (possibly historical crop fields). These habitats extend into the property which also includes mining areas of the Boschmanspoort underground mine operations and AIS trees.

### Animal Species

The following is relevant in terms of vertebrate fauna species:

- Of the six listed Species of Conservation Concern (SCC) in the Environmental Screening Tool Report, the following have been included as cautionary species for the the assessment of the site ecological importance (SANBI, 2020):
    - The Southern Bald Ibis has been previously recorded in the area. The species was not noted on site and the development area is considered as possible forage area for the species only; no breeding sites in the development area.
    - The Oribi has been recorded on the MPTA Data (date of records unknown) and is considered as a cautionary species on site, although the site provides little in terms of cover and is likely only to be utilised as forage area for the species. Even in terms of forage the site is considered to provide limited food due to overgrazing of the development area.
- The Secretary bird was noted in the surrounds, and has been included as an additional SCC for the SEI assessment, although the site is only likely to provide forage habitat for the species (no adequate breeding sites occur in the development footprint or immediate surrounds).
- Two other threatened or protected (TOP) vertebrates were recorded for the QDGS / pentad (Southern African Hedgehog and Blue Korhaan) and a further three (Serval, Lesser Kestrel and Giant Bullfrog) could not be conclusively excluded from occurring on site. None were observed on site, but the species should be monitored during on-site activities.
- None of the endemic species recorded in the area or identified as likely on site are restricted and the area is not an area of mammal endemism.
- No significant populations of congregatory water birds will occur on site.

In terms of invertebrates:

- No invertebrate SCCs are listed in the Environmental Screening Report.
- No TOP invertebrates were recorded for the QDGS or recorded from site.

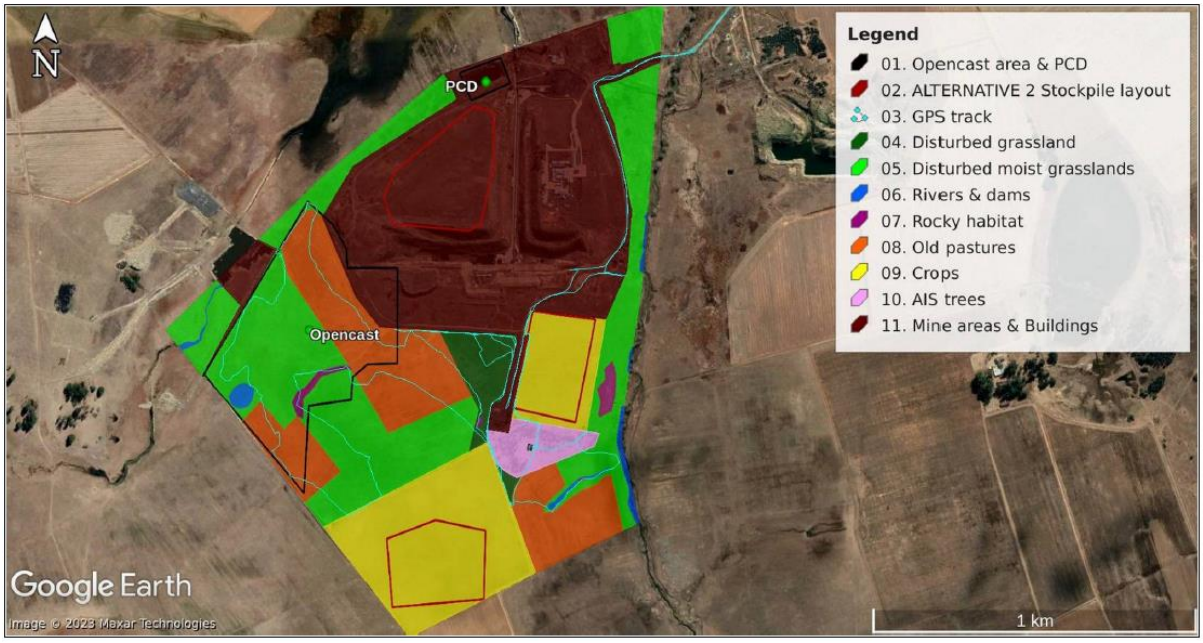



**Figure 3-36: Habitat units overlaid onto Google Earth image (July 2022)**

## Site Ecological Importance and Impact Statements

Overall site sensitivity is presented below. In terms of the findings, SEI assessment and scores for the development area include:

- Medium SEI – Minimization and restoration mitigation to be applied. Development activities of medium impact acceptable followed by appropriate restoration activities.
- Low – Minimization and restoration mitigation to be applied. Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- Very Low – Minimization mitigation to be applied. Development activities of medium to high impact acceptable and restoration activities may not be required.

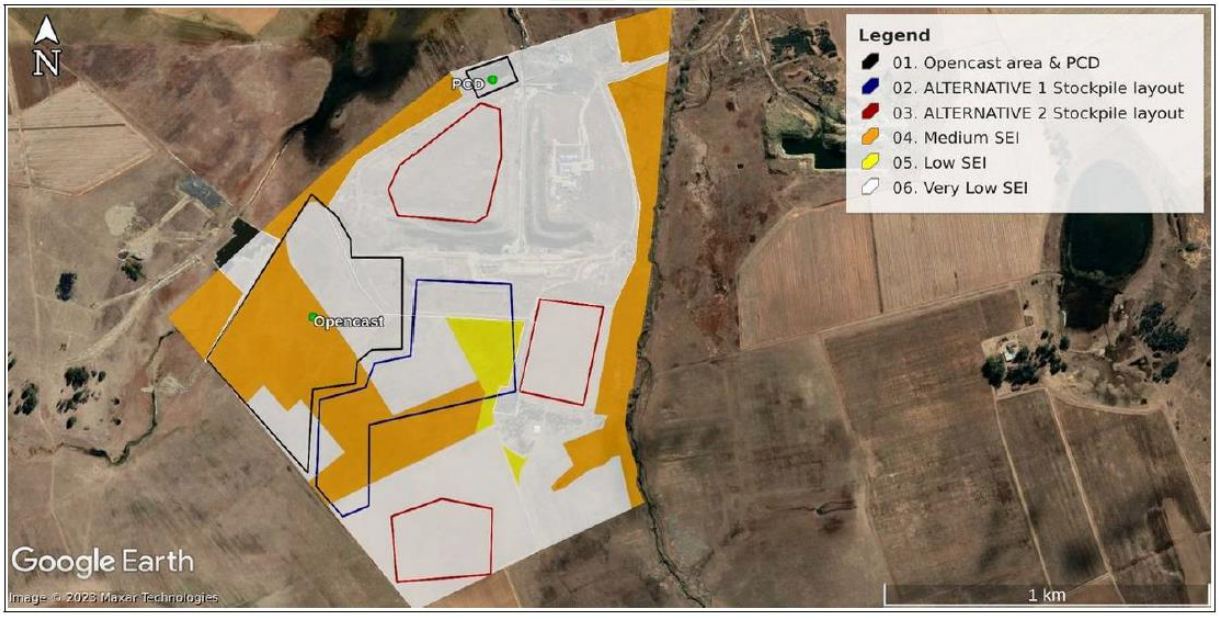



**Figure 3-37: Site Ecological Importance in terms of SCCs**

The potentially more significant impacts (medium-low to medium impact significance) assessed in this report include:

- Loss of fauna habitat and the associated productivity of to terrestrial fauna.
- Increased faunal alien invasive species.
- Loss of Freshwater ESAs and impairment of ecological corridors.
- Destruction of TOP species.
- Contamination of fauna environment through use and storage of hazardous substances, littering and dumping of waste or sewage leaks.

## Terrestrial Vegetation And Plant Species Assessment

Dimela Eco Consulting was appointed to undertake the vegetation assessment to inform the environmental authorisation for the proposed mining operation. The following information pertaining to the site is relevant as detailed by the National Web based Environmental Screening Tool downloaded on the 09/11/2022:

- The site is classified as 'very high terrestrial biodiversity sensitivity'. The mine site falls within a Vulnerable ecosystem, Protected Areas Expansion Strategy areas, and a Critical Biodiversity Area (CBA) is adjacent to the site.
- The site is also classified as "medium sensitivity for plant species", indicating that the site includes suitable habitat for plant species of conservation concern. The screening tool lists six (6) species that can possibly occur on or near the site.

An alternative layout was proposed after the reporting for the initial layout of the project was concluded. The initial layout (Alternative 1) comprised an open cast on the south-western corner, with the hard dump, soft dump, and topsoil dump directly east thereof. However, these areas were found to be sensitive in terms of vegetation and wetlands. The Alternative 2 layout proposes to move the three dumps to cultivated land and historically mined areas.

The proposed open cast of Alternative 1 and 2, as well as the soft-, hard-, and topsoil dumps of Alternative 1, will destroy moist grasslands that is wedged between an historic open cast in the north and maize fields to the east and south. It is also likely that mining will be taking place to the west of the site.

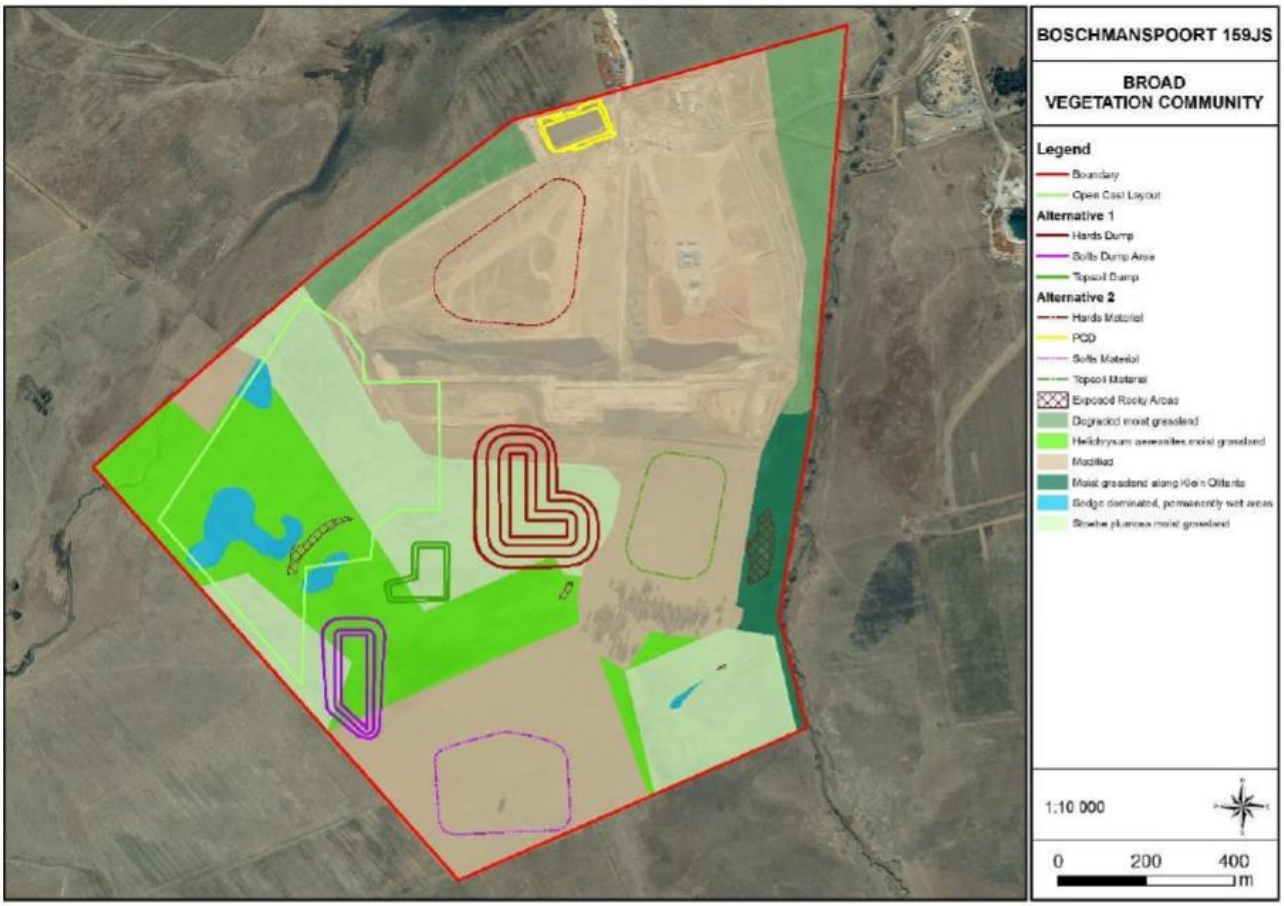



Figure 3-38: Vegetation groups on the site

## Biodiversity (vegetation) results

The site falls in an area that is listed by the National Screening Tool as being of 'High' terrestrial biodiversity. However, this assessment delineated three sensitivity classes on the site.

**Low:** Most of the vegetation within the site boundary was modified, including historical mining, infrastructure, and maize fields. The vegetation in such modified areas were classified as being of low sensitivity to the proposed mining operations.

**Medium:** Historically ploughed land were in a secondary state and dominated by the encroacher Stoebe plumosa. The grassland included moist elements and was likely too wet to cultivate again. Nevertheless, the vegetation does not support the species diversity of the Endangered Eastern Highveld Grassland and the species diversity was low. However, the presence of a Vulnerable plant species in the Stoebe plumosa moist grasslands, increased the Site Ecological Importance (SEI). There is also a possibility that other sensitive species may occur.

**High:** The site also included extensive moist grasslands in a natural to semi-natural state. The moist grasslands supported several species, although the species diversity was lower than expected, likely due to the moist, clayey soils, and historic ploughing and grazing. The vegetation was homogenous, bar the permanently wet areas that was dominated by sedges. The vegetation was not considered as being of conservation importance in the Mpumalanga Biodiversity Sector Plan and did not comprise sensitive vegetation groupings. However, the vegetation includes wetlands, that are protected by national legislation and is highly likely to support the vulnerable species recorded in the Stoebe plumosa moist grassland.

The open cast footprint for both Alternatives are the same and will impact on the high and medium sensitivity classes as discussed above, including the confirmed locality of the Vulnerable plant species. However, Alternative 2 will have the least direct impact on remaining natural vegetation as all three dumps are proposed within low sensitivity, modified vegetation.

On the contrary, the dumps of Alternative 1 will impact on about 2.26ha of high sensitivity and 6.57ha of medium sensitivity directly. When comparing the direct impacts of the Alternative layouts, Alternative 2 is preferred. However, for Alternative 2 to be feasible from a vegetation perspective, access roads and edge effects must also be confined to the low sensitivity vegetation.

Although some operational impacts can be mitigated, the destruction of good condition grassland vegetation in the open cast footprint for both Alternatives can not be mitigated as grassland vegetation is difficult, if not impossible, to rehabilitate.

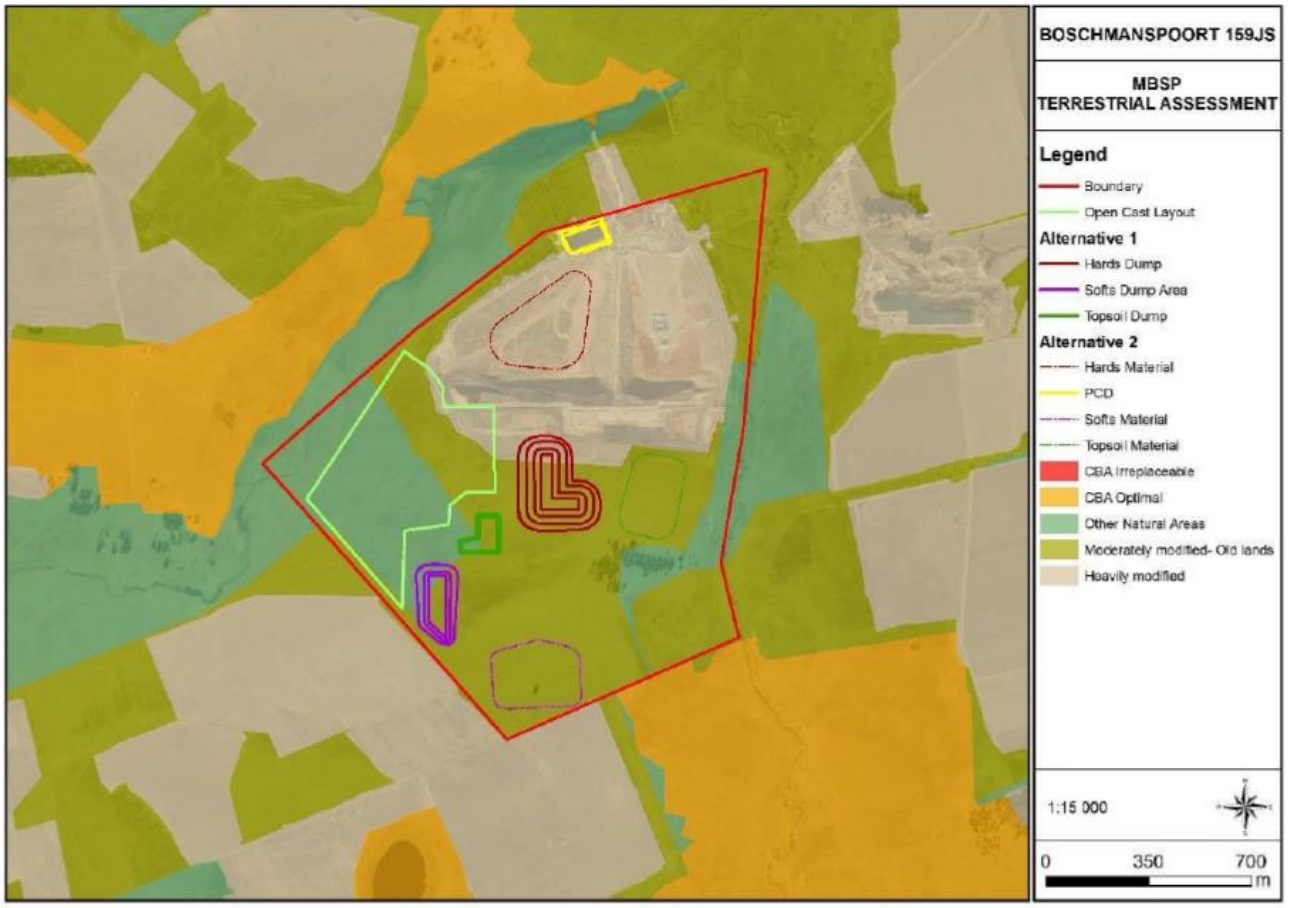



**Figure 3-39: Mpumalanga Biodiversity Sector Plan Map**

### Sensitive plant species site inspection results

The site is classified by Screening Tool as “medium sensitivity for plant species”, indicating that the site includes suitable habitat for plant species of conservation concern. The screening tool lists six (6) species that can possibly occur on or near the site. Of these species, one (1) is classified as Endangered, three (3) as Vulnerable and two (2) was historically listed as Declining. Declining species were reassessed to Least Concern or are currently listed as Data Deficient. The numbers of these plants are still decreasing and therefor it is listed here as best practise.

Suitable habitat is present on the site for most of the species listed that are associated with moist grasslands. At the time of the site visit on 18 November 2022, one (1) Vulnerable plant species was confirmed to occur within the proposed open cast footprint. As per the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species (Government Gazette 43855 30 October 2020), the presence of suitable habitat and the confirmed occurrence of a sensitive plant species, triggers a Terrestrial Plant Species Specialist Assessment.

Thus, it is recommended that a Terrestrial Plant Species Specialist Assessment is undertaken within the flowering period of this plant (October to November), and a survey for any other species with a medium to high likelihood of being present in late summer.

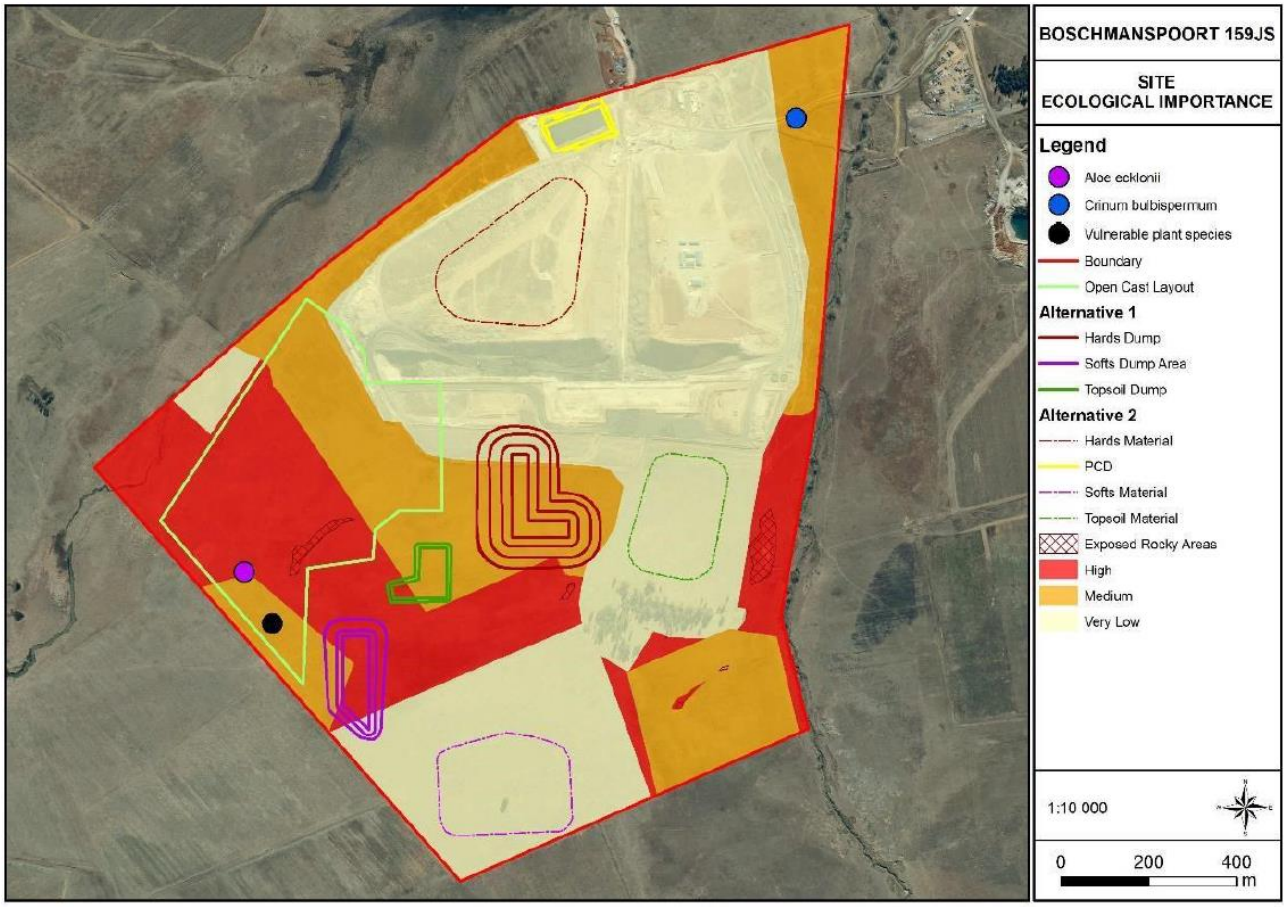



**Figure 3-40: Site Ecological Importance and sensitivity map**

# AIR QUALITY

## Summary of findings

The air quality impact assessment undertaken for the project includes a meteorological overview of the area. An emissions inventory was undertaken with the aim of quantifying emissions associated with the activities involved in the mining of coal. The emissions for specific activities such as bulldozing, blasting, tipping, wind erosion and materials handling activities were calculated, and the cumulative impacts were compared to the relevant ambient air quality standards to determine legal compliance.

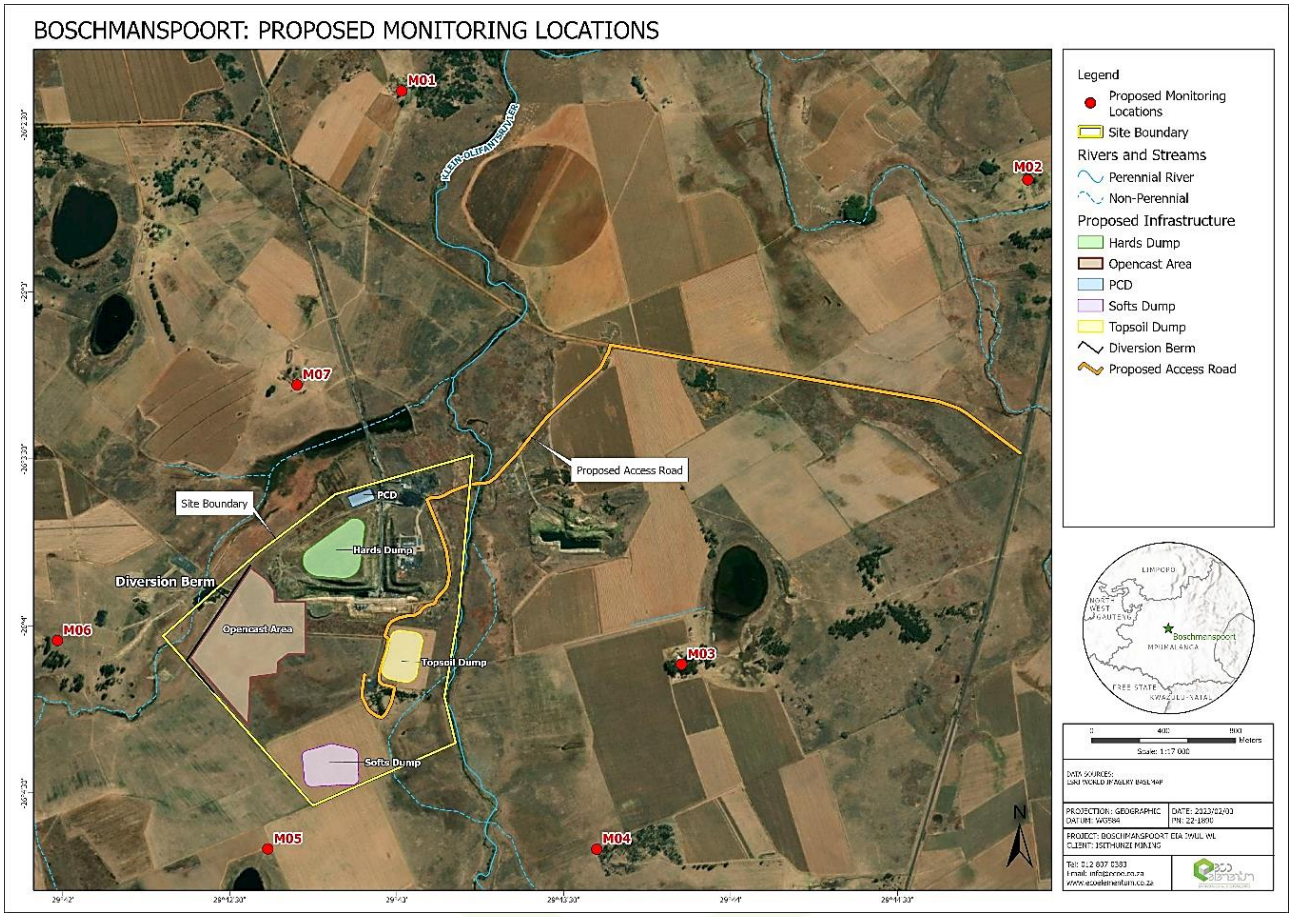



**Figure 3-41: Proposed Monitoring Locations**

The findings reported here is therefore a combination of historical, observed and previously modelled data and provided the background and predicted scenario of various pollutants in the proposed Boschmanspoort project mining area. The construction and operational phases were assessed. Based on the dispersion modelling simulations, the following conclusions can be summarised as follows:

## PM10

For the unmitigated Daily PM10 concentrations it was predicted to be higher than the 75 µg/m³ limit for all 17 of the sensitive receptors.

When comparing the Daily Mitigated PM10 modelled concentrations, the sensitive receptors exceeding the 75 µg/m³ limit dropped to 0 of the identified sensitive receptors. This as well is the highest levels predicted for a 24 hour period within the period. Due to site specific atmospheric conditions these exceedances may still occur within the limit of 4 per year.

The annual average PM10 limit of 40 µg/m³ are predicted to exceed at 3 of the sensitive receptors for the unmitigated scenario and dropping to 0 for the mitigated scenario.

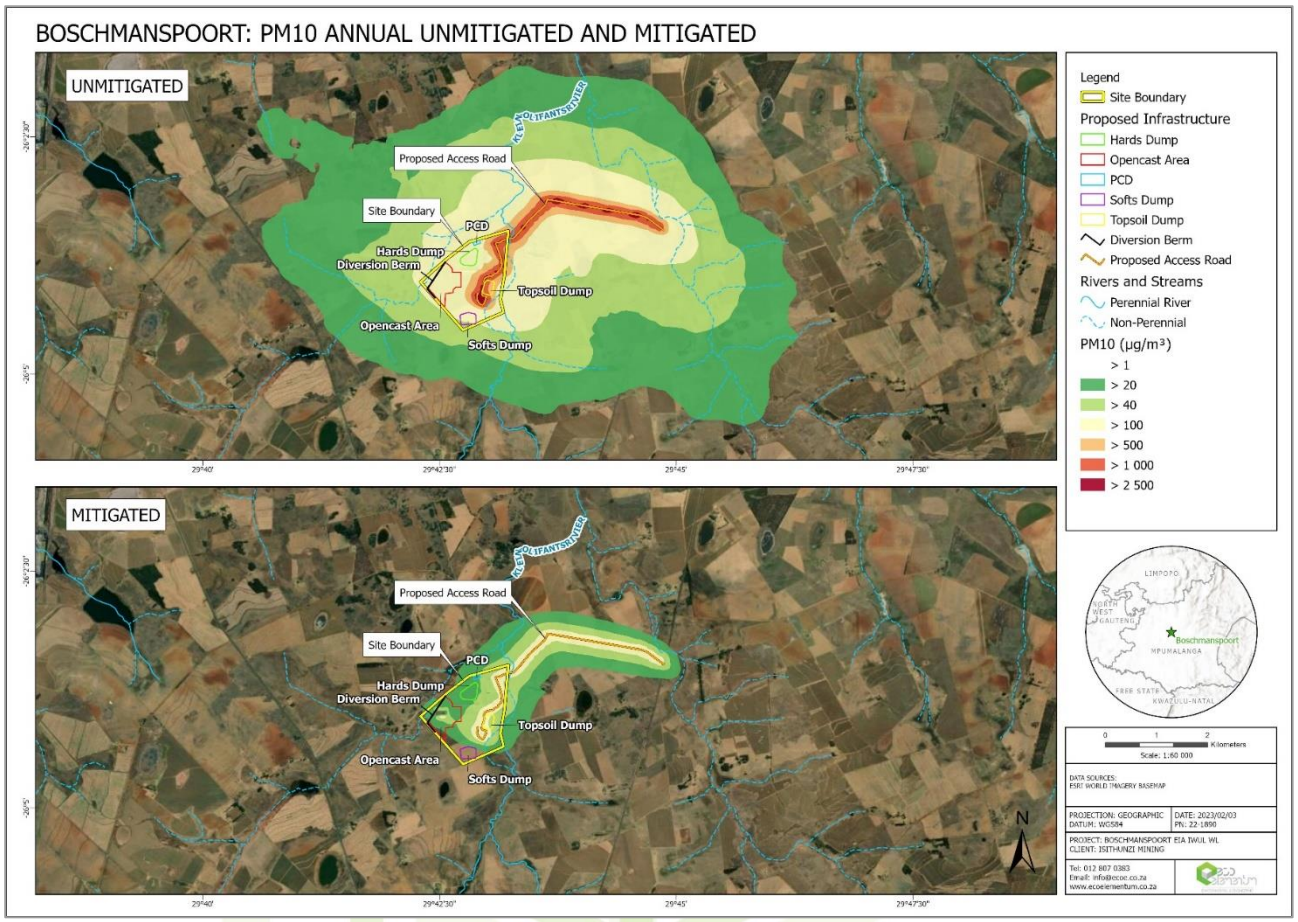



**Figure 3-42: Predicted average annual concentrations for PM10 for the proposed Boschmanspoort project.**

## TSP

In the unmitigated and mitigated scenarios, no sensitive receptors are predicted to exceed the monthly dust fallout for the highest month residential limit of 600 mg/m²/day.

The predicted annual dust fall out for the unmitigated and mitigated scenarios are not predicted to exceed the annual limit of 300 mg/m²/day at any of the sensitive receptors.

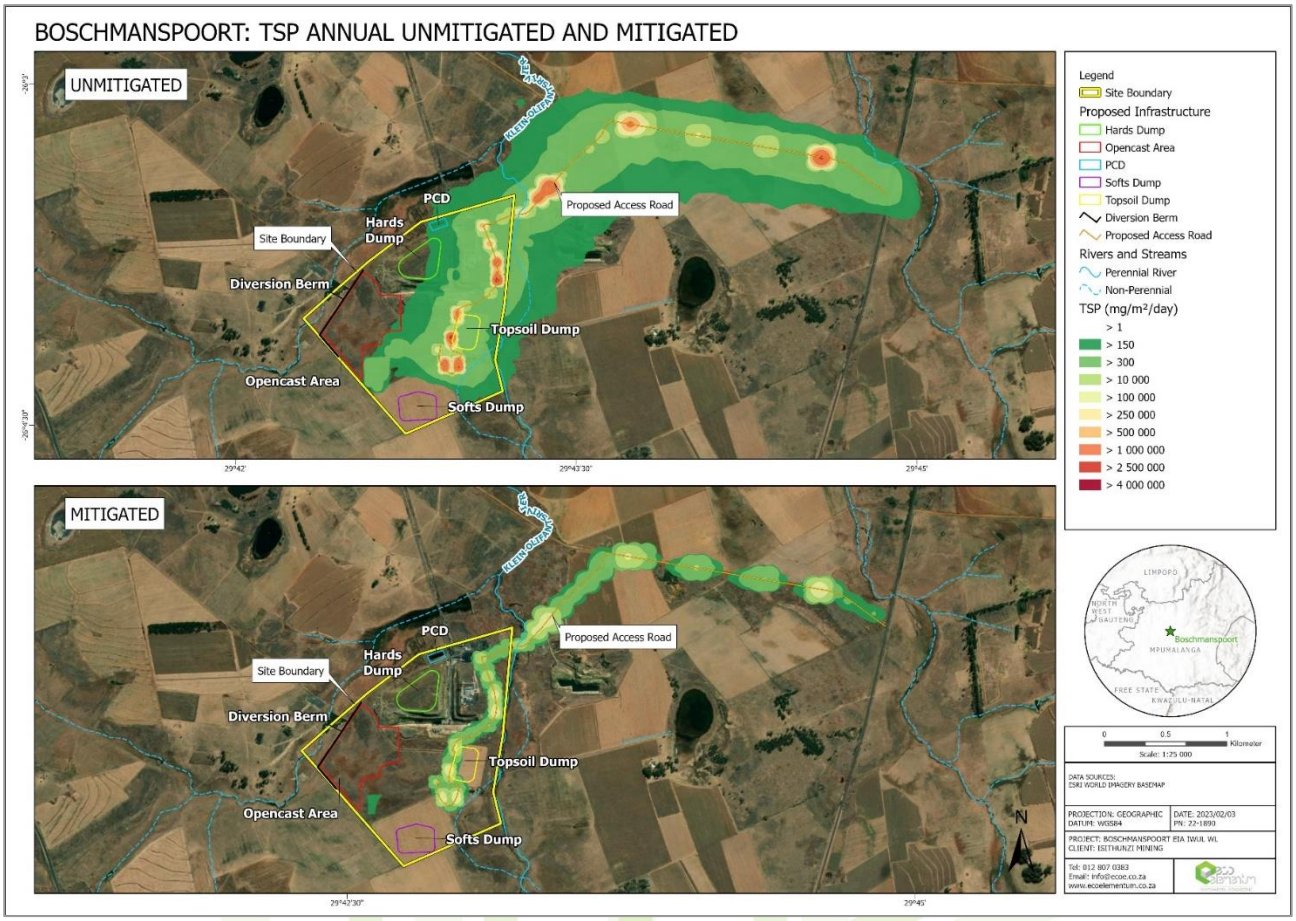



**Figure 3-43: Predicted average annual deposition for TSP for the proposed Boschmanspoort project operations.**

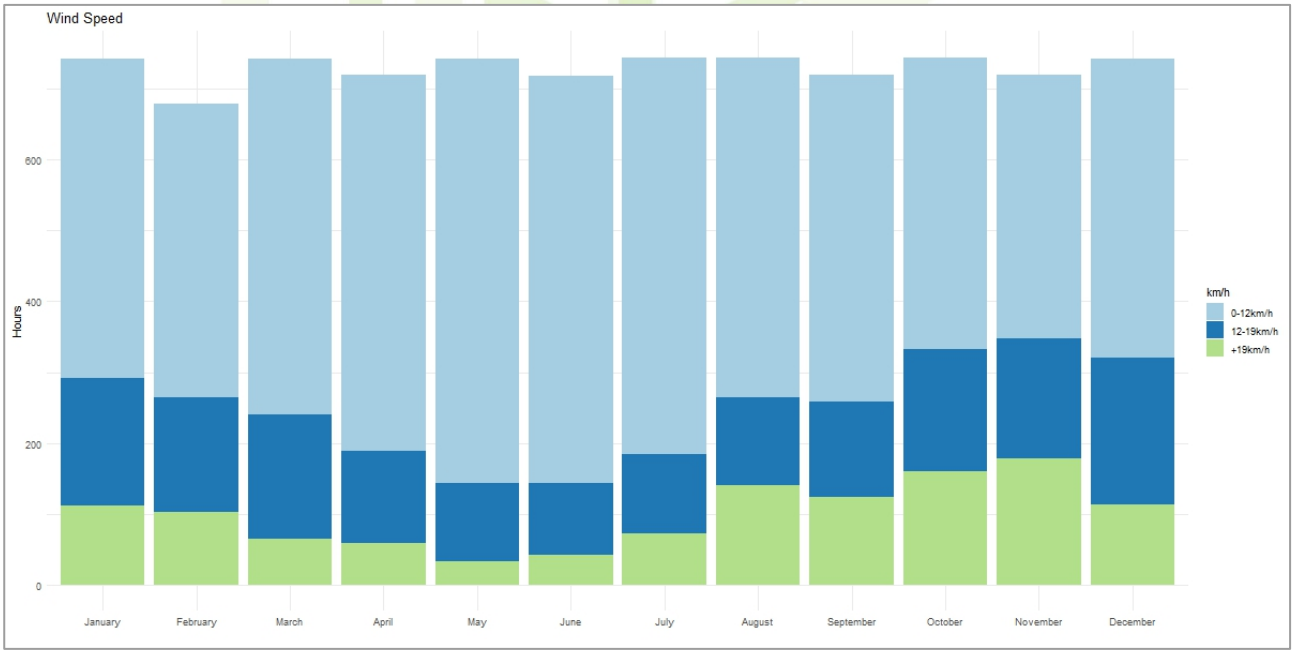



**Figure 3-44: Wind Class Frequency Distribution per month.**

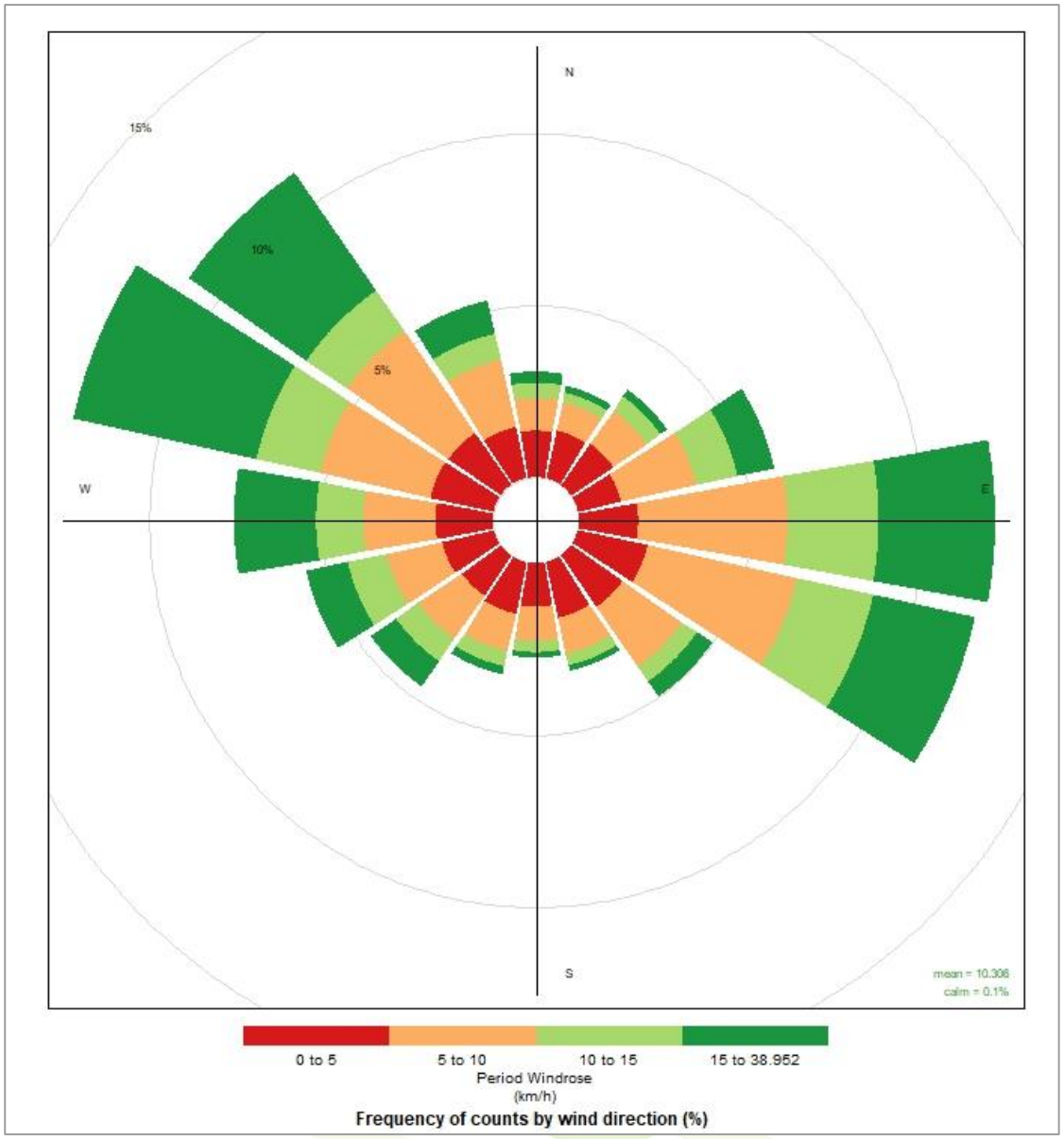



**Figure 3-45: WRF 10 km simulation model wind rose for the proposed Boschmanspoort project area for the period 2019 to 2021.**

Modelling was performed using Soundplan software.

The table below shows the predicted noise levels at the various identified sensitive receptors for the preferred scenario.

None of the identified sensitive receptors are predicted to be above the Night-time limit of the SANS 10103:2008 night-time limit for rural districts of 45 db. It should however be noted that due to site specific environmental and meteorological conditions these may still fall within the allowed standards.

Day-time predicted noises level fall within the allowed 35 dB SANS 10103:2008 day-time limit for identified sensitive receptors.

**Table 3-14: Predicted noise levels at the sensitive receptors due to the Preferred scenario operations**

| No. | Receiver name | Coordinates | | Limit | | Level | |
|---|---|---|---|---|---|---|---|
| | | X | Y | Day | Night | Day | Night |
| | | UTM35S | | dB(A) | | dB(A) | |
| 1 | 1 | 771871.92 | 7117086.2 | 45 | 35 | -1 | -1.9 |
| 2 | 2 | 774716.36 | 7117596.36 | 45 | 35 | -10.9 | -11.5 |
| 3 | 3 | 775009.25 | 7116518.59 | 45 | 35 | -4.7 | -5.2 |
| 4 | 4 | 773205.76 | 7113858.5 | 45 | 35 | 6.6 | 5.4 |
| 5 | 5 | 774055.93 | 7109718.89 | 45 | 35 | -8.5 | -9.6 |
| 6 | 6 | 772329.24 | 7110272.64 | 45 | 35 | -3.2 | -4.2 |
| 7 | 7 | 772004.29 | 7109848.67 | 45 | 35 | -4.5 | -5.4 |
| 8 | 8 | 770863.89 | 7110732.5 | 45 | 35 | -0.6 | -1.7 |
| 9 | 9 | 770237.08 | 7111257.55 | 45 | 35 | 1.2 | 0 |
| 10 | 10 | 770078.81 | 7111883.2 | 45 | 35 | 4 | 2.8 |
| 11 | 11 | 769393.34 | 7111297.15 | 45 | 35 | -0.7 | -1.8 |
| 12 | 12 | 769354.54 | 7111896.17 | 45 | 35 | 1.5 | 0.3 |
| 13 | 13 | 768835.59 | 7111437.21 | 45 | 35 | -1.9 | -2.9 |
| 14 | 14 | 768325.96 | 7113271.23 | 45 | 35 | 0.1 | -0.9 |
| 15 | 15 | 767849.7 | 7112999 | 45 | 35 | -2.3 | -3.2 |
| 16 | 16 | 769707.91 | 7114281.74 | 45 | 35 | 8.4 | 7.3 |
| 17 | 17 | 771871.92 | 7117086.2 | 45 | 35 | -1 | -1.9 |

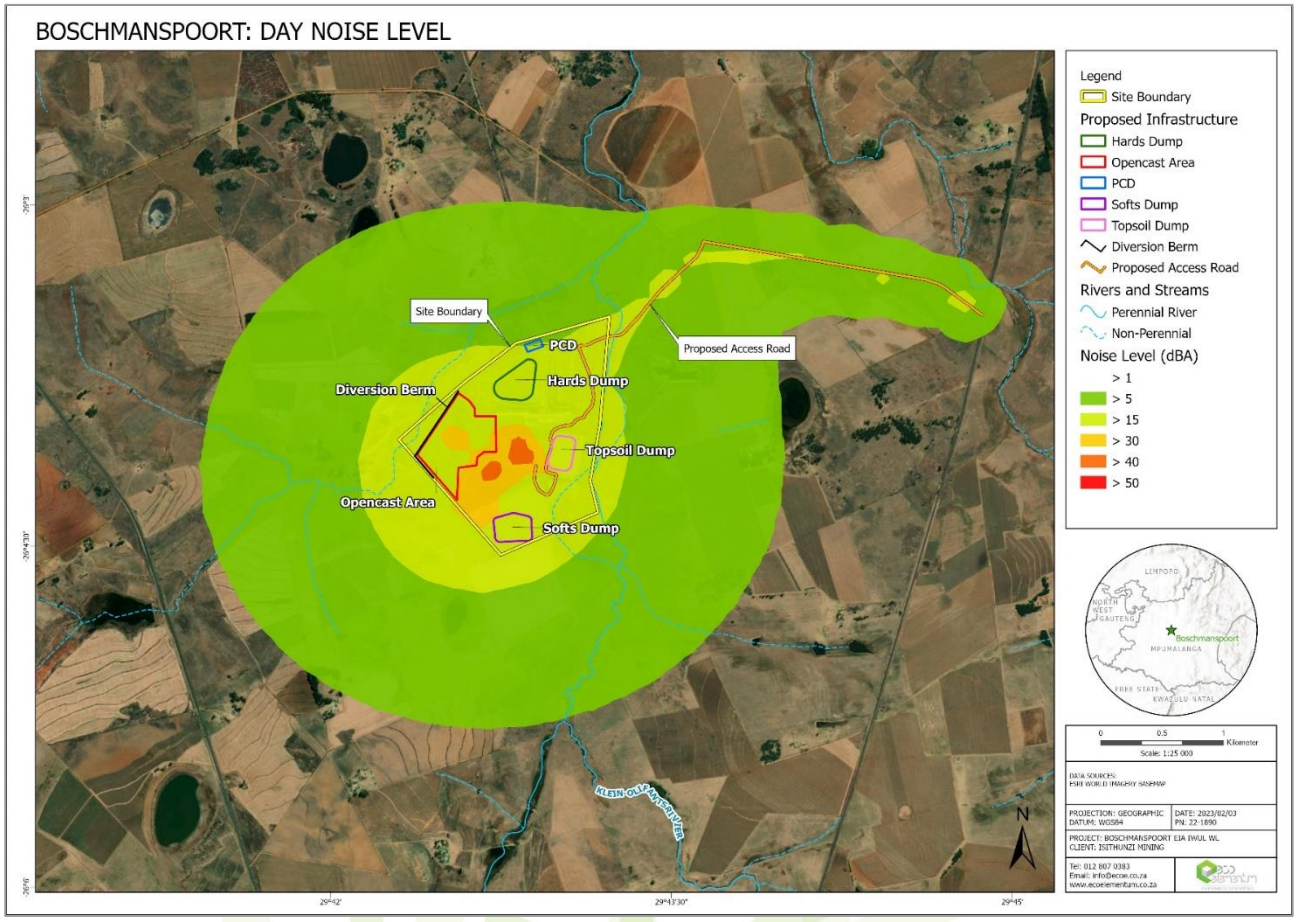



**Figure 3-46: Predicted noise results for the proposed Boschmanspoort project.**

Through the implementation of the management and mitigation measures and continuous compliance monitoring the potential impact of the Boschmanspoort development on the receiving environment can be lowered, and mitigated to an extent where the significance will be acceptable and within the tolerable level. It can therefore be concluded that the proposed project could go forward without a detrimental impact on the environment given the implementation of the management, mitigation and monitoring measures as presented throughout this report.

## BLASTING & VIBRATION ASSESSMENT

Blasting operations have effect to its surroundings. These effects can manifest in the form of ground vibration, air blast, fumes, fly rock etc. The application of explosives breaking rock will always have a positive and negative manifestation of different energies. It is the effects that have negative outcome that we concentrate on and that will need to be managed.

This section contains the assessment of ground and air vibrations and gives the applicable limits which forms part of the baseline assessment for blasting. Once mining commences a proper operational blast design and code of practice must be compiled, implemented, monitored, evaluated and improved.

### Ground Vibration Assessment

In the opencast mining environment explosives are used to break rock into smaller loads and haulable fragments through the shockwaves and gases generated from the explosion. Ground vibration is a natural result from blasting activities. The

far field vibrations (those vibrations felt further away from the blast area) are inevitable, but undesirable by-products of blasting operations. The shockwave energy that travels beyond the zone of rock breakage is wasted and could cause damage and annoyance further on. The magnitude of the shockwave is determined by the following factors (Rangasamy, 2018):

- The charge mass per delay,
- The delay period,
- Distance from the blast,
- Rock mass and
- Geometry of the blast.

The factors influencing ground vibrations that can be controlled by a planned design and proper blast preparation, are as follows (Rangasamy, 2018):

- The larger the charge mass per delay the greater the vibration energy yielded. When a number of holes are detonating simultaneously the maximum total explosive mass per such delay will have the greatest influence on the amount of ground vibrations. In practice, this means that if all holes are detonated individually, the weight of explosives per single hole is considered as opposed to the entire mass if multiple holes are detonated. Therefore, if more than one hole is detonated simultaneously, the mass per hole for each hole must be added up. Specifically, charges detonated within 15 milliseconds are considered as a single detonation, and delays of more than 15 milliseconds are treated as separate blasts.
- The distance between the blast and the point of interest. The ground vibrations weaken over distance at a rate determined by the mass per delay, timing and geology. Each geological interface (slips, joints, discontinuity planes, etc.) that a shockwave encounters will reduce the vibration energy, due to reflections of the shockwave. In rock such as sedimentary or laminated material with high laminations and with multiple bedding planes the shockwave transfer will be limited.
- The geology of the blast medium and surroundings also influences the magnitude of vibrations. High density materials have high shockwave transferability, whereas low density materials have lower transferability of the shockwave. For example, when comparing coal (density of 14-16 kN/m3) and granite (26 to 27kN/m3), granite will be the better conductor of the shockwave.

## Air Blast Assessment

Air blast represents an undesirable and unavoidable output of the blasting technique. Air blasts can also be referred to as ‘air – overpressure’. The air blast damage and annoyance can be influenced by various different factors such as the blast design itself, the weather, field characteristics and human response (Aloui et al, 2016). An air blast disturbance propagates as a compression wave in the air.

Air blasts are often confused with sound that is within an auditable range. According to Thompson (2005), air blasts are the cause of most complaints regarding blasting since the public apt to confuse air blasts and ground vibrations with one another. Aloui et al (2016) indicates that the audible part of an air blast is characterized by higher frequencies from 20 to 20 000Hz whilst the sub-audible part of the air blast has low frequencies of below 20 Hz. *The audible part of an air blast is called noise* whilst the frequencies below 20 Hz is called as concussion and classified as *“over pressure” when the air blast pressure exceeds atmospheric pressure*. It is the over pressure that exerts a force on structures and in turn causes a secondary and audible rattle within a structure.

Since air blasts damage and annoyance can be influenced by various different factors, it is recommended that a well-balanced conceptual design be generated as to not generate significant air blast. Controls such as the following should be considered during the design process (Thompson 2005):

- Cover all detonating cord or use noiseless shock tube or electric trunk lines.
- Limit explosives per delay
- Blasting should not be conducted early in the morning because of temperature inversion
- Blasting should not be conducted when the wind is very strong
- Blast ideally at peak noise time
- Avoid short collars and fill blast holes with enough stemming.

Dimela Eco Consulting was appointed to undertake the vegetation assessment to inform the environmental authorisation for the proposed mining operation. The following information pertaining to the site is relevant as detailed by the National Web based Environmental Screening Tool downloaded on the 09/11/2022:

- The site is classified as 'very high terrestrial biodiversity sensitivity'. The mine site falls within a Vulnerable ecosystem, Protected Areas Expansion Strategy areas, and a Critical Biodiversity Area (CBA) is adjacent to the site.
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An alternative layout was proposed after the reporting for the initial layout of the project was concluded. The initial layout (Alternative 1) comprised an open cast on the south-western corner, with the hard dump, soft dump, and topsoil dump directly east thereof. However, these areas were found to be sensitive in terms of vegetation and wetlands. The Alternative 2 layout proposes to move the three dumps to cultivated land and historically mined areas.

The proposed open cast of Alternative 1 and 2, as well as the soft-, hard-, and topsoil dumps of Alternative 1, will destroy moist grasslands that is wedged between an historic open cast in the north and maize fields to the east and south. It is also likely that mining will be taking place to the west of the site

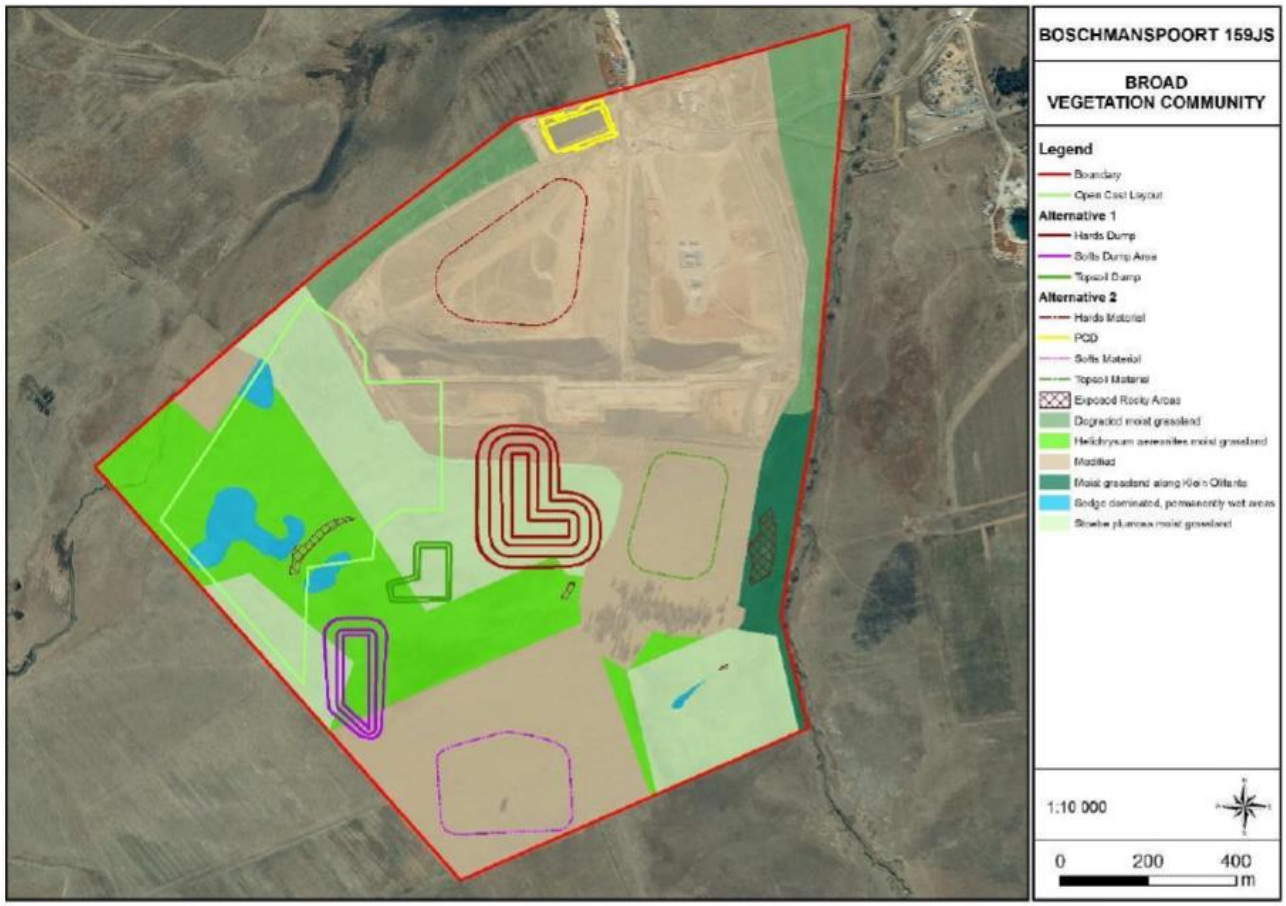


**Figure 3-47: Vegetation groups on the site**

### *Biodiversity (vegetation) results*

The site falls in an area that is listed by the National Screening Tool as being of 'High' terrestrial biodiversity. However, this assessment delineated three sensitivity classes on the site.

**Low:** Most of the vegetation within the site boundary was modified, including historical mining, infrastructure, and maize fields. The vegetation in such modified areas were classified as being of low sensitivity to the proposed mining operations.

**Medium:** Historically ploughed land were in a secondary state and dominated by the encroacher *Stoebe plumosa*. The grassland included moist elements and was likely too wet to cultivate again. Nevertheless, the vegetation does not support the species diversity of the Endangered Eastern Highveld Grassland and the species diversity was low. However, the presence of a Vulnerable plant species in the Stoebe plumosa moist grasslands, increased the Site Ecological Importance (SEI). There is also a possibility that other sensitive species may occur.

**High:** The site also included extensive moist grasslands in a natural to semi-natural state. The moist grasslands supported several species, although the species diversity was lower than expected, likely due to the moist, clayey soils, and historic ploughing and grazing. The vegetation was homogenous, bar the permanently wet areas that was dominated by sedges. The vegetation was not considered as being of conservation importance in the Mpumalanga Biodiversity Sector Plan and did not comprise sensitive vegetation groupings. However, the vegetation includes wetlands, that are protected by national legislation and is highly likely to support the vulnerable species recorded in the Stoebe plumosa moist grassland.

The open cast footprint for both Alternatives are the same and will impact on the high and medium sensitivity classes as discussed above, including the confirmed locality of the Vulnerable plant species. However, Alternative 2 will have the least

direct impact on remaining natural vegetation as all three dumps are proposed within low sensitivity, modified vegetation. On the contrary, the dumps of Alternative 1 will impact on about 2.26ha of high sensitivity and 6.57ha of medium sensitivity directly. When comparing the direct impacts of the Alternative layouts, Alternative 2 is preferred. However, for Alternative 2 to be feasible from a vegetation perspective, access roads and edge effects must also be confined to the low sensitivity vegetation.

Although some operational impacts can be mitigated, the destruction of good condition grassland vegetation in the open cast footprint for both Alternatives can not be mitigated as grassland vegetation is difficult, if not impossible, to rehabilitate.

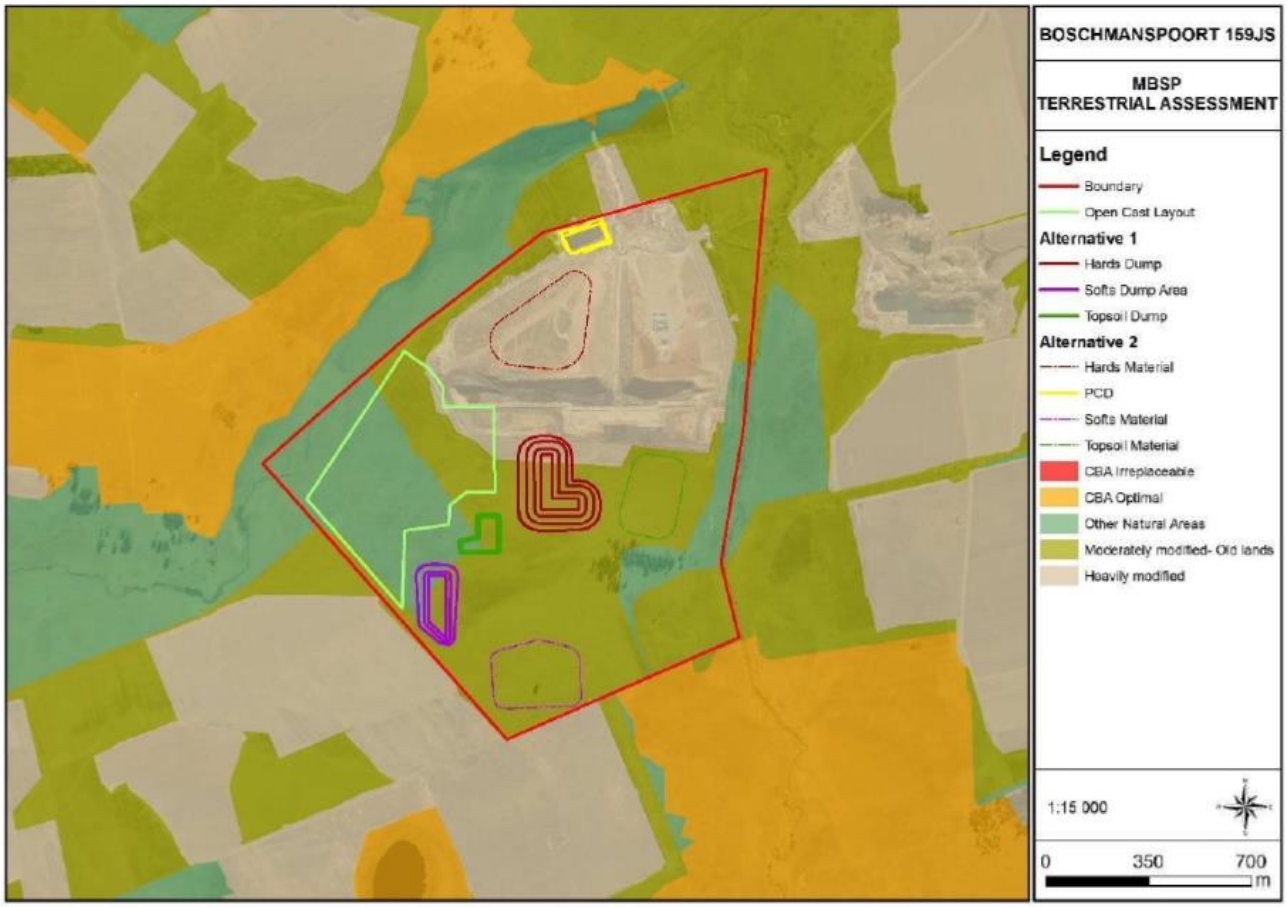


**Figure 3-48: Mpumalanga Biodiversity Sector Plan Map**

### *Sensitive plant species site inspection results*

The site is classified by Screening Tool as "**medium sensitivity for plant species**", indicating that the site includes suitable habitat for plant species of conservation concern. The screening tool lists six (6) species that can possibly occur on or near the site. Of these species, one (1) is classified as Endangered, three (3) as Vulnerable and two (2) was historically listed as Declining. Declining species were reassessed to Least Concern or are currently listed as Data Deficient. The numbers of these plants are still decreasing and therefor it is listed here as best practise.

Suitable habitat is present on the site for most of the species listed that are associated with moist grasslands. At the time of the site visit on 18 November 2022, one (1) Vulnerable plant species was confirmed to occur within the proposed open cast footprint. As per the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species (Government Gazette 43855 30 October 2020), the presence of suitable habitat and the confirmed occurrence of a sensitive plant species, triggers a Terrestrial Plant Species Specialist Assessment.

Thus, it is recommended that a Terrestrial Plant Species Specialist Assessment is undertaken within the flowering period of this plant (October to November), and a survey for any other species with a medium to high likelihood of being present in late summer.

Furthermore, it is recommended that Search and Rescue be conducted before commencement of site clearance activities to identify any fauna and flora species of importance.

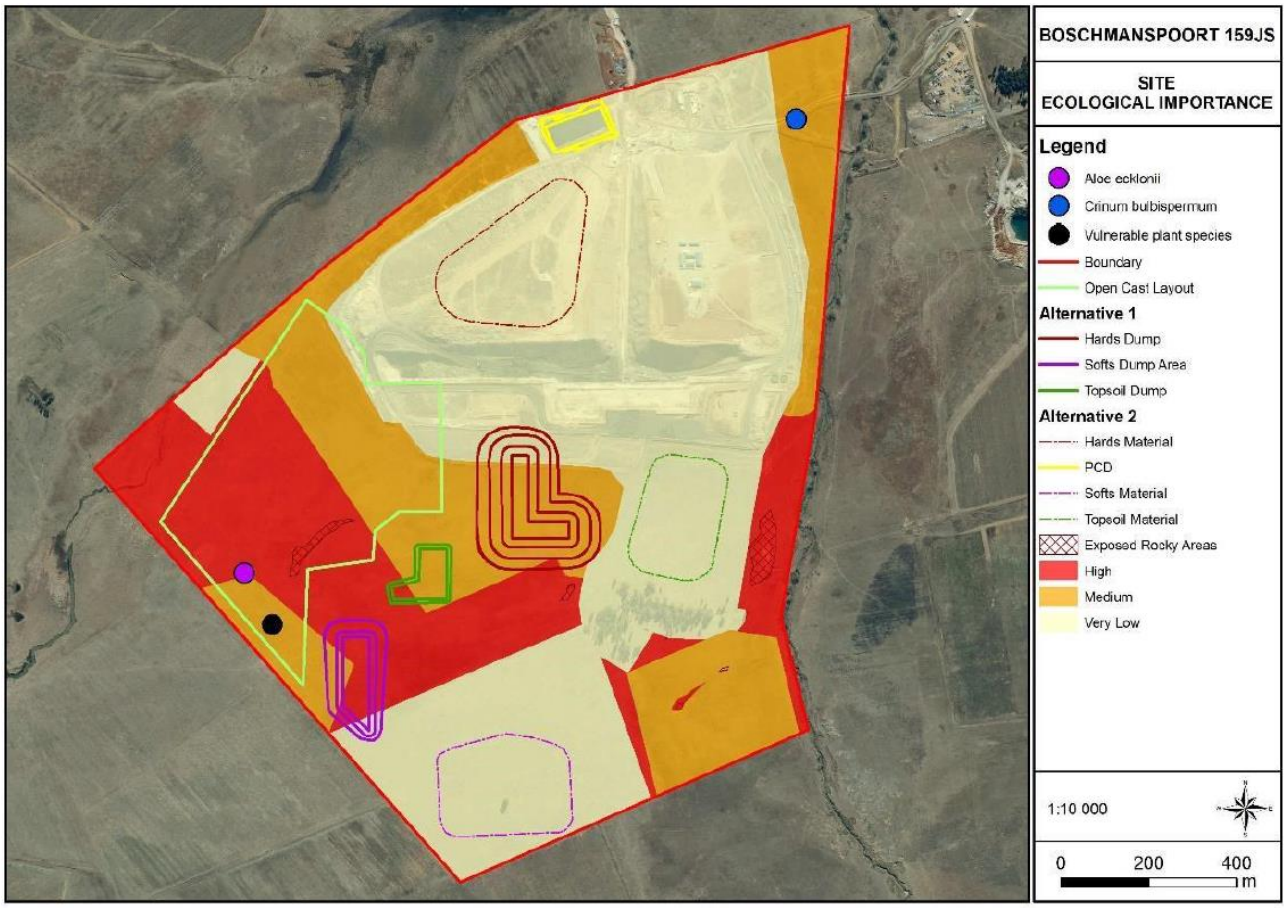


**Figure 3-49: Site Ecological Importance and sensitivity map**

## SOCIAL

The proposed Project is located in Steve Tshwete Local Municipality (ELM), within the Nkangala District Municipality (NDM) in Mpumalanga Province. The socio-economic characteristics of the population within each of the aforementioned areas are listed below.

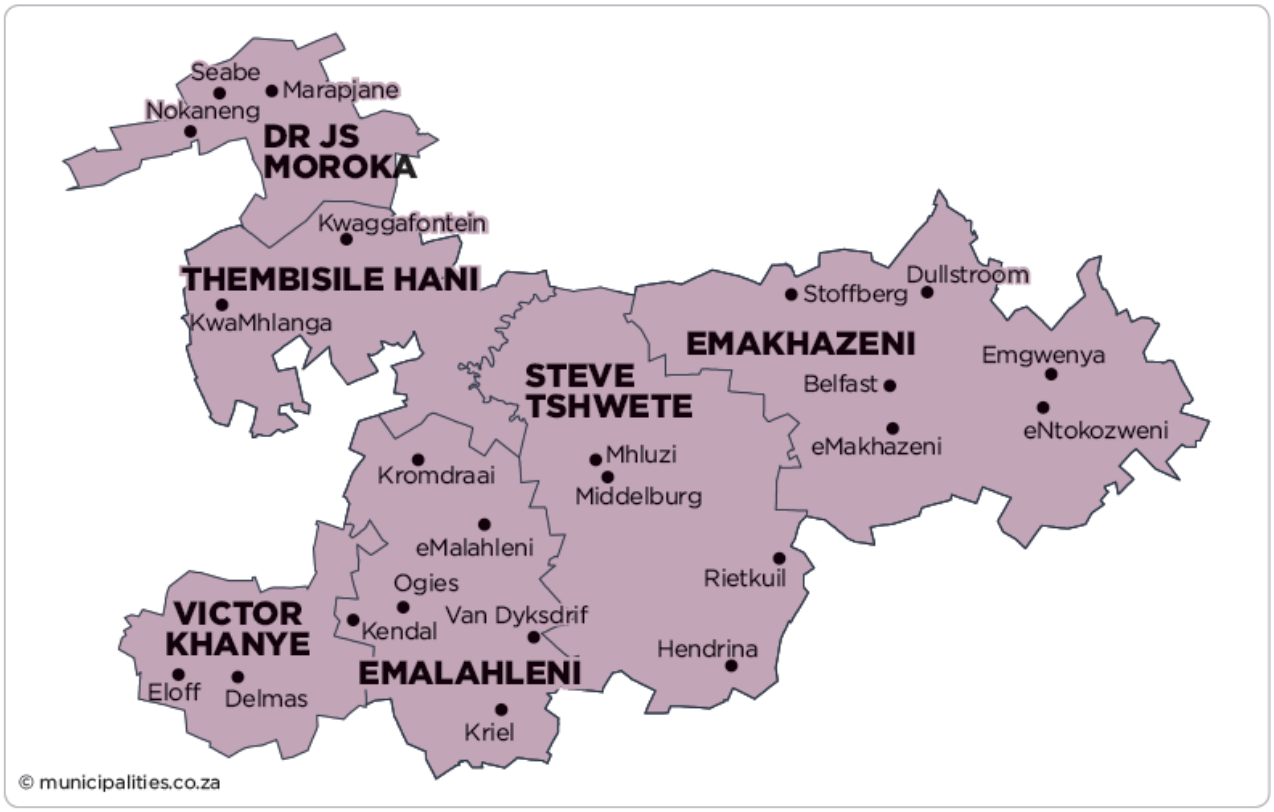


**Figure 3-50: Nkangala District and Local Municipalities Map**

### Population and Demographics

According to the STLM 2022/23 IDP, Stats SA 2016, recorded a population of 278,749 people for the STLM. This makes STLM the 7th largest population in the province, accounting for 19.3% of Nkangala's total population. The municipality recorded a population growth rate of 4.4% per annum (highest in the province) between 2011 & 2016. The area's increase in population is attributed to the number of industries which opened in the past years, attracting workers into Middleburg. The STLM has a youthful population pyramid which is slightly skewed towards the male population, with 52.4% of the population being male. The Youth population (15 – 34 years) make up 40.7% of the total population.

The number of households in Steve Tshwete increased from 64,971 in 2011 to 86,713 households (almost 22,000 households increase) in 2016 - represents 20.6% of the Nkangala household figure - household size declining from 3.5 to 3.2 in the same period. In 2016, there were 86,713 households in the STLM, with an average household size of 3.2 people. This is a relatively low family size, which may reflect the young age of the urban centres in the district, in which large family structures have not had time to develop. More established towns generally have average family sizes in excess of 4.5 people, while rural areas often average 5.5 people or more per household.

## Educational Status

Educational achievement is a key development indicator of a population. STLM has the 2nd highest matric pass rate in the Mpumalanga province, with the majority of the population, (ages over twenty), having completed high school level education. The municipality's functional literacy has been noted to be improving and it is the 2nd highest in the province.

## Employment and Labour

Although significant, at 23.1%, statistics show that STLM has the lowest unemployment rates in the Mpumalanga Province. Steve Tshwete contributed 10.3% to total employment in the province. In 2020, the youth population's expanded unemployment rate was 34.4%. There is concern about the high share of unemployed youth and especially females. Although the municipality has a relatively good education status, there is a mismatch in the demand of the labour market.

A large portion of those employed are absorbed into the mining, manufacturing, community services and finance sectors. STLM contributed 13.3% to Mpumalanga Province's economy during 2022, this was the 3rd largest economy in the province. In 2020, the largest industries were mining, manufacturing, community services and finance. Together these four contributed 72.9% to the Steve Tshwete economy. Steve Tshwete holds comparative advantages in agriculture, mining, manufacturing and utilities.

## Annual Household Income

It was reported by StatsSA that approximately 13% of the population in STLM have no annual income. Most of the population (17%) received an average income of R38,201 - R76,4000. According to the STLM 2022/23 IDP, the average annual household income increased from R55,369 per annum in 2001 to R134,026 per annum in 2011. This represents an absolute increase in nominal terms over the 10 year period, which was the highest among the eighteen local municipalities in the province. This is closely related to its higher education levels and employment rates.

## Social Infrastructure and Services

Approximately 89% of the STLM is categorised as an urban area, while 11% is categorised as a Farm area. A large percentage of households in the local study area have access to piped water either inside their house, or within a communal yard, with an average of 90.7% having access to municipal water, whilst 4.8% have access to water through a borehole. The 2011 Census of the municipality also found that 62.2% of the STLM households have access to piped water inside their dwellings, while 23.5% of the household have access to piped water in their yard.

In terms of sanitation, data from the 2011 census show that an estimated 84% of households in the local study area have access to waterborne sewer services (flush toilets, with or without septic tanks). An estimated 85% of waste generated within the STLM is collected weekly by the local municipality. Of the households in local study area, 82 % use electricity for cooking, 63% for heating and 90.8% for lighting. The majority of the population (41.6%) rent their dwellings and 32.1% own their dwellings which are full paid off.

One of the most important features of the Steve Tshwete LM (STLM) is the fact that the intersection between two national transport corridors, the N4 (Maputo Development Corridor) and the N11 (Middelburg/ Bethal/ Ermelo/ Richards Bay Corridor) is located in the central part of the Municipality at Middelburg Town. Although roads in the STLM are sufficiently connected with district, provincial and national roads, many secondary road systems are in a state of disrepair, being insufficient to handle the increased traffic created by mining and other industrial developments.

Crime and community safety is generally a cause of concern for communities in the local study area. Steve Tshwete ranked 11th (7th highest / worst) in terms of the 17 serious crimes reported. Despite the unfavourable ranking, it recorded an improvement between 2014/15 and 2019/20.

### Health Services

The mining operations in the municipality have resulted in an influx of inhabitants into the area which has put tremendous strain on health facilities. HIV and AIDS is one of the biggest challenges within the health sector of STLM. Fortunately, according to the 2013 Antenatal Care Survey, HIV prevalence rate has decreased from 52%- 43%. This positive change can be attributed to the active Aids Council, vigorous HCT campaigns and community awareness. STLM aims to promote health and primary healthcare in their communities and assisting the communities to adapt to climatic changing conditions, the institution shall ensure functionality of HIV/AIDS Councils within the municipality and ensuring the effectiveness of campaigns on HIV & AIDS.

#### *3.8.1.2 Description of the current land uses.*

When the surrounding environment is considered, the region is associated with crop cultivation and mining activity. Access to the study area is via a local road / haul road turning from the N11 towards Hendrina. On a local scale, the area is associated with cultivated land and a wetland system on the eastern and westerns side. The area comprises of agricultural land, natural veld and a neighbouring coal mine.

#### *3.8.1.3 Description of specific environmental features and infrastructure on the site.*

The study area was previously cultivated, and vegetation has since re-established. The area comprises of agricultural land, natural veld for grazing purposes.

#### *3.8.1.4 Environmental and current land use map.*

(Show all environmental and current land use features)

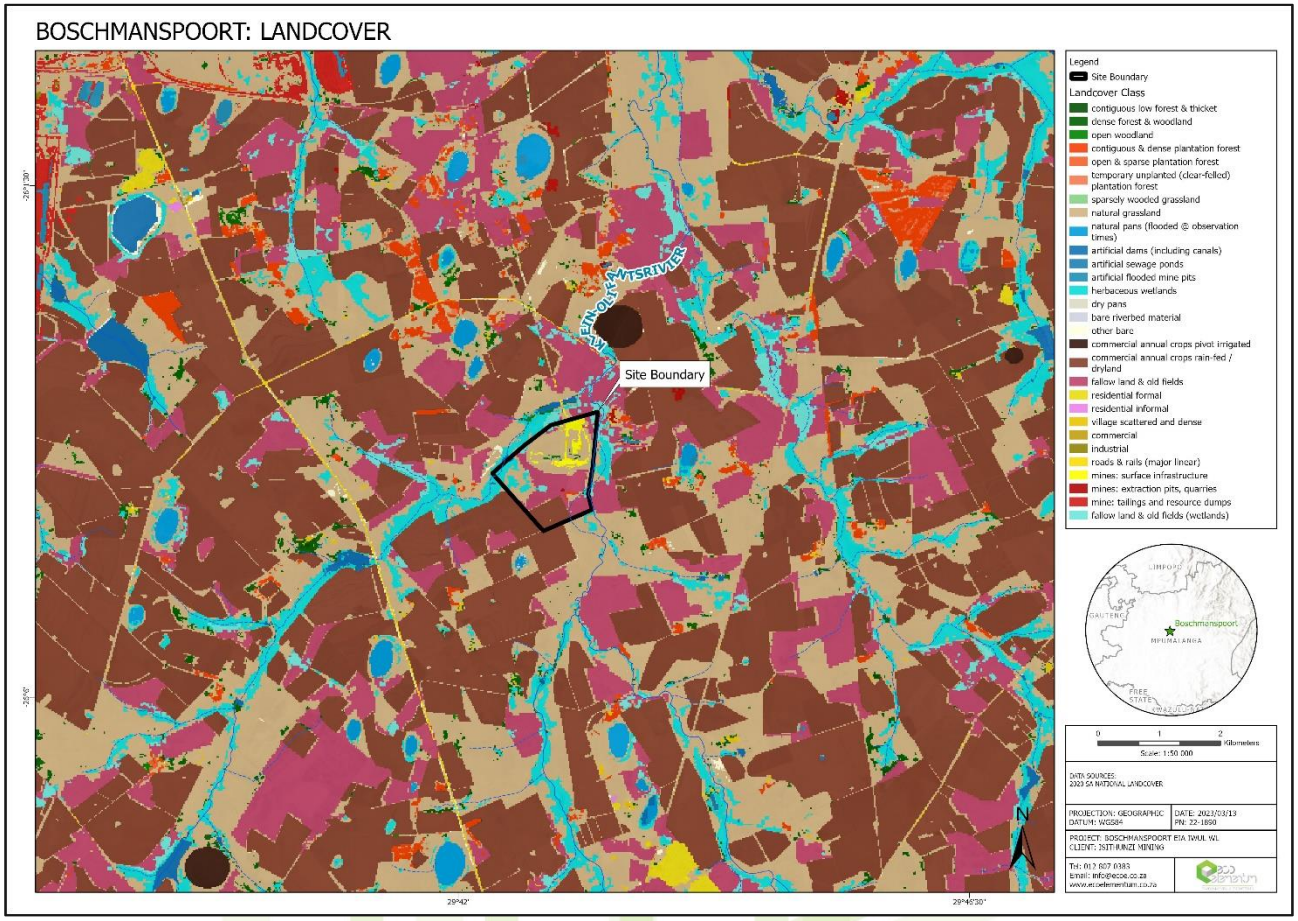


**Figure 3-51: Land cover of the study area**

## 3.9 IMPACT ASSESSMENT

**Table 3-15: Impact Assessment Table**

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| Blasting | Opencast Mining | Ground vibrations | Construction | 3 | Negative | 39 | Low-Med | Negative | 0,2 | 7,8 | Low | Limit ground vibrations to an acceptable value with a proper blast design designed by a competent person, include site specific geological data in pre-ppv calculations, measure vibrations with seismometers and record the outcome, evaluate and improve where needed. Mitigating measures include using a smaller amount of explosives, including delays, blasting parallel to main joint set, using a presplit or drilling pattern that suites the geology, electronic single hole firing, etc. | Implement a proper blast design and standard operating procedures compiled by a competent person. The designs and operating procedures must be adjustable, allowing easy change when site specific conditions requires a different approach. These designs must include mitigating measures mentioned. Monitoring must form part of the actions along with daily safe declarations and over-inspections. |
| Blasting | Opencast MIning | Air blasts | Construction | 3 | Negative | 39 | Low-Med | Negative | 0,2 | 7,8 | Low | Limit the decibels to an acceptable value with a proper blast design designed by a competent person, include site specific geological data in preblast calculations, measure decibels with seisometers and record the outcome, evaluate and improve where needed. | Implement a proper blast design and standard operating procedures compiled by a competent person. The desings and operating procedures must be adjustable, allowing easy change when site specific conditions requires a different approach. These |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | | **Mitigation measures** | **Action Plan** |
| | | | | | | | | | | | | Mitigating measures can include covering the detonating cord, limit the explosives per delay, conducting blasting early in the morning, no blasting when the wind is strong, etc. | deisgns must include mitigating measures mentioned. Monintoring must form part of the actions along with daily safe declarations and over-inspections. |
| Opencast mining, construction, blasting | B01 - Demolished building | None | Construction, operational | 1 | Negative | 4 | Low | Positive | 1 | 4 | Low | None | None |
| Opencast mining, construction, blasting | B02 - Demolished building | None | Construction, operational | 1 | Negative | 4 | Low | Positive | 1 | 4 | Low | None | None |
| Opencast mining, construction, blasting | B03 - Building ruin | None | Construction, operational | 1 | Negative | 4 | Low | Positive | 1 | 4 | Low | None | None |
| Opencast mining, construction, blasting | F01 - Graves | None | Construction, operational | 3 | Negative | 15 | Low | Positive | 0,8 | 12 | Low | Conservation buffer of 50 m | Avoid site, review HIA if development footprints change |
| Opencast mining, construction, blasting | F02 - Mining infrastructure | None | Construction, operational | 1 | Negative | 4 | Low | Positive | 1 | 4 | Low | None | None |

| | | | | Category Rating | | | | | | | | | |
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| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | | **Mitigation measures** | **Action Plan** |
| Opencast mining, construction, blasting | F03 - Corrugated iron building | None | Construction, operational | 1 | Negative | 4 | Low | Positive | 1 | 4 | Low | None | None |
| All surface activities | Terrestrial fauna | Contamination of fauna environment through use and storage of hazardous substances, littering and dumping of waste or waste water leaks. Cumulative Impact: Large or continuous cumulative leaks and waste dumps that are not appropriately designed or managed will contaminate the environment through run-off or leachate and significantly impact fauna through toxins in their environment. Residual Impact: | Construction, operation, decommissioning, closure | 4 | Negative | 52 | Med | Negative | 0,2 | 10,4 | Low | MITIGATION OBJECTIVE: Prevent deterioration of surrounding and downstream environments and contain all contamination on site. STOP: Discontinue use of all faulty machinery / equipment on site until properly repaired. GENERAL MITIGATION: The recommendations and monitoring requirements of the hydrologist and geohydrologist must be applied to prevent water - based contaminant transport. Recommendations and monitoring requirements of the air quality specialist must be applied to prevent air - based contamination. Ensure good house-keeping practices on the site. MODIFY: Plan and implement a proper storm-water management plan from the onset. Facilities for storage of all hazardous substances and waste to prevent the exposure of these substances to the | Apply all recommendations stipulated in the relevant environmental, waste and water use audits. Ensure effective staff and contractors reporting system regarding any spills and leaks noted on site. Inspect all water and sewer pipes daily and repair any issues immediately. |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| | | If toxic substances and waste are not properly handled or spills not cleared immediately, the environment will suffer significant residual impacts, particularly if toxins seep into the soils or are washed to downstream environments. Moderately reversible and requires mitigation and rehabilitation to ensure contamination is contained. High loss of resource if extensive contamination is transported through the riverine systems and impair aquatic and | | | | | | | | environment will be erected on site before any substances are brought to / generated on site. CONTROL: All equipment / machinery will be serviced and maintained within operating specifications to prevent the risks of leaks / noise / emissions. Keep toilets facilities clean and operational. Waste (domestic, hydrocarbon, hazardous) must be handled in line with the prescribed waste management plan. Refuse bins with properly secured lids will be placed around site to collect waste. REMEDY: Apply reparations to any issues noted on site immediately and apply recommendations of any specialists or auditors. | |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| | | related ecosystems and corridors. | | | | | | | | | |

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| Site establishment and construction of mine infrastructure | •Clearing of vegetation within the development footprint, •Clearing of Vegetation of a medium or higher SEI, •Trampling of vegetation around the footprint, •Illegal disposal and dumping of construction material such as cement or oil •Edge effects e.g. heavy vehicles turning in adjacent areas | Destruction of natural vegetation resulting in:<br>•localised loss of vegetation and associated habitats and – organisms.<br>•localised loss of vegetation, denudation and compaction of soils may lead to an increase in runoff and erosion,<br>•possible distribution and increased establishment of alien invasive species, possible disturbance and fragmentation of suitable habitat for niche-dependent species,<br>•possible loss of protected species,<br>•possible permanent reduction of re-vegetation potential of soil surface. | Design and if approved, construction and operation | 4 | Negative | 68 | Med-High | Negative | 0,2 | 13,6 | Low | With open cast mining, the only mitigation within the development footprint is avoidance. Rehabilitation post mining could restore some functionality, but not species diversity. If the mine is approved by the approving authorities, the following must be implemented.<br>Design phase:<br>• Limit clearing or impacting any highly sensitive vegetation:<br>o Alternative 2 is preferred to Alternative 1 as the dumps are entirely situated in low sensitivity areas.<br>o Plan access roads and other infrastructure through low sensitivity areas and not through the medium and high sensitivity, as this will negate the conservation benefits made by opting for Alternative<br>• The construction footprint and operational area of the mine may not result in edge effects to surrounding sensitive vegetation.<br>• The presence of wetland conditions should be verified by a wetland specialist and the design phase must follow recommendations and buffers as stipulated by the wetland specialist.<br>• Development within a wetland area will require a | Finalise a design layout with minimum impact on high sensitivity areas<br>Train staff/ workers on the value of biodiversity<br>Follow recommendations and buffers as stipulated by the wetland specialist<br>Implement a vegetation rehabilitation plan from the onset of construction |

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| | | | | | | | | | | | water use license.<br>• No construction / activities should be undertaken within the moist soils until a Water Use License was granted by the Department of Water Affairs (DWA).<br>• After the final layout has been approved, conduct a thorough footprint investigation to detect all affected protected and/or threatened plant species that must be removed (See 6.2.3<br>• Aim to start/conduct bulk of construction activities during the dry season<br>• Planning of the construction site must incorporate eventual rehabilitation in accordance with a vegetation rehabilitation plan. Prior to construction, grassland can be removed as sods and stored within transformed vegetation, maintained, and used in eventual rehabilitation (see closure phase mitigation below).<br>• Undertake a Plant Species Assessment in accordance with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species as published in the Government Gazette No 43855 on 30 | |

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| | | | | | | | | | | | October 2020 in terms of sections24(5)(a) and 25 (5)(h) of the National Environmental Management Act (NEMA).<br><br>Construction and Operation:<br>• An independent Ecological Control Officer (ECO) should be appointed to oversee construction.<br>• Train staff/ workers on the value of biodiversity and the need to conserve the species and systems that occur within the mining rights area where necessary<br>• There is zero tolerance of the destruction or collecting of any biodiversity or part thereof by anybody working for or on behalf of the mine<br>•Keep the development footprint as small as possible. Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.<br>•Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area (DWAF, 2005).<br>•Minimise the impact by clearly demarcating the footprint area to be affected, and strictly prohibit any | |

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| | | | | | | | | | | | movement outside the demarcated areas during construction and operation.<br>•No off-road driving beyond designated areas may be permitted, especially not in natural vegetation<br>•Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction / mining area.<br>•No open fires are permitted within naturally vegetated areas.<br>•Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas.<br>•Construction workers may not remove flora and neither may anyone collect seed from the plants without permission from the local authority.<br>•Store topsoil in a separate area where such soils can be protected until they can be re-used for post-construction / operation rehabilitation<br>oNever mix topsoils with subsoils or other spoil materials<br>•Maintain site demarcations in position until the cessation of construction and operational work.<br>•After construction, the land | |

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| | | | | | | | | | | | must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.<br>•Dust control measures must be implemented<br>•Pollution and litter prevention and emergency containment and remediation measures will be implemented<br>•Major spillage incidents will be handled in accordance with the emergency response procedure<br>•No open and/or unprotected fires will be permitted at any time | |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| Closure | Lack of rehabilitation | No natural vegetation | Closure | 4 | Negative | 68 | Med-High | Positive | 0,6 | 40,8 | Med | •All foreign material from decommissioned infrastructure must be entirely removed.<br>•The area should be re-landscaped and resemble the landform prior to the open cast activities.<br>•A vegetation rehabilitation plan must be implemented. Grassland can be removed as sods and stored within transformed vegetation – remove alien invasive vegetation prior to storing grasslands sods in transformed areas. The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each other. Once construction is completed, these sods should be used to rehabilitate the disturbed areas from where they have been removed. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks.<br>•Grass species, typical of the | Rehabilitate disturbed and degraded areas as per the vegetation rehabilitation plan |

| | | | | Category Rating | | | | | | | | |
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| Activity | Aspect | Impact | Phase | Weighting Factor | +/- | Significance without mitigation | +/- | Mitigation efficiency | Significance with mitigation | Mitigation measures | Action Plan |
| | | | | | | | | | | Eastern Highveld Grassland can be sown in prepared soils. Revegetation should take place successively to re-establish vegetation as soon as possible after construction in a specific area<br>•Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access Delay the re-introduction of livestock (where applicable) to all rehabilitation areas until an acceptable level of re-vegetation has been reached. | |

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| Site establishment Edge effects | Removal of surface vegetation in moist grasslands/wetlands / watercourses | •Soil erosion could lead to increased sedimentation<br>•Polluted water or sediment containing water reaching the watercourse and moist grassland<br>•Reduced water holding capacity | Design phase, construction, and operation | 5 | Negative | 85 | High | Negative | 0,6 | 51 | Med | **Design phase:**<br>•The presence of wetland conditions should be verified by a wetland specialist and the design phase must follow recommendations and buffers as stipulated by the wetland specialist.<br>•Development within a wetland area will require a water use license and are subjected to the provisions of this license.<br>•No construction / activities should be undertaken within the moist soils until a Water Use License was granted by the Department of Water Affairs (DWA).<br>•The design must include an ecologically sound, storm water management plan.<br>**Construction:**<br>•Do not allow erosion to develop on a large scale before acting.<br>•Contain sediment and turbidity at the open cast and work sites by installing diversion or containment structures.<br>•Place and maintain erosion control barriers as appropriate to prevent | Follow recommendations and buffers as stipulated by the wetland specialist Monitor continuously and take corrective action where needed. |

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| | | | | | | | | | | | sedimentation into the watercourse and moist grasslands.<br>•Keep sediment barriers in place until restoration is complete.<br>•Stockpile topsoil and organic surface material such as root mats separately from overburden and returning it to the surface of the restored site where feasible.<br>•Systematically remove vegetation as needed, storing it in a manner to retain viability, and replacing it after operation where feasible.<br>•Make use of existing roads and tracks where feasible, rather than creating new routes through grassland areas.<br>•Runoff from roads must be managed to avoid erosion and pollution problems.<br>•Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (erosion management plan required)<br>•Remove only the | |

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| | | | | | | | | | | | | vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. The grassland can be removed as sods and re-established after construction is completed.<br>•Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.<br>•Prevent spillage of construction material, oils or other chemicals, strictly prohibit other pollution. Ensure there is a method statement in place to remedy any accidental spillages immediately.<br>•Trucks and equipment should only be washed in dedicated areas and the dirty water is not allowed to discharge into the watercourse or surrounding natural vegetation.<br>**Operation:**<br>•Adhere to construction mitigation measures above.<br>•Prevent polluted water from reaching the |

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| | | | | | | | | | | | watercourse and surrounding moist grasslands<br>•The hydrology of the moist grasslands should be monitored and flow restored if interrupted or ceased. If moist grasslands dry out, the plant succession in these areas should be monitored to ensure that indigenous pioneer species colonise the area and that alien invasive plant species are removed as soon as they become evident. | |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| Lack of rehabilitation | Closure and lack of rehabilitation | •Bare soils that are susceptible to erosion<br>•indigenous vegetation communities are unlikely to colonise eroded soils successfully<br>•Seeds from proximate alien invasive plant species can spread easily into eroded soils | Closure | 3 | Negative | 42 | Med | Positive | 0,6 | 25,2 | Low-Med | Closure:<br>•Colonisation of the disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area.<br>•The area should be re-landscaped and resemble the landform prior to the open cast activities.<br>•A vegetation rehabilitation plan should be implemented. Grassland can be removed as sods and stored within transformed vegetation – remove alien invasive vegetation prior to storing grasslands sods in transformed areas. The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each other. Once construction is completed, these sods should | Ensure the land has been rehabilitated to a sate as close as possible prior to mining |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| | | | | | | | | | | | be used to rehabilitate the disturbed areas from where they have been removed. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks. | |
| Site establishment, edge effects | Construction and mining | •Removal / Destruction of protected plants and plants of conservation concern<br>•Destruction of sensitive species habitat<br>•Impact on sensitive species pollinators and ecological processes | Construction and operation | 4 | Negative | 68 | Med-High | Negative | 0,6 | 40,8 | Med | Design phase:<br>•Undertake a Plant Species Assessment in accordance with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species as published in the Government Gazette No 43855 on 30 October 2020 in terms of sections24(5)(a) and 25 (5)(h) of the National Environmental Management Act (NEMA).<br>•It is likely that the Vulnerable species population extends through the southern footprint of the open cast and dumps. The design should avoid as much of this habitat, or the approval must be sought from the conservation authority to relocate these species. | Undertake a Plant Species Assessment in accordance with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species as published in the Government Gazette No 43855 on 30 October 2020 in terms of sections24(5)(a) and 25 (5)(h) of the National Environmental Management Act (NEMA).<br>The design should avoid as much of this habitat and species as possible or the approval must be sought from the conservation authority to relocate these species.<br>Relocate provincially protected plant species to |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| | | | | | | | | | | Construction and operation:<br>•Mitigation will depend on the size of the population and species present and must be informed by the plant species assessment.<br>•If the species are to be relocated, it should be moved to suitable habitat outside of the proposed impact zone. Survival and fecundity must be monitored for at least four (4) years post relocation and thereafter at least every three (3) years until at least two (2) years post closure. Monitoring should result in a regular reporting to the conservation authority. | suitable habitat outside of the proposed footprint, prior to construction |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | | **Mitigation measures** | **Action Plan** |
| Site establishment, soil disturbances, erosion, import of foreign material (e.g. soils) and plant material with vehicles | •Soil disturbance<br>•Introduction of weeds<br>•Lack of or failed rehabilitation | Increase in invasive vegetation | Construction, Operation and Closure | 4 | Negative | 56 | Med | Negative | 0,2 | 11,2 | Low | Construction:<br>•Alien invasive species, in particular category 1b species that were identified within the study area (Appendix B), should be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation.<br>•Manual removal is preferred to chemical control, particularly in the moist grassland.<br>•Only suitably trained contractors (e.g. certified by the South African green Industries Council (SAGIC)) with knowledge of the species in question should be employed.<br>•All alien seedlings and saplings must be removed as they become evident for the duration of construction.<br>•All construction vehicles and equipment, as well as | Implement an alien invasive plant management plan that is updated biannually and implemented untill at least three years post closure |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Activity | Aspect | Impact | Phase | Weighting Factor | +/- | Significance without mitigation | | +/- | Mitigation efficiency | Significance with mitigation | Mitigation measures | Action Plan |
| | | | | | | | | | | | construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.<br>•If filling material is to be used, this should be sourced from areas free of invasive species.<br><br>Operational:<br>•Implement an alien invasive plant monitoring and management plan whereby the spread of alien and invasive plant species into the areas disturbed by the construction and mining are regularly removed and re-infestation monitored.<br>•Combating alien infestation is a dynamic process and needs to be reviewed periodically. The laine invasive management plan must be updated regularly and be implemented for at least three (3) years post closure. | |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | The sources of this impact includes the compaction of soil, the removal of vegetation and surface water redirection. Intercepting lateral interflow by mining upslope will result in changes to water volumes available to support specialised downstream floodplain wetland habitats, which is located within the DWS 500 m regulated area. | Changing the quantity and fluctuation properties of the wetlands by restricting water flow or increasing flood flows | Pre-construction, construction, operation and closure | 5 | Negative | 85 | High | Negative | 0,8 | 68 | Med-High | • Alternative Layout Plans should be considered to avoid development within a wetland<br>• Critical recharge areas should be determined in a hydropedology assessment.<br>• A temporary fence or demarcation must be erected around No-Go Areas outside the proposed works area prior to any construction taking place as part of the contractor planning phase when compiling work method statements to prevent access to the adjacent portions of the watercourse.<br>• Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMP.<br>• High energy stormwater input into the watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) should be taken into account during the design phase and mitigated effectively. | |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount). Construction and operational activities will result in earthworks and soil disturbance, as well as the removal of natural vegetation. This could result in the loss of topsoil, sedimentation of the watercourse and increase the turbidity of the water. Possible sources of the impacts include:<br>• Earthwork activities during construction<br>• Clearing of surface vegetation will expose the soils, which in rainy events would wash | Changes in sediment entering and exiting the system. | Pre-Construction, construction, operation and closure | 4 | Negative | 68 | Med-High | Positive | 0,6 | 40,8 | Med | • Alternative Layout Plans should be considered to avoid development within a wetland<br>• Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses.<br>• Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed.<br>• Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.<br>• Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction and that plan must be implemented immediately upon completion | |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| | through the watercourse, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soils.<br>• Disturbance of soil surface.<br>• Disturbance of slopes through creation of roads and tracks adjacent to the watercourses.<br>• Erosion (e.g. gully formation, bank collapse). | | | | | | | | | of construction.<br>• Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.<br>• Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.<br>• Runoff from the mining area must be managed to avoid erosion and pollution problems.<br>• Implementation of best management practices.<br>• Source-directed controls.<br>• Buffer zones to trap sediments.<br>• Monitoring should be done to ensure that sediment pollution is timeously dressed. | |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | | **Mitigation measures** | **Action Plan** |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plans can easily colonise and impact on downstream users. | Introduction and spread of alien vegetation. | Design phase, construction,operation and closure | 4 | Negative | 56 | Med | Negative | 0,6 | 33,6 | Low-Med | • Implement an Alien Plant Control Plan<br>• Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area and returning it where possible afterwards.<br>• Monitor the establishment of alien invasive species within the affected areas take immediate corrective action where invasive species are observed to establish.<br>• Rehabilitate or revegetate disturbed areas | |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | | **Mitigation measures** | **Action Plan** |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | Disturbance of soil/water processes upslope from the wetlands may cut off interflow that feeds downslope wetlands | Loss and disturbance of wetland habitat and fringe vegetation. | Design phase, construction,operation and closure | 5 | Negative | 100 | High | Positive | 1 | 100 | High | • Loss of wetland by mining cannot be mitigated only offset<br>• Drying out of wetlands and loss of hydrological zonation (loss of temporary and seasonal wetland zones) should be monitored and addressed through an offset program<br>• Critical recharge areas should be determined in a hydropedological assessment. | Offset Plan |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | Construction and operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in wetland function. This includes wind-blown coal dust during the operational phase as well as the | Changes in water quality due to pollution. | Construction and operation | 4 | Negative | 68 | Med-High | Negative | 0,6 | 40,8 | Med | • Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone.<br>• Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.<br>• The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc. | |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | | **Mitigation measures** | **Action Plan** |
| | inappropriate disposal of wastewater. The risk and potential treatment of acid mine drainage should be assessed by a specialist in that field and is not addressed here since it falls outside our area of expertise. Impact scores should be revised | | | | | | | | | | | • Maintenance of construction vehicles / equipment should not take place within the watercourse or watercourse buffer.<br>• Control of waste discharges.<br>• Maintenance of buffer zones to trap sediments with associated toxins.<br>• Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.<br>• Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse.<br>• Regular independent water quality monitoring should form part of operational procedures in order to identify pollution.<br>• Treatment of pollution identified should be prioritized according to best practice guidelines | |
| Site Clearing | Clearing of vegetation | Fugitive dust and particulate matter emissions | Construction | 2 | Negative | 16 | Low | Negative | 0.4 | 6.4 | Low | Stop site clearing when windy. Clear only areas that are necessary | Seize site clearing on windy days |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Activity | Aspect | Impact | Phase | Weighting Factor | +/- | Significance without mitigation | | +/- | Mitigation efficiency | | Significance with mitigation | Mitigation measures | Action Plan |
| Transportation of Material | Transport of construction materials | Fugitive dust and particulate matter emissions | Construction | 2 | Negative | 18 | Low | Negative | 0.4 | 7.2 | Low | Dust suppression on roads | Implement dust suppression on roads |
| Drilling and Blasting | Opencast mining | Fugitive dust and particulate matter emissions | Operational | 2 | Negative | 18 | Low | Negative | 0.4 | 7.2 | Low | Drilling with water | Implement dust suppression on drilling |
| Material Handling | Opencast mining | Fugitive dust and particulate matter emissions | Operational | 3 | Negative | 33 | Low-Med | Negative | 0.6 | 19.8 | Low-Med | Water sprays | Implement dust suppression with water sprays on transfer point |
| Hauling of Material - Offsite | ROM transport | Fugitive dust and particulate matter emissions | Operational | 5 | Negative | 75 | Med-High | Negative | 0.8 | 60 | Med-High | Sealed or Salt-Encrusted roads | Implement dust suppression on the access road |
| Demolition and Removal of Infrastructure | Rehabilitation | Fugitive dust and particulate matter emissions | Closure | 2 | Negative | 14 | Low | Negative | 0.4 | 5.6 | Low | Dust suppression on roads | Implement dust suppression |
| Rehabilitation of landform | Rehabilitation | Fugitive dust and particulate matter emissions | Closure | 3 | Negative | 27 | Low-Med | Negative | 0.6 | 16.2 | Low | Dust suppression on roads. Revegetate finshed land forms as quickly as possible. | Revegetate the final land forms as soon as possible |
| Site Clearing | Vegetation clearing | Noise from construction equipment | Construction | 2 | Negative | 14 | Low | Negative | 0.4 | 5.6 | Low | Noise barrier in the form of a berm, tree break or similar noise fence between the sensitive receptors and noise sources. Switching off equipment when not in use. Construction and mining-related machinery and vehicles must be serviced on | Ensure noise mitigation is applied |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| | | | | | | | | | | | | a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers | |
| Material Handling | Transport of construction materials | Noise from trucks transporting Topsoil to the topsoil stockpile | Construction | 2 | Negative | 14 | Low | Negative | 0.4 | 5.6 | Low | Switching off equipment when not in use. Construction and mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers | Implement dust suppression on roads |
| Opencast Mining | Opencast mining | Noise from loaders loading coal on trucks | Operational | 2 | Negative | 24 | Low-Med | Negative | 0.4 | 9.6 | Low | Noise barrier in the form of a berm, tree break or similar noise fence between the sensitive receptors and noise sources. Switching off equipment when not in use. Construction and mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. Fixed noise producing sources such as generators, pump stations and crushers to be to be either housed in enclosures or barriers put up around the noise source. Equipment with lower sound power levels would be used in | Implement dust suppression on drilling |

| | | | | Category Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | **Significance with mitigation** | | **Mitigation measures** | **Action Plan** |
| | | | | | | | | | | | | preference to noisier equipment. | |
| Material Handling | Opencast mining | Noise from trucks dumping material on the various stockpiles | Operational | 3 | Negative | 27 | Low-Med | Negative | 0.6 | 16.2 | Low | Switching off equipment when not in use. Construction and mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers | Implement dust suppression with water sprays on transfer point |
| Profiling Stockpiles | Opencast mining | Noise from bulldozers shaping the stockpiles | Operational | 2 | Negative | 16 | Low | Negative | 0.4 | 6.4 | Low | Switching off equipment when not in use. Construction and mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. Equipment with lower sound power levels would be used in preference to noisier equipment. | |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| Hauling of Material - Offsite | ROM transport | Trucks leaving the site transporting Coal to the processing plant | Operational | 4 | Negative | 48 | Medium | Negative | 0.6 | 28.8 | Low-Med | Switching off equipment when not in use. Construction and mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. Fixed noise producing sources such as generators, pump stations and crushers to be to be either housed in enclosures or barriers put up around the noise source. Equipment with lower sound power levels would be used in preference to noisier equipment. The on-site road network will be well maintained to limit body noise from empty trucks travelling on internal roads. All project employees and contractors will be instructed to avoid the use of engine compression brakes when approaching the site entrance or driving through or in the vicinity of any adjacent town. | Implement dust suppression on the access road |
| Rehabilitation of landform | Rehabilitation | Noise from bulldozers profiling the final landforms | Closure | 2 | Negative | 12 | Low | Negative | 0.6 | 7.2 | Low | Switching off equipment when not in use. Construction and mining-related machinery and vehicles must be serviced on | Revegetate the final land forms as soon as possible |

| | | | | Category Rating | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Aspect** | **Impact** | **Phase** | **Weighting Factor** | **+/-** | **Significance without mitigation** | | **+/-** | **Mitigation efficiency** | | **Significance with mitigation** | **Mitigation measures** | **Action Plan** |
| | | | | | | | | | | | | a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. | |
| Mining | Excavations | loss of fossils | Operations | 3 | Negative | 27 | Low-Med | Positive | 0,6 | 16,2 | Low | Remove a representaive sample of fossils if found | Once mining begins follow the Fossil Chance Find Protocol (Section 8). Look out for fossils and remove a representative sample for a paaleontologist to assess the scientific value. |
| Dumps | Change in surface elevation. Excavations. | loss of fossils | Dumping | 1 | | 5 | Low | | | 0 | Low | No fossils on the surface. No mitigation required | The site visit confirmed that there are no fossils on the surface so the dumps can go ahead with no impact on the palaeontology. |
| Rehabilitation | Backfilling of open voids | Loss of fossils | Closure | 1 | | 4 | Low | | | 0 | Low | No fossils on the surface. No mitigation required | None |

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

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

**Table 3-16: Impact Criteria and Assigned Rating**

| Intensity (Magnitude) | | ASSIGNED QUANTITATIVE SCORE |
|---|---|---|
| **The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it has a significant, moderate or insignificant** | | |
| **(L)OW** | The impact alters the affected environment in such a way that the natural processes or functions are not affected. | **1** |
| **(M)EDIUM** | The affected environment is altered, but functions and processes continue, albeit in a modified way. | **3** |
| **(H)IGH** | Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases. | **5** |
| **Duration** | | |
| **The lifetime of the impact, that is measure in relation to the lifetime of the proposed development.** | | |
| **(S)HORT TERM** | The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase. | **1** |
| **(SM) SHORT - MEDIUM TERM** | The impact will be relevant through to the end of a construction phase. | **2** |
| **(M)MEDIUM** | The impact will last up to the end of the development phases, where after it will be entirely negated. | **3** |
| **(L)ONG TERM** | The impact will continue or last for the entire operational lifetime (i.e. exceed 20 years) of the development, but will be mitigated by direct human action or by natural processes thereafter. | **4** |
| **(P)ERMANENT** | This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact is transient. | **2** |
| **Spatial Scale/Extent** | | |
| **Classification of the physical and spatial aspect of the impact** | | |
| **(F)OOTPRINT** | The impacted area extends only as far as the activity, such as footprint occurring within the total site area. | **1** |
| **(S)ITE** | The impact could affect the whole, or a significant portion of the site. | **2** |

| | | |
|---|---|---|
| **(R)EGIONAL** | The impact could affect the area including the neighbouring Farms, the transport routes and the adjoining towns. | **3** |
| **(N)ATIONAL** | The impact could have an effect that expands throughout the country (South Africa). | **4** |
| **(I)NTERNATIONAL** | Where the impact has international ramifications that extend beyond the boundaries of South Africa. | **5** |
| **Probability** | | |
| **This describes the likelihood of the impact actually occurring. The impact may occur for any length of time during the life cycle of the activity. The classes are rated as follows:** | | |
| **(I)MPROBABLE** | The possibility of the Impact occurring is none, due to the circumstances or design. The chance of this Impact occurring is zero (0%) | **1** |
| **(P)OSSIBLE** | The possibility of the Impact occurring is very low, due either to the circumstances or design. The chance of this Impact occurring is defined as 25% or less | **2** |
| **(L)IKELY** | There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of Impact occurring is defined as 50% | **3** |
| **(H)IGHLY LIKELY** | It is most likely that the Impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %. | **4** |
| **(D)EFINITE** | The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %. | **5** |
| **Weighting Factor** | | |
| **Subjective score assigned by Impact Assessor to give the relative importance of a particular environmental component based on project knowledge and previous experience. Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance** | | |
| **(L)OW** | | **1** |
| **LOW- MEDIUM** | | **2** |
| **MEDIUM (M)** | | **3** |
| **MEDIUM-HIGH** | | 4 |
| **HIGH (H)** | | 5 |
| **Mitigation Measures and Mitigation Efficiency** | | |
| **Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures** | | |

Mitigation measures were recommended to enhance benefits and minimise negative impacts and address the following:

Mitigation objectives: what level of mitigation must be aimed at: For each identified impact, the specialist must provide mitigation objectives (tolerance limits) which would result in measurable reduction in impact. Where limited knowledge or expertise exists on such tolerance limits, the specialist must make "educated guesses" based on professional experience;

Recommended mitigation measures: For each impact the specialist must recommend practicable mitigation actions that can measurably affect the significance rating. The specialist must also identify management actions, which could enhance the condition of the environment. Where no mitigation is considered feasible, this must be stated and reasons provided;

Effectiveness of mitigation measures: The specialist must provide quantifiable standards (performance criteria) for reviewing or tracking the effectiveness of the proposed mitigation actions, where possible; and

Recommended monitoring and evaluation programme: The specialist is required to recommend an appropriate monitoring and review programme, which can track the efficacy of the mitigation objectives. Each environmental impact is to be assessed before and after mitigation measures have been implemented.

The management objectives, design standards, etc., which, if achieved, can eliminate, minimise or enhance potential impacts or benefits. National standards or criteria are examples, which can be stated as mitigation objectives.

| | | |
|---|---|---|
| **HIGH** | The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable. | **1.0** |
| **MEDIUM-HIGH** | The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels. | **0.8** |
| **MEDIUM** | Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw. | **0.6** |
| **LOW -MEDIUM** | The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels. | **0.4** |
| **LOW** | The impact will be mitigated to the point where it is of limited importance. | **0.2** |

Table 3-17: Description of bio-physical assessment parameters with its respective weighting

| Extent | Duration | Intensity | Probability | Weighting Factor (WF) | Significance Rating (SR) | Mitigation Efficiency (ME) | Significance Following Mitigation (SFM) |
|---|---|---|---|---|---|---|---|
| Footprint 1 | Short term 1 | Low 1 | Probable 1 | Low 1 | Low 0-19 | High 0,2 | Low 0-19 |
| Site 2 | Short to medium 2 | | Possible 2 | Low to medium 2 | Low to medium 20-39 | Medium to high 0,4 | Low to medium 20-39 |
| Regional 3 | Medium term 3 | Medium 3 | Likely 3 | Medium 3 | Medium 40-59 | Medium 0,6 | Medium 40-59 |
| National 4 | Long term 4 | | Highly Likely 4 | Medium to high 4 | Medium to high 60-79 | Low to medium 0,8 | Medium to high 60-79 |
| International 5 | Permanent 5 | High 5 | Definite 5 | High 5 | High 80-100 | Low 1,0 | High 80-100 |

Table 3-18: Significant Rating Scale Without Mitigation

| | | |
|---|---|---|
| **Potential Impacts Without Mitigation Measures (WOM)** | | |
| Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures). | | |
| **SIGNIFICANT RATING EQUATION** | | |
| Significant Rating (SR) = (Extent + Intensity + Duration) x Probability | | |
| **S=0** | **INSIGNIFICANT** | The impact will be mitigated to the point where it is regarded as insubstantial. |
| **SR < 30** | **LOW (L)** | The impact will be mitigated to the point where it is of limited importance. |
| **20<SR<39** | **LOW- MEDIUM** | The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels; |
| **40> SR < 59** | **MEDIUM (M)** | Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw. |
| **60<SR>79** | **MEDIUM-HIGH** | The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels. |
| **80<SR > 100** | **HIGH (H)** | The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable. |

Table 3-19: Significant Rating Scale with Mitigation

| |
|---|
| **Potential Impacts with Mitigation Measures (WM) –** |
| In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it will be necessary to re-evaluate the impact. |
| **SIGNIFICANT RATING WITH MITIGATION EQUATION** |
| Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency. |
| Or WM = WOM x ME |

| | | |
|---|---|---|
| **S=0** | **INSIGNIFICANT** | The impact will be mitigated to the point where it is regarded as insubstantial. |
| **SR < 30** | **LOW (L)** | The impact will be mitigated to the point where it is of limited importance. |
| **20<SR<39** | **LOW- MEDIUM** | The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels; |
| **40> SR < 59** | **MEDIUM (M)** | Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw. |
| **60<SR>79** | **MEDIUM-HIGH** | The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels. |
| **80<SR > 100** | **HIGH (H)** | The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable. |

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.

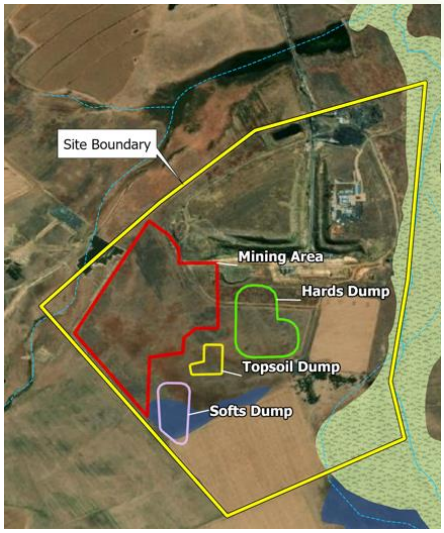
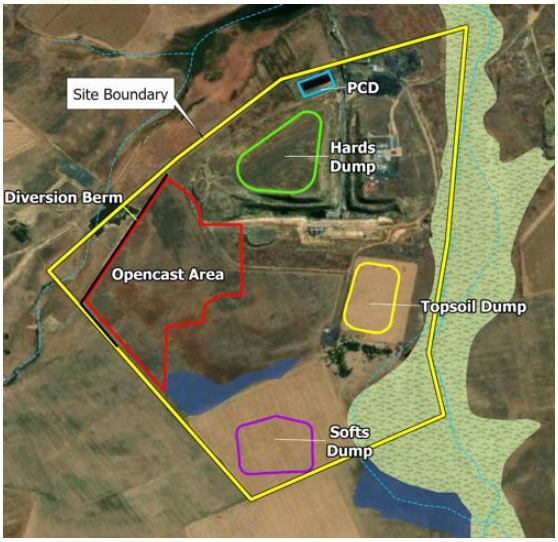
Refer to Section 3.9 and Table 3-15.

Possible Mitigation Measure that could be applied and the level of risk

Refer to Section 3.9 and Table 3-15.

Motivation where no alternative sites were considered.

The area is located within the Witbank Coal Field. The site is preferred due to the shallow coal reserve and the site's already modified state (cultivated land). Two alternative site layouts were considered, refer to figure below illustrating the two alternative layouts.

| **Alternative 1:** | **Alternative 2:** |
|---|---|
|  |  |

Statement motivating the alternative development location within the overall site.

The Mining Right is dependent on the area chosen being susceptible to possible coal deposits and therefore no alternative site could be considered in terms of the opencast mining area, however the stockpile dumps could be placed at alternative locations within the site boundary to determine the best possible position. Additionally, the stormwater management infrastructure of the proposed site and layout will be based on the most effective way to handle clean and dirty water separation.

The area is located within the Witbank Coal Field. The site is preferred due to the area already being approved for mining, albeit underground. Due to this being a Section 102 amendment to existing Rights, the areas available for mining is limited.

The alternative to open cast mining is underground mining, which is already approved for the proposed area. The decision to apply for an amendment is due to the resource being shallower and therefore more coal can be abstracted in a safer manner through opencast mining.

In terms of the technologies and activities proposed, roll-over mining is seen as the most efficient way to undertake concurrent rehabilitation as mining progresses, therefore also reducing the cost required for rehabilitation after cessation of mining activities.

The option of not approving the activities will result in the continued loss of employment on a mine where many people very abruptly lost their jobs and income.

Alternative 2 was chosen as the preferred option for the Boschmanspoort proposed mine project as illustrated in the map below. Alternative 2 is more suited due to the fact that the stockpiles/dumps' locations are placed on more stable areas than the locations chosen in alternative 1 when taking into consideration the previous underground workings. Alternative 2 also is considered less disruptive to natural habitat. The preferred layout is illustrated in the map below together with the previous underground workings to justify the chosen alternative.

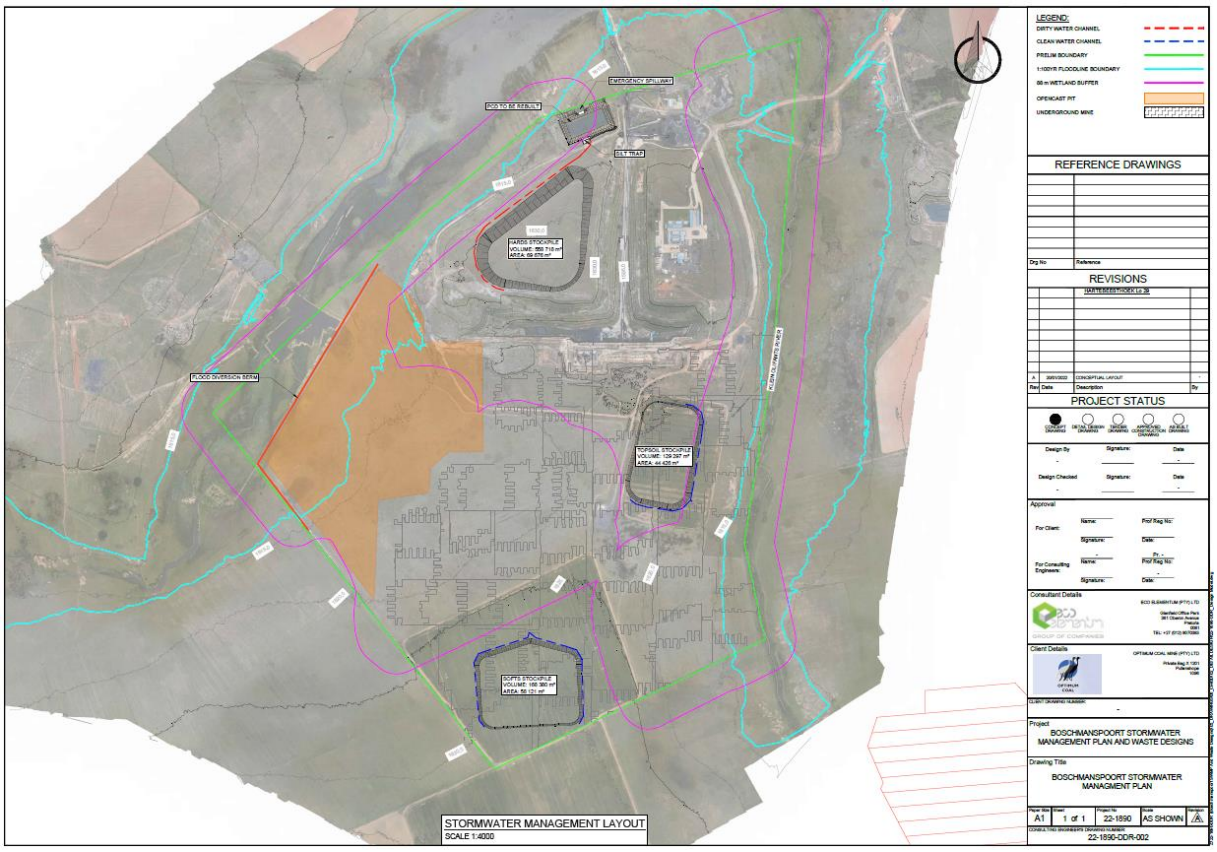



**Figure 3-52: Preferred alternative and previous underground workings**

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

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

The same impact ranking criteria and methodology was employed as discussed in Section 0 of this report.

## 3.11 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

Refer to Section 3.9 and Table 3-15.

## 3.12 SUMMARY OF SPECIALIST REPORTS.

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

| List of Studies Undertaken | Recommendations of Specialist Reports | Recommendations that have been Included in the EIA / BA Report | Reference to Applicable Section of Report |
|---|---|---|---|
| **Heritage / Archaeological Impact Assessment** | The areas demarcated for the proposed mining development largely consist of previously and currently cultivated land, as well as sections of mined areas and open veldt. The demarcated footprints are therefore not considered to be sensitive from a heritage perspective and cultural resources are unlikely to be impacted by the proposed development.<br><br>The following recommendations are made in terms with the National Heritage Resources Act (25 of 1999) in order to avoid the destruction of heritage remains associated with the area demarcated for development:<br><br>• Sites B01 & B02 used to be associated with buildings dating to the Historic Period. The buildings, however, have completely been demolished an no surface indications are present. The sites are not considered to be significant or sensitive from a heritage perspective and since the proposed development footprints don't intersect the Site B01 and B02 footprints, no impact is foreseen.<br>• Site B03 used to be associated with a building dating to the Historic Period. The building, however, has largely been demolished and is currently a ruin. The site is not considered to be significant or sensitive from a heritage perspective and since the structure is located approximately 108 m from the nearest development footprint (topsoil stockpile), the site is not at risk of being impacted.<br>• **Site F01 consists of four graves located approximately 68 m from the nearest proposed development (topsoil stockpile).** Although the age of the graves is unknown, it is likely to exceed 60 years of age. Therefore, the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act 25 of 1999 apply.<br>o Due to the proximity of the graves to the proposed development footprints, it is unlikely that the graves will be impacted by the proposed project. However, since the site appears not to be in use anymore and in order to prevent accidental damage to the graves, **a fenced-off conservation buffer of 50 m must be established** and maintained for effective in situ preservation of the graves.<br>o The **proposed fence infrastructure, which should be at least 1.8 m high, must include a gate** to allow access by the family of the deceased individuals. **A distance of at least 2 m must be maintained between the graves and fence.**<br>o **Should relocation of the graves be considered in future, a full 60 days consultation process as stipulated in the NHRA Regulations of 2000 must be implemented to identify the family of the deceased individuals who must then be consulted to give consent for the relocation.**<br>• Sites F02 & F03 are of contemporary origin, do not exceed 60 years of age and are not considered to be significant or sensitive from a heritage perspective. No further action is required. | **X** | This table, Section 0 |

| List of Studies Undertaken | Recommendations of Specialist Reports | Recommendations that have been Included in the EIA / BA Report | Reference to Applicable Section of Report |
|---|---|---|---|
| | • The above recommendations are based on the specific project activities and extents as indicated by the figures in the Phase 1 Archaeological Impact Assessment (In this Basic Assessment Report, refer to Appendix D - Specialist Studies for the Phase 1 Archaeological Impact Assessment). **Should the proposed surface impact areas be altered, a qualified archaeologist must inspect the new areas and amend the report accordingly.**<br>• Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible.<br>• Since archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the construction/development phase, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended, and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).<br>• From a heritage point of view, development may proceed on the demarcated area, subject to the abovementioned conditions, recommendations, and approval by the South African Heritage Resources Agency. | | |
| **Paleontological Impact Assessment** | • Based on the fossil record but confirmed by the site visit and walk through there are **NO FOSSILS of the Glossopteris flora on the surface even though fossils have been collected and recorded from rocks of a similar age and type in South Africa.** It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary so the sites for the prosed dumps will not impact on the fossil heritage.<br>• **There is a chance that fossils may occur below the ground surface in the shales of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr.** If fossils are found by the environmental officer, or other responsible person once mining, excavations or drilling have commenced, then they should be rescued, and a paleontologist called to assess their scientific value and if important a collection of a representative sample should be made (with the relevant SAHRA permit).<br>• The above recommendations are based on the specific project activities and extents as indicated by the figures in the Phase 2 Paleontological Impact Assessment (In this Basic Assessment Report, refer to Appendix D - Specialist Studies, for the Phase 2 Paleontological Impact Assessment). | **X** | This table, Section 0 |
| **Geohydrological Impact Assessment** | The proposed mitigation measures for the proposed mining operation are summarised below:<br>• Should fuel spillages occur during the construction phase immediate action is required to minimise the impact on the groundwater regime.<br>• Groundwater levels in the monitoring boreholes should be measured at least at a quarterly interval.<br>• Should the water levels of surrounding users be influenced in terms of groundwater level or quality decline, the users should be compensated.<br>• Monitor groundwater inflow rates on a monthly basis throughout the mining operation.<br>• The groundwater quality in the monitoring boreholes should be analysed on a quarterly basis.<br>• Annual reporting on the groundwater qualities and levels should be conducted and submitted to the DWS. | **X** | This table, Section 0 |

| List of Studies Undertaken | Recommendations of Specialist Reports | Recommendations that have been Included in the EIA / BA Report | Reference to Applicable Section of Report |
|---|---|---|---|
| | • The numerical model should be updated once more time-series monitoring data (water levels and qualities) are available.<br>• Cut-off trenches and passive treatment of contaminated water collected in the trenches downgradient of potential sources such as the PCD should be implemented.<br>• Divert run-off water away from the rehabilitated opencast area.<br>• Minimise the recharge to the mining material by capping.<br>• Minimise oxygen diffusion.<br>• Revegetate the dump.<br>• The groundwater quality in the monitoring boreholes should continue to be analysed on a quarterly interval basis.<br>• Monitoring of surface water features should be conducted on a quarterly interval.<br>• Implement water treatment which may include Passive Treatment System. | | |
| **Wetland Impact Assessment** | Where the PES is in the A, B, C, D or E the EIS components must be checked to determine if any of the aspects of importance and sensitivity (Ecological Importance; Hydrological Functions and Direct Human Benefits) are high or very high. If this is the case, the feasibility of increasing the EC (particularly if the EC is in a low C or D category) should be evaluated. This is recommended to enable important and/or sensitive wetland water resources to maintain their functionality and continue to provide the goods and services for the environment and society. | **X** | This table, Section 0 |
| **Ecological Impact Assessment** | The following recommendations are relevant:<br>• The following areas should not be considered for development:<br>  ○ No such areas were identified in terms of the proposed development area.<br>• The following areas should be prioritised for development:<br>  ○ Where possible, areas determined to have LOW and VERY LOW SEI should be prioritised for material stockpiles and infrastructure. The current proposed layout largely complies with this recommendation.<br>  ○ Of the two alternative layouts, the Alternative 2 layout meets this recommendation and is considered less disruptive to natural habitat units on site as long as haul roads between the pits and stockpile areas are formalised to prevent damage to natural habitat and reduce edge effect (expand existing gravel roads on site and utilise these rather than creating new haul roads).<br>• Other areas may be developed as per the recommendations below.<br>  ○ The riverine area in the north must be respected and managed as per the wetland specialists recommendations.<br>• Indirect impacts through dust, noise and vibration may be expected to the surrounding areas, and must be managed in accordance to the relevant specialists' recommendations. | **X** | This table, Section 0 |

| List of Studies Undertaken | Recommendations of Specialist Reports | Recommendations that have been Included in the EIA / BA Report | Reference to Applicable Section of Report |
|---|---|---|---|
| | • The tributary to the Klein-Olifants River is likely to suffer impact from water related impacts and must be managed in accordance to the aquatic biodiversity specialists, hydrologist and geohydrologist.<br>• Recommendations of the flora specialist must be implemented on site. The mitigation measures and action plan stipulated in the impact table must be included within the environmental management plan report and implemented on site. | | |
| **Aquatic Biodiversity Impact Assessment** | The reopening of the mine will ensure that the management of water systems on site will be reinstituted, and monitoring of the systems are recommended. The frequency of water sampling must be weekly for the reopening period of the mine. This is to ensure that aspects such as leaking pipes and machinery can be detected.<br><br>Separation of clean and dirty water must be clarified and approved before the surface dumping and storage of topsoils, soft and hard stockpiles on site. | **X** | This table, Section 0 |
| **Air Quality Impact Assessment** | Based on the results presented in the Air Quality Impact Assessment, the following further recommendations are outlined:<br>(In this Basic Assessment Report, refer to Appendix D - Specialist Studies, for the Air Quality Impact Assessment)<br>• **Ambient air quality monitoring should be established to get a baseline condition prior to the onset of the operations and in order to establish the level at which the proposed operations are noted to impact on the ambient air quality.**<br>• **Fallout monitoring should be continued for the life of mine** to better assess the level of nuisance dust associated with both mining and process related operations.<br>o **Sampling of fallout (dust) should be undertaken within the neighboring areas as well as on-site.** Dust fallout monitoring is recommended at the locations as shown in Figure 23 - Proposed Monitor Locations of the Air Quality Impact Assessment. (In this Basic Assessment Report, refer to Appendix D - Specialist Studies, for the Air Quality Impact Assessment).<br>• **If it is found that dust fallout levels are measured to be exceeding limits, it is highly recommended to establish a Real-Time indicative monitoring network to quantitatively help identify the sources and to assist in the management of the mitigation of these sources.**<br>• The impacts from dust fallout and particulate matter (PM) can be reduced by **implementing dust control measures:**<br>o The highest intensity of the construction work should be carried out during the summer months and not over the harsh winter months as can result in increased dispersion of fugitive dust.<br>o The mine should ensure that unpaved roads are continuously watered (dust suppression measures) and treated with dust binding additive products to reduce the volume of fugitive dust emitted from unpaved roads.<br>o Rehabilitate exposed surfaces. Revegetation on overburden and topsoil stockpiles. | **X** | This table, Section 0 |
| **Noise Impact Assessment** | The following mitigation measures were recommended:<br>• Primary measures that intrinsically comprise part of the development design through an iterative process. Mitigation measures are more effective if they are implemented from project inception when alternatives are being considered. **Primary measures** that will be implemented will mainly be measures that **will minimise the noise impact on the receiving environment by reducing the noise of the operational equipment**. Such measures may include:<br>o Berms or noise breaks between the operational area and the sensitive receptors. | **X** | This table, Section 0 |

| List of Studies Undertaken | Recommendations of Specialist Reports | Recommendations that have been Included in the EIA / BA Report | Reference to Applicable Section of Report |
|---|---|---|---|
| | ○ Fixed noise producing sources such as generators, pump stations and crushers to be to be either housed in enclosures or barriers be put up around these sources.<br>○ Use equipment with lower sound levels used in preference over higher sound emitting equipment.<br>○ Maintaining the onsite road network to reduce the noise emitted from trucks traveling on the roads.<br>• **Secondary measures** designed to **specifically address the remaining negative effects** of the final development proposals. Secondary measures may include the following:<br>○ Operational machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g., installed exhaust mufflers.<br>○ Switching off equipment when not in use.<br>○ All project employees and contractors will be instructed to avoid the use of engine compression brakes when approaching the site entrance or driving through or in the vicinity of any adjacent town. | | |

## 3.13 ENVIRONMENTAL IMPACT STATEMENT

### Summary of the key findings of the environmental impact assessment;

The most significant impacts after mitigation and with a cumulative medium to high significance are:

**Table 3-20: Summary of key findings**

| Activity | Aspect | Impact | Phase | +/- | SU | +/- | SM |
|---|---|---|---|---|---|---|---|
| **Groundwater** | | | | | | | |
| Box cut opening. | Dewatering. | Decrease in water level should the pit floor be lower than the water level. | Construction | Negative | Med-High | Negative | Med-High |
| Pit dewatering | Dewatering | The water infiltrating the pit will be removed for safe mining, causing a decrease in the water level. | Operation | Negative | High | Negative | High |
| Backfilling of pit | Backfilling of the pit and no more dewatering. | Recovery of the water level in the pit as dewatering ceases. In the case of acid generation, the plume will start to move away from the pit as the water level recovered. Decanting may occur once the water level has recovered to the decanting elevation. | Residual | Negative | High | Negative | High |
| **Surface Water and Wetlands** | | | | | | | |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | The sources of this impact includes the compaction of soil, the removal of vegetation and surface water redirection. Intercepting lateral interflow by mining upslope will result in changes to water volumes available to support specialised downstream floodplain wetland habitats, which is located within the DWS 500 m regulated area. | Changing the quantity and fluctuation properties of the wetlands by restricting water flow or increasing flood flows | Design and if approved, construction, operation and closure | Negative | High | Negative | Med-High |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount). Construction and operational activities will result in earthworks and soil disturbance, as well as the removal of natural vegetation. This could result in the loss of topsoil, sedimentation of the watercourse and increase the turbidity of the water. Possible sources of the impacts include:<br>• Earthwork activities during construction<br>• Clearing of surface vegetation will expose the soils, which in rainy events would wash through the watercourse, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soils.<br>• Disturbance of soil surface.<br>• Disturbance of slopes through creation of roads and tracks adjacent to the watercourses.<br>• Erosion (e.g. gully formation, bank collapse). | Changes in sediment entering and exiting the system. | Design and if approved, construction, operation and closure | Negative | Med-high | Negative | Med |
| Land clearing and construction of open cast mine and associated infrastructure as well as closure of mine | Disturbance of soil/water processes upslope from the wetlands may cut off interflow that feeds downslope wetlands | Loss and disturbance of wetland habitat and fringe vegetation. | Design phase, construction, operation and closure | Negative | High | Negative | High |
| Land clearing and cosntrution of open cast mine and associated infrastrucure as well as closure of mine | Construction and operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in wetland function. This includes wind-blown coal dust during the operational phase as well as the inappropriate disposal of waste water. The risk and potential treatment of acid mine drainage should be assessed by a specialist in that field and is not addressed here since it falls outside our area of expertise. Impact scores should be revised | Changes in water quality due to pollution. | Construction and edge effects of operation | Negative | Med-High | Negative | Med |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Vegetation** | | | | | | | |
| Closure | Lack of rehabilitation | No natural vegetation | Closure | Negative | Med-High | Negative | Med |
| Site establishment Edge effects | Removal of surface vegetation in moist grasslands/wetlands / watercourses | Soil erosion could lead to increased sedimentation<br>Polluted water or sediment containing water reaching the watercourse and moist grassland<br>Reduced water holding capacity | Design phase, construction and operation | Negative | High | Negative | Med |
| Site establishment edge effects | Construction and mining | Removal / Destruction of protected plants and plants of conservation concern<br>Destruction of sensitive species habitat<br>Impact on sensitive species pollinators and ecological processes | Construction and edge effects of operation | Negative | Med-High | Negative | Med |
| **Air Quality** | | | | | | | |
| Hauling of Material Offsite | Air quality | Fugitive dust and particulate matter emissions | Operational | Negative | Med-High | Negative | Med-High |
| **Social Economic** | | | | | | | |
| Mine establishment | Mining operations | Employment and income opportunity. | Construction and Operation Phase | Positive | Med | Negative | Med |
| Mining operations | Mine closure | Job losses. | Decommissioning and Closure | Negative | Med-High | Negative | Med |
| Mining operations | Mine Closure | Decrease/termination of community investment funds and support to local communities. | Decommissioning and Closure | Negative | Med-High | Negative | Med |

## 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. Attach as Appendix C.

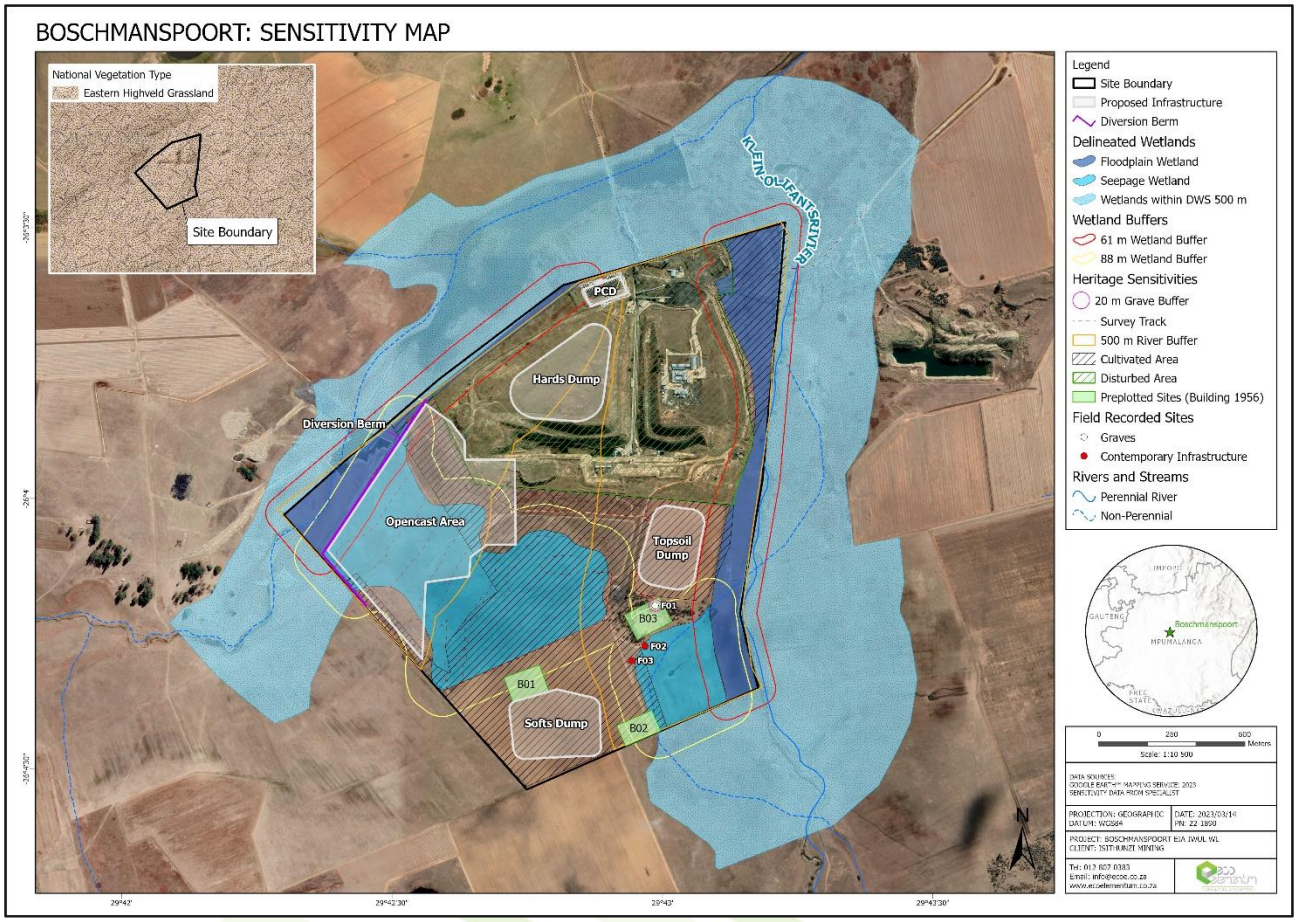



**Figure 3-53: Final Site Map**

Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.

| Description | Advantages | Disadvantages |
|---|---|---|
| **Mining Alternatives** | | |
| Mining on cultivated area. | • Remaining coal resources can be optimally extracted and benefited from financially.<br>• Additional job creation. | • Production from cultivate land will be compromised for the duration of the operation until rehabilitation has established the area to pre-mining conditions. |
| The no go option of not mining. | • Area remains a modified cultivated land to some degree and agricultural practises continue. | • Loss of remaining coal resources and the financial gain from mining it.<br>• No additional jobs will be created. |
| Open Cast Mining | • Relatively flexible; can vary output if demand change.<br>• Safe and hygienic working conditions | • Weather can be detrimental; it can impede operations.<br>• Exposes more waste materials |
| Underground mining | • More cost effective.<br>• Lower ground footprint. | • destruction of land,<br>• surface subsidence,<br>• abandoned shafts,<br>• extensive surface spoil heaps,<br>• collapses and flooding. |
| Alternative 1 | • Proximity to open cast area<br>• Less haul cost<br>• Small area needed for access road from open cast area | • Mining activities taking place within a wetland.<br>• Stockpiles situated within wetland buffers.<br>• Large impact on natural habitat. |
| Alternative 2 | • Stockpiles situated outside of the wetland buffers.<br>• Hards stockpile placed on a previously disturbed area | • Mining activities taking place within a wetland.<br>• Distance from open cast area |

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

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMP as well as for inclusion as conditions of authorisation.

**The objectives of impact mitigation and management are to:**

- Primarily pre-empt impacts and prevent the realisation of these impacts - PREVENTION.
- To 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.
- To ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.
- 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 impact management outcomes are:**

- Efficient groundwater recharge.
- Record of Groundwater Levels.

- Limit of the extent of contamination plume.
- Prevention of groundwater pollution.
- Fair compensation for loss of groundwater.
- Prolong period before decanting and allow for decant to be of an acceptable quality.
- Minimised impact on aquifer recharge.
- Maintenance and improvement of water quality in the watercourse.
- Limited noise disturbance.
- No soil erosion on site.
- No soil compaction in areas outside of the construction / operation area.
- Preservation of topsoil and seed bank.
- No soils pollution occurrence.
- Offset of agricultural areas for sustainable co-existence.
- Minimal dust nuisance.
- Minimise the cumulative impact on sense of place.
- Maintenance and conservation of heritage resources.
- Increased employment in the local community.
- Improved economic status locally.
- health and safety issues within the community remain the same or improve.
- Social uplifting of neighbouring communities.

## 3.15 Aspects for inclusion as conditions of Authorisation.

- Adhere to all recommendation and management measures contained in the EMP.
- All relevant permits and authorisation must be obtained prior to construction commencing.
- A search and relocation needs to be undertaken for plant species of importance before any clearance of the site can commence.
- Adhere to all monitoring requirements.
- A water use license must be obtained prior to any water uses undertaken on site.
- Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the development and construction phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended, and the relevant heritage resources authority contacted.
- From a palaeontological perspective – the possibility exists that fossiliferous significant material (plants, insects, bone, coal) may be exposed during the development (construction & operational phase). These materials generally occur below the surface and is of palaeontologic significance. In cases where such material is found, all activities must be suspended pending further palaeontological investigations by a qualified palaeontological scientist.
- Methods of handling the potential decant should be investigated, approved, and set in place prior to mine closure.
- All acoustic screening measures must be in place before commissioning the mining activities.
- No off-road driving, hunting, poaching, or fires should be permitted on the property.
- An incident and complaints register must be present on site and submitted to the Municipality on quarterly basis.

- The applicant must have dust fallout monitoring points around the proposed mining area and have the monitoring reports submitted to the Municipality on quarterly basis.
- The mining layout proposed in this report should be considered with the diversion of clean surface water from the top of the wetland catchment to the depression in the south through berms or cut-off trenches.

## 3.16 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE.

### Paleontology

The following knowledge gaps, limitations and assumptions apply to the study area:

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The site visit and walk through on 15 November 2022 by palaeontologists confirmed that there are no fossils on the surface. The sands of the Quaternary period would not preserve fossils. It is not known if there are fossils below the surface associated with the deeper coal seams.

### Air Quality

A disadvantage of the model is the range of uncertainty of the model predictions could to be -50% to 200% and spatial varying wind fields, due to topography or other factors cannot be included. The accuracy of the model improves with fairly strong wind speeds and during neutral atmospheric conditions.

The stochastic uncertainty includes all errors or uncertainties in data such as source variability, observed concentrations, and meteorological data. Model evaluation studies suggest that the data input error term is often a major contributor to total uncertainty. Even in the best tracer studies, the source emissions are known only with an accuracy of ±5%, which translates directly into a minimum error of that magnitude in the model predictions. It is also well known that wind direction errors are the major cause of poor agreement, especially for relatively short-term predictions (minutes to hourly) and long downwind distances. All of the above factors contribute to the inaccuracies not associated with the mathematical models themselves.

### Archaeological

The pedestrian surveys (December 2022 & February 2023) confirmed that the study area consists of a combination of open grassland, mined areas and cultivated land. Movement was hampered in a few places by wet and marshy conditions and visibility within the cultivated fields were poor. The general visibility of the remaining areas, however, was considered to be good.

### Wetlands and Aquatics

The following constraints may have affected this assessment:

- Sampling by its nature means that the entire study area cannot be assessed. In this case, the entirety of the study site could not be assessed due to time constraints and access restrictions. Therefore, the assessment findings are only applicable to the areas sampled and extrapolated to the rest of the study site. Some reliance was also made on a previous wetland assessment done in the area.
- Formal vegetation sampling was not done by the specialist. All vegetation information recorded was based on the onsite visual observations of the author. Furthermore, only dominant, and noteworthy plant species were recorded. Thus, the vegetation information provided has limitations for true botanical applications.
- The information provided by the client forms the basis of the planning and layouts discussed.
- It should be noted that at the time of the assessment, the exact location of the infrastructure was not available.

- All watercourses within 500 m of any developmental activities should be identified as per the DWS authorization regulations. In order to meet the timeframes and budget constraints for the project, watercourses within the study sites were delineated on a fine scale based on detailed soil and vegetation sampling. Watercourses that fall outside of the site, but that fall within 100 m of the proposed activities were delineated based on desktop analysis of vegetation gradients visible from aerial imagery.
- Deriving a 100% factual report based on field collecting and observations can only be done over several years and seasons to account for fluctuating environmental conditions and migrations. Since environmental impact studies deal with dynamic natural systems additional information may come to light at a later stage.
- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.
- Description of the depth of the regional water table and geohydrological and hydropedological processes falls outside the scope of the current assessment
- Floodline calculations fall outside the scope of the current assessment.
- A Red Data scan, fauna and flora, and aquatic assessments were not included in the current study
- Species composition described for landscape units aimed at depicting characteristic species and did not include a survey for cryptic or rare species.
- The recreation grade GPS used for wetland and riparian delineations is accurate to within five meters.
- Watercourses delineation plotted digitally may be offset by at least five meters to either side. Furthermore, it is important to note that, while converting spatial data to final drawings, several steps in the process may affect the accuracy of areas delineated in the current report. It is therefore suggested that the no-go areas identified in the current report be pegged in the field in collaboration with the surveyor for precise boundaries. The scale at which maps and drawings are presented in the current report may become distorted should they be reproduced by for example photocopying and printing.
- The calculation of buffer zones does not consider climate change or future changes to watercourses resulting from increasing catchment transformation.
- No alternative layouts were available for consideration in this assessment.

## Vegetation

The following limitations is applicable to this report, although none were considered a fatal flaw:

- The results of this report rely on the accuracy of available literature, data from provincial and national data bases and spatial data.
- Vegetation studies should be conducted during the growing season of all plant species that may potentially occur. This may require more than one season's survey with two visits undertaken preferably during November and February. This report relied on a single field survey undertaken on the 18th of November 2022.
- The palatable grass layer was grazed short which hampered the identification of some grass species.
- The proposed development area was sampled, while the larger site boundary, including historically open cast mining, was verified. The site boundary includes an historic open cast mine and infrastructure. The vegetation outside of the proposed development footprint were not assessed or discussed in detail.
- The site visit was undertaken after prolonged rains and the day after a thunderstorm. The clay soil was inundated and could distort the observation of moistness of the site.
- Due to the sensitivities recorded during this project, an Alternative layout was proposed in January 2023. Therefore, some Alternative 2 areas were not directly sampled as the alternative was not known at the time of

the site visit. However, the Alternative 2 utilises historically disturbed areas, including cultivated lands, and therefore this is not considered a fatal flaw.

## Fauna

Despite the animals species guidelines (SANBI, 2020) requiring a more rigorous scientific approach to surveying for biodiversity, the aim of biodiversity assessment in the EIA sector is also to specifically find sensitive features (affects the randomness required by rigorous scientific approach) on site. Therefore final survey meanders deviated on site if and when features were observed on site that needed further investigation. This does mean that in most cases the situation described in the report is accurate at high certainty levels, although there exists a low probability that some aspects may still not have been identified / captured during the studies. Such situations cannot be avoided simply due to the nature of field work.

The animal species guidelines (SANBI, 2020) requires assessment of potential areas of influence. Although visual assessment is completed of neighbouring open space areas, this reports does explore larger areas of influence where relevant (for example downstream and catchment level impacts to potential fauna habitats and ecological corridors, or the migration / dispersion pathways of animals from conservation areas). Working with various fauna means the area of influence varies, but the discussion within this report is deemed to more than adequately address the areas of potential influence, although they are not necessarily mapped.

The site was very overgrown and inundated and animal signs on site were either difficult to spot or were washed away by the rains. Habitat units identified in this report are approximations extrapolated from Google Earth satellite imagery. It must be kept in mind that changes between habitat units are gradual with transitional zones rather than hard edges. The Animal Species Guidelines (SANBI, 2020) only requires the assessment of SCCs (largely IUCN species), which excludes many of our nationally protected and Red-listed species. This report therefore also includes a synopsis of other potential TOP species that may be relevant to site based on citizen science databases, distribution data and broader habitat requirements.

The SEI assessment proposed in SANBI's guideline (SANBI, 2020) must be understood in terms of the activity (it is not a stand-alone assessment):

- Not all the necessary information is available for all SCCs to adequately complete SEI methodology or even fulfil the guideline requirements. SEI can only be appropriately applied if the species has been recorded on site or is known to occur on site. Although the guideline talks about likely species, the protocol and guideline require population-specific information which can be provided only if species have been observed on site. Furthermore, the SEI requires an assessment of the potential of the species to remain or move off site, which can only be completed if the species is known to occur on site.
- SEI has been developed to assess discrete habitat units and is difficult to apply to generalist fauna that may utilise more than one specific habitat unit or large home-range or migrant species. It is also difficult to apply to modified habitats, which are not necessarily habitats critical to the survival of an SCC, but may support SCC populations for certain periods (for example crop fields are not natural habitats but do sustain some SCCs and are listed as habitats utilised by some SCCs).
- Unfortunately the SEI assessment requires a post-impact assessment (requires an activity to take place within the area in order to obtain the ecological importance of the area) which means that the ecological importance of an area varies depending on the type of activity and the density of activity that takes place in the specified area. It is not a baseline rank assessment of the site.
- Due to the above, the SEI of an area is very likely to decrease with sequential applications and developments. For example a medium SEI area for an initial environmental application may become a low SEI area once the

development has taken place, allowing more extensive development to take place in a second environmental authorisation process.

- Furthermore, the ecological importance of a site that will not be directly or indirectly impacted (where receptor resilience is very high) can only attain SEI scores of very low, low or medium, regardless of the sensitivity of the habitat (for example areas of endemism, streams and rivers, ridges).
- Due to the fact that the SEI is activity-dependent, a sensitive habitat that is spared direct and indirect impact is likely to score a lower SEI than a general/slightly disturbed habitat that will be fully and permanently developed.
- All persons reading this report must understand that the SEI rank in no way relates to the preference of the site for development (lower SEI ranks do not mean the site is preferred for development) and only goes to inform the level of mitigation and management required.

The animal species protocols require academic-level information on species population demographics which is not possible with mobile animals that are startled by, and run away from, observers. Where such information is readily available, or can be collected during field surveys, this will be done I accordance with the protocols.

The animal species protocols require that photos of SCCs be published on recognized on-line database facility, with iNaturalist the preferred platform. No photos were captured of the SCCs. Sighting was reported to Dr. Mervyn Lötter, Control Scientist: Biodiversity Planning at the Mpumalanga Tourism and Parks Agency.

It must be stressed that the survey area is a much smaller area within the larger QDGS and Pentad areas utilised for desktop species, and species presented in these databases may not have been recorded at the specific site.

A few species are data deficient species, such as the Maquassie Musk Shrew relevant to this study site. Information on species is limited and extrapolation is often required. A cautionary approach has been taken with this species.

Larger herbivores have not been fully evaluated within this report as these species are actively fenced in and managed within selected areas. Where they are historically recorded TOP species they are included in the relevant tables, but are not further discussed at length. This is further extended to large carnivore predators of such species (e.g. Lion and Cheetah). Rhinos and elephants are completely excluded due to sensitivity of information. As these species are largely restricted to reserves and farms this is not seen as a significant omission.

Some species are confirmed through signs rather than actual sightings. This is not always ideal as the age of the signs are not always known and many species have similar scat / tracks / marks on the environment and species cannot always be fully determined. The more signs the more confidence in the identification of the animal. This limitation must be kept in mind where species are discussed based on signs.

There are inherent errors in mapping programmes which must be considered with all mapping information presented. Citizen Science projects were used for bird (SABAP2) and animal (ADU) baseline data. When utilising data from Citizen Science projects, the following must be kept in mind:

- Public interest in sites may be fickle, and may wane and increase, which could have a direct effect on the number of records available and therefore the number of species recorded.
- Populated areas or popular tourist destinations may have more participants and therefore higher biodiversity data than less populated areas.
- Misidentification of species by the public cannot be excluded, but is not seen as a major problem as this is likely to be a consistent issue from year to year, and a degree of vetting does take place.
- It must also be considered that animals observed in captivity may be recorded by citizens. Such animals should not be considered part of the natural biodiversity but as the data provided by citizen science sites do not make such distinctions, it cannot be separated from the biodiversity data presented in this report.

Due to the low resolution of some distribution maps and the mobility of animals, distribution data utilised to present animal lists are not 100% accurate. Proper distribution data for the TOP invertebrates is scant and it is difficult to conclusively state if every species does or does not occur in the area.

Waste

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

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

The EAP believes that the authorisation for the activity on the Portion 8 of the Farm Boschmanspoor 159 IS be granted. The site area is located in a modified area (previous mining operations) and is in close proximity to other existing mining operations. The risks of the proposed project and opencast section are however highl but can be mitigated by following the mitigation measures stipulated in the EMP and effective wetland offset strategy. This will reduce impacts significantly to acceptable levels.

### Conditions that must be included in the authorisation

- Adhere to all recommendation and management measures contained in the EMP.
- All relevant permits and authorisation must be obtained prior to construction commencing.
- A search and relocation needs to be undertaken for plant species of importance before any clearance of the site can commence.
- Adhere to all monitoring requirements.
- A water use license must be obtained prior to any water uses undertaken on site.
- Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the development and construction phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended, and the relevant heritage resources authority contacted.
- From a palaeontological perspective – the possibility exists that fossiliferous significant material (plants, insects, bone, coal) may be exposed during the development (construction & operational phase). These materials generally occur below the surface and is of palaeontologic significance. In cases where such material is found, all activities must be suspended pending further palaeontological investigations by a qualified palaeontological scientist.
- Methods of handling the potential decant should be investigated, approved, and set in place prior to mine closure.
- All acoustic screening measures must be in place before commissioning the mining activities.
- No off-road driving, hunting, poaching, or fires should be permitted on the property.
- An incident and complaints register must be present on site and submitted to the Municipality on quarterly basis.
- The mining layout proposed in this report should be considered with the diversion of clean surface water from the top of the wetland catchment to the depression in the south through berms or cut-off trenches.
- The applicant must have dust fallout monitoring points around the proposed mining area and have the monitoring reports submitted to the Municipality on quarterly basis.

## 3.18 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED.

9 Years.

## 3.19 UNDERTAKING

Confirm 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 Basic assessment report and the Environmental Management Programme report.

For the undertaking refer to Part B: EMP.

## 3.20 FINANCIAL PROVISION

| CALCULATION OF THE MINE CLOSURE QUANTUM | | | | | | | | Version 0.0: Annual Mine Closure Quantum Update for FY2022 |
|---|---|---|---|---|---|---|---|---|
| Mine: OPTIMUM COLLIERY | | | | | Province: Mpumalanga | | | |
| Evaluators: Eco Elementum (Pty) Ltd | | | | | Date: Mar 2023 | | | |
| General Information | Risk Class | High (A) | OPTIMUM COLLIERY (BOSCHMANSPOORT) | | | | | |
| | Environmental Sensitivity | Medium | | | | | | |
| | WF 1: Nature of Terrain Weighting Factor | Flat 1.00 | | | | | | |
| | WF 2: Proximity to Urban Area Weighting Factor | 1.05 | | | | | | |
| Component No | Main Activities Itemized Descriptions | [B] CPI Adjusted Master Rate | [A] Quantity | Units | [C] Multiplication Factor | [D] Weighting Factor 1: | Sub Totals [E = A*B*C*D] | NOTES & SUPPORTING EXPLANATIONS |
| | | STEP 4.3 | STEP 4.5 | | STEP 4.3 | STEP 4.4 | | |
| 1 | Dismantling of processing plant and structures | R 17,46 | 18450,00 | m3 | 1,00 | 1,00 | R 322 108,77 | Plant structures |
| 2(A) | Demolition of steel buildings and structures | R 243,13 | 0,00 | m2 | 1,00 | 1,00 | R 0,00 | Mobile container type structures |
| 2(B) | Demolition of reinforced concrete buildings and structures | R 358,39 | 0,00 | m2 | 1,00 | 1,00 | R 0,00 | n/a |
| 3 | Rehabilitation of access roads | R 43,52 | 85643,00 | m2 | 1,00 | 1,00 | R 3 727 027,46 | Haul roads and other roads (some roads will remain in agreement with landowner) |
| 4(A) | Demolition and rehabilitation of electrified railway lines | R 422,38 | 0,00 | m | 1,00 | 1,00 | R 0,00 | n/a |
| 4(B) | Demolition and rehabilitation of non-electrified railway lines | R 230,39 | 0,00 | m | 1,00 | 1,00 | R 0,00 | n/a |
| 5 | Demolition of housing and facilities | R 486,38 | 0,00 | m2 | 1,00 | 1,00 | R 0,00 | Mobile container type structures |
| 6 | Opencast rehabilitation including final voids and ramps | R 247 541,65 | 25,00 | ha | 0,52 | 1,00 | R 3 218 041,39 | Total opencast and voids |
| 7 | Sealing of shafts, adits and inclines | R 130,55 | 0,00 | m3 | 1,00 | 1,00 | R 0,00 | n/a |
| 8(A) | Rehabilitation of overburden and spoils | R 169 976,89 | 14,06 | ha | 1,00 | 1,00 | R 2 389 875,07 | Total overburden and spoils |
| 8(B) | Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste) | R 211 703,14 | 0,00 | ha | 1,00 | 1,00 | R 0,00 | n/a |
| 8(C) | Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste) | R 614 886,28 | 1,37 | ha | 0,80 | 1,00 | R 673 315,36 | Crushing & Screening, ROM & PCD |
| 9 | Rehabilitation of subsided areas | R 142 330,05 | 0,00 | ha | 1,00 | 1,00 | R 0,00 | n/a |
| 10 | areas | R 134 650,37 | 5,00 | ha | 1,00 | 1,00 | R 673 251,85 | General surface disturbance areas |
| 11 | River diversions | R 134 650,37 | 0,00 | ha | 1,00 | 1,00 | R 0,00 | n/a |
| 12 | Fencing | R 153,59 | 5477,00 | m | 1,00 | 1,00 | R 841 232,01 | Removal of all fencing |
| 13 | polluted water and managing the impact on groundwater, including treatment, when required) | R 51 197,86 | 1,37 | ha | 0,67 | 1,00 | R 46 934,51 | Refer item 8(C) |
| 14 | 2 to 3 years of maintenance and after care | R 17 313,25 | 45,43 | ha | 1,00 | 1,00 | R 814 071,55 | Entire disturbed footprint |
| 15 | Specialist study | R 165 000,00 | 1,00 | report | 1,00 | 1,00 | R 165 000,00 | Final closure study: GNR1147 Format |
| | | | | | | Subtotal (1 to 15 above) | R 12 871 517,98 | |
| | Subtotal 1 | | Weighting Factor 2 | | | 1,05 | R 13 515 093,88 | |
| 1 | Preliminary and General | | 12% of Subtotal 1 if less than R100mil<br>6% of Sub Total 1 if more than R100mil | | | | R 1 621 811,27 | |
| 2 | Contingency | | 10% of Sub Total 1 | | | | R 1 351 509,39 | |
| | Subtotal 2 (Subtotal 1 plus sum of management and contingency) | | | | | | R 2 973 320,65 | |
| | Subtotal 3 | | | | | | R 16 488 414,54 | |
| | GRAND TOTAL (Subtotal 3 plus 15% VAT) | | | | | | R 18 961 676,72 | |

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Figure 3-54: Financial Provision

Explain how the aforesaid amount was derived.

Rates were provided by the DMRE for calculation of the financial provision.

A bill of quantity was determined for each of the units and applied to the rates to determine a closure cost per unit. The unit costs determined the category costs and the category costs resulted in a preliminary closure cost also called Sub-Total 1. A contingency of 10% was included on Subtotal 2 to obtain a Financial Liability Cost in Subtotal 3. Finally, a 15% VAT was added to Subtotal 3 to obtain a subtotal 4. Subtotal 3 is regarded as the Final closure liability of the mine.

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

The applicant confirms that this amount will be provided for.

## 3.21 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the EIA report must include the:

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

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an **Appendix D**.

| | | | |
|---|---|---|---|
| **Mining operations.** | Employment and income opportunity. | Med - | Med - |
| **Employee training.** | Upskilling of Labour force. | Low-Med + | Low-Med + |
| **Coal production and sales.** | Increased Public revenue. | Low-Med + | Low-Med + |
| **Social Development Plan.** | Increase in Local Economic Development Funds. | Low-Med + | Low-Med + |
| **Employment creation.** | Project Induced In-Migration. | Low-Med + | Low-Med + |
| **Increased traffic Mining related hazards Increased dust Water quality deterioration Historical subsidence Blasting.** | Safety and Health Risks. | Med - | Low-Med + |
| **Open pit establishment.** | Change in sense of place. | Low-Med + | Low-Med + |
| **Mine closure.** | Job losses. | Med-High - | Med - |
| **Mine Closure.** | Decrease/termination of community investment funds and support to local communities. | Med-High - | Med - |
| **Water quality deterioration Historical subsidence.** | Safety and Health Risks. | Med - | Low-Med + |

*3.21.1.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act. (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).*

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

Section 24(4) (b) (i) of the Act specifies "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".

The alternatives assessed and the impacts associated with the alternatives assessed have been fully presented in Section 3.8 and Section 0.

# PART B

# ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

# 4. ENVIRONMENTAL MANAGEMENT PROGRAMME

## 4.1 DETAILS OF THE EAP

(Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

Name of The Practitioner: Riana Panaino

Tel No.: 012 807 0383

e-mail address: riana@ecoe.co.oza

## 4.2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

Optimum Colliery intends to mine coal resources on a +/- 25ha portion of a portion of Portion 8 of the Farm Boschmanspoort 159 IS in the Mpumalanga Province. The resource will be mined via opencast roll over mining. The following activities will be undertaken on site:

- Box cut opencast mining with a roll over rehabilitation sequence;
- Hauling, access road, haul road;
- Mobile office;
- Mobile sanitation and change house;
- Mobile fuel storage;
- Pollution control facility/dam(s);
- Clean and dirty water separation system;
- Topsoil, subsoil, overburden, ROM stockpiles;
- Weighbridge; and
- Waste management.

### Site Preparation

Site preparation mainly deals with the stripping and stockpiling of topsoil prior to the mining activities commencing as this might affect the quality and quantity of available valuable topsoil resources. The main objectives of soil management are to:

- Minimal removing and stockpiling of topsoil due to historical mining activities;
- Optimise the preservation and recovery of topsoil for rehabilitation;
- Identify soil resources and stripping guidelines;
- Identify surface areas requiring stripping (to minimise over clearing);
- Manage topsoil reserves to not degrade the resource;
- Identify stockpile locations and dimensions; and
- Identify soil movements for rehabilitation use.

In accordance with the objective of providing sufficient stable soil material for rehabilitation and to optimise soil recovery, the following strategies have been adopted:

- Stockpiles to be located outside proposed mine disturbance areas;
- Construction of stockpiles by dozers rather than scrapers to minimise structural degradation;
- Construction of stockpiles with a “rough” surface condition to reduce erosion hazard, improve drainage and promote revegetation; and

- Revegetation of stockpiles with appropriate fertiliser and seed to minimise weed infestation, maintain soil organic matter levels, soil structure and microbial activity and maximise the vegetative cover of the stockpile depending on the exposure timeframes.

Disturbance areas will be stripped progressively (i.e. only as required) to reduce erosion and sediment generation, to reduce the extent of topsoil stockpiles and to utilise stripped topsoil as soon as possible for rehabilitation. Rehabilitation of disturbed areas (i.e. roads, embankments and stripped mining footprint) will be undertaken as practicable after these structures are completed or as areas are no longer required. Soil surveys over the open cut area, beneath proposed mine waste emplacements and other infrastructure areas will determine the depth of topsoil. It should be noted that it is important that for topsoil recovered from the areas it is required that underlying material is not inadvertently collected since it is unsuitable for reuse in rehabilitation.

A general protocol for soil handling is presented below and includes soil handling measures which optimise the retention of soil characteristics (in terms of nutrients and micro-organisms) favourable to plant growth:

- The surface of the completed stockpiles will be left in a “rough” condition to help promote water infiltration and minimise erosion prior to vegetation establishment;
- Topsoil stockpiles to have a maximum height of 3 m to limit the potential for anaerobic conditions to develop within the soil pile;
- Topsoil stockpiles to have an embankment grade of approximately 1V:4H (to limit the potential for erosion of the outer pile face);
- Topsoil stockpiles will be seeded and fertilised; and
- Soil rejuvenation practices will be undertaken if required prior to re-spreading as part of rehabilitation works.

### Box Cut Opencast Mining with a Roll-over Rehabilitation Sequence

Opencast mining using the truck and shovel lateral sequential rollover mining method will be undertaken. Mining will commence from the initial box cut. A haul road that will be extended from the nearby existing road will be used as access to the mining area.

The soft overburden will be removed by mechanical methods. The hard overburden will be drilled and blasted and then removed by mechanical methods. The coal will be drilled and blasted prior to removal.

Replacement of overburden materials into the mining pit will be according to the following sequence:

1. Placement of hard overburden at base of pit;
2. Placement of soft overburden; and
3. Final cover of topsoil (minimum 500 mm).

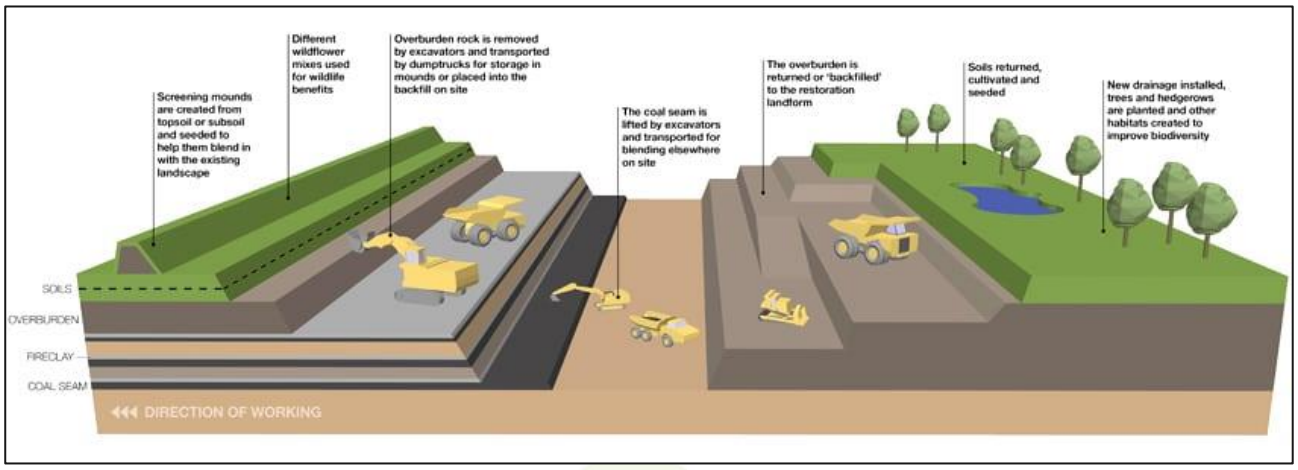


**Figure 4-1: Typical Opencast Concurrent Roll Over Rehabilitation Mining Technique**

## ROM Coal

The Run of Mine (RoM) will be loaded and hauled to the designated off-site beneficiation plant.

## Access and Haul Roads Construction

The dirt road will be upgraded to the applicable standards which includes a gravel road leading into the mine. The road will be used to access the mine offices, ablution facilities, workshop complex, and mining area. Coal transportation trucks will also use this road to enter and exit the mine premises, including travelling to the weighbridge.

## Semi Temporary Site and Security Offices

The site offices for the project, including a small security hut (existing) will consist of container-type site offices that is commercially available as off the shelve products, as illustrated in the image below. Upon project commencement, the applicant will explore the possibility of upgrading the existing facilities on site to further ensure minimal construction requirements on site and also minimal footprint. Keeping the disturbance area minimal and ensuring ease of mine closure and rehabilitation after life of mine make the temporary offices ideal, especially considering the short duration of the proposed activities and requirement of these offices.

**Figure 4-2: Typical semi temporary site offices and security office**

## Semi Temporary Sanitation and Change House

Similar to the structure indicated in the section above, will the semi temporary sanitation and change house also be container type facilities which can easily be brought to site and also removed after life of mine. For the change house and ablution facility a septic tank system will be implemented which is temporary of nature and can also be decommissioned easily. The septic tank system will ensure a 'honey-sucker' type sewage removal vehicle can remove and dispose of sewage at an appropriate facility off site. This ensures no major construction and approval is required for a full-scale sewage treatment facility. Mobile chemical toilets will also be used where necessary and supplied by an approved contractor who will be responsible for the management of these toilets. Water requirements relating to ablutions and drinking water are expected to be minimal and if water cannot be sourced on site from a borehole it will be brought in by a tanker. As mentioned above the applicant will explore the opportunity to make use of the existing facilities on site.

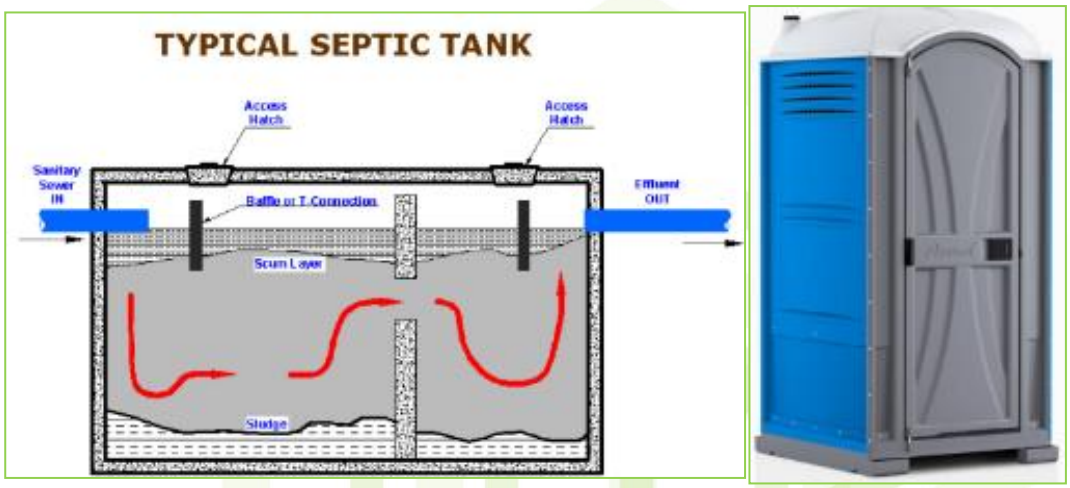


Figure 4-3: Typical septic tank cross section and chemical toilet illustration

## Mobile Fuel Storage

The main fuel storage will be diesel in a mobile fuel storage tank with a drip tray designed to hold 110% the capacity of the tanks. The fuel bowser will be stored off site.

Figure 4-4: Typical mobile fuel storage trailer with bunded tray

## Pollution Control Facility/Dam (Evaporation and Dust Suppression Usages)

Pollution control dams (PCDs) form an integral and important part of the water management systems on a mine. Different types of PCDs may exist on a mine site, such as process water dams, storm water dams, evaporation dams and other dams, possibly including excess mine water dams and natural pans.

The purpose of PCDs for the mine and in the water management circuits are to:

- Minimise the impact of polluted water on the water resource;
- Minimise the area that is polluted as far as possible, by separating out clean and dirty catchments; and
- Capture and retain the dirty water contribution to the PCDs that cannot be discharged to the water resource, due to water quality constraints, and manage this dirty water through recycling, reuse, evaporation and/or treatment and authorised discharge.

The image below is an illustration of the typical PCD that will be constructed.

**Figure 4-5: Lined PCD illustration**

## Clean and Dirty Water Separation

A detailed surface water management plan will be drawn up as part of the WULA including the determination of flood lines, identification of sensitive receptors and existing surface water systems and flow paths, and civil engineering design reports for the required trenches and water management facilities. The Geohydrological investigation will also feed into these designs as the anticipated pollution will be modelled. Trenching around the mining area forms part of the clean and dirty water separation and is to a large extent based on the water balance as calculated by the civil engineering team. The image below is a typical illustration of aspects to consider during the calculation of the opencast mining area water balance.

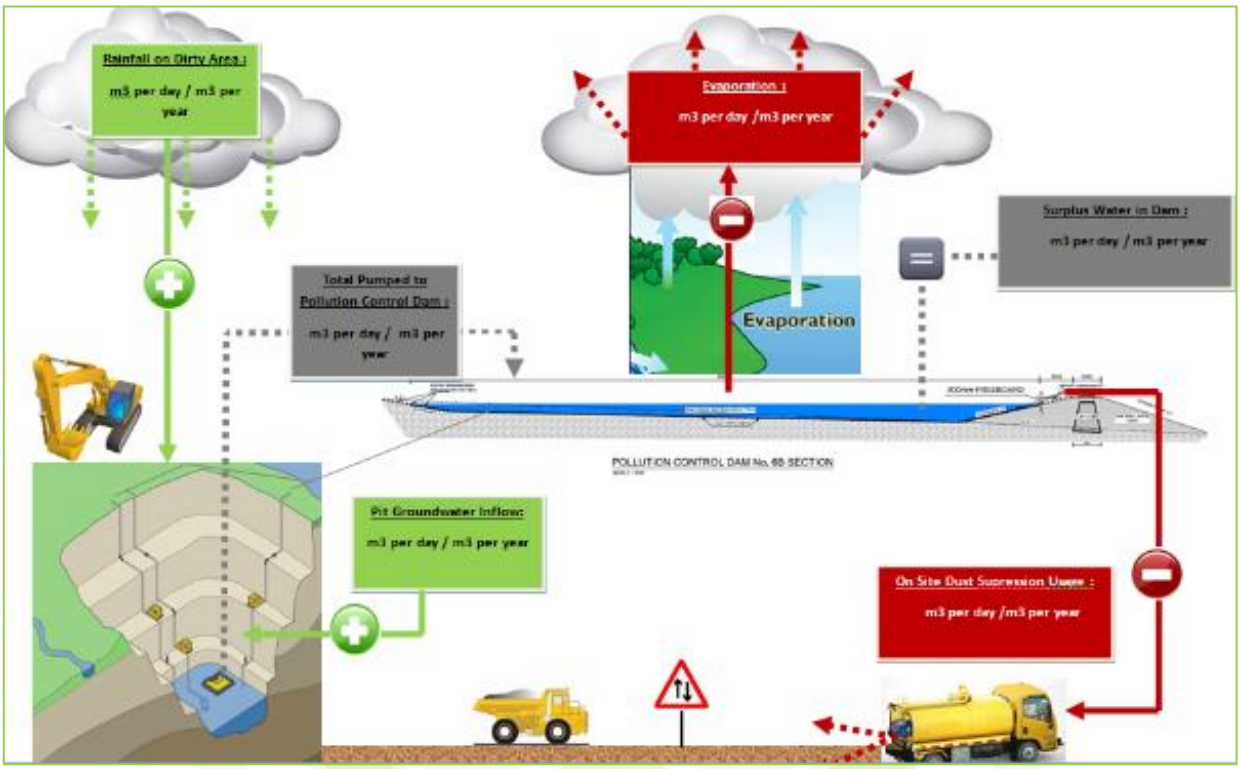


**Figure 4-6: Typical water balance considerations during the design of a clean and dirty water separation system**

Further images for clarification purposes have been provided below to indicating cross sections of both the dirty water and clean water diversion trenches which will be constructed around the mining area. These designs will also form part of the final master plan to be implemented during the Water Use License Application.

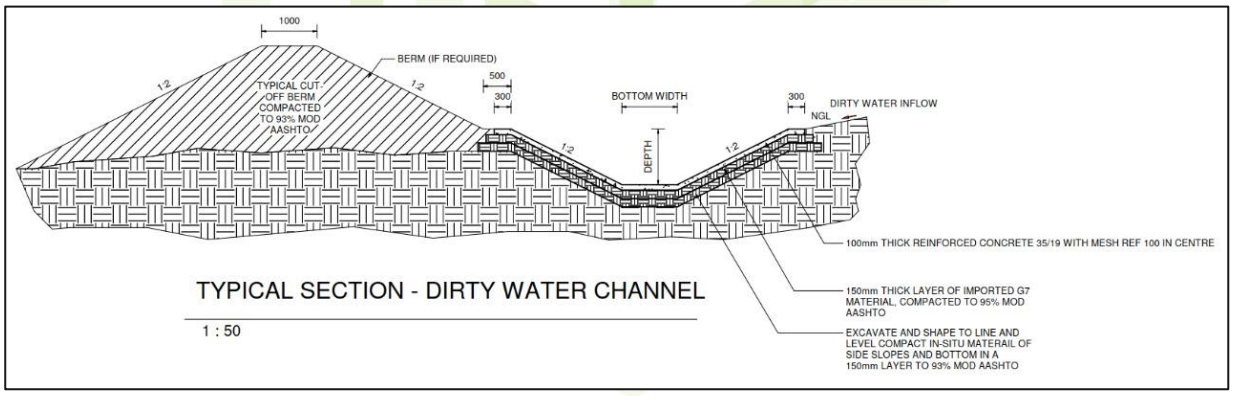


**Figure 4-7: Typical Channel / Berm Cross Section For Polluted Water Diversion**

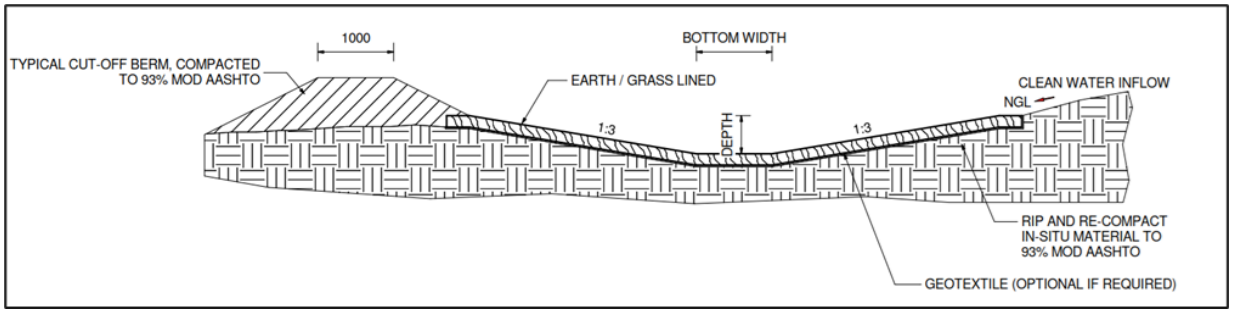


**Figure 4-8: Typical channel/berm cross section for clean water diversion**

## Fencing

Fencing of the entire mining area will be required as a means of ensuring safety and also keeping trespassers at bay. Fences will be clearly demarcated, and appropriate signage will be displayed, similar to the signs in the images below. Fencing of the sensitive receptors such as wetlands will also take place ensuring no mining personnel will enter these areas and that it will remain protected for the duration of the project. Sites of archaeological and heritage importance will also need to be fenced off while safe access to these sites will be provided. The necessary signage will also be erected at sites of archaeological and/or heritage importance to ensure visitors can easily and safely access the premises.


Figure 4-9: Typical mine fence signage

## Staff and Visitors Parking

Existing and proposed designated parking areas will be upgraded and constructed by compaction of the subsoil after removal, storage and preservation of the valuable layer of topsoil. Storm water management control around these areas will be implemented while the necessary signage will be erected to ensure optimal safety while reverse parking will be implemented at all parking bays. The necessary waste receptacles as well as oil spill kits will be provided at these sites in case of accidental spillage or leakage of hydrocarbon fuel/oil/greases from the vehicles.

## Drilling and Blasting

Blasting of mine overburden to allow efficient recovery of the underlying coal can have impacts on the surrounding community. These impacts mainly include vibration through the air (overpressure) and earth (ground vibration) along with the generation of dust and fume. Overpressure and ground vibration limits in place for private residences and heritage structures are prescribed by government based on standards. Blasts are designed and managed to minimise the risk of exceeding these limits, and to minimise impacts they have on the community, surrounding structures and environment.

Due to the nature of the activities associated with open cast activities, blasting will mainly occur during the construction phase of the initial box cut, however, subsequent blasting to remove overburden and gain access to the mineral reserve will also take place during the life of mine. A suitably qualified blasting contractor will be appointed to construct a blasting design and conduct blasting activities. There will be no explosives magazine on site and the blasting contractor will be required to supply the explosives and consumables required to blast.

## Topsoil, Subsoil, Overburden Stockpiles

All topsoil, subsoil and overburden material will be removed during the mining operation and stockpiled separately for the purpose of backfill rehabilitation. The topsoil stockpiles will not exceed a height of six meters which is high enough to reduce leaching impacts of stockpiled topsoil. The subsoil and overburden stockpiles will however exceed this height.

## Waste Management

Waste will be generated from the start to the decommissioning of the project. It is proposed that the waste that would be generated on site would be managed by reducing, reusing and recycling as far as possible. A certified and approved external contractor will be responsible for the removal and disposal of the waste at a registered landfill.

## 4.3 COMPOSITE MAP

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

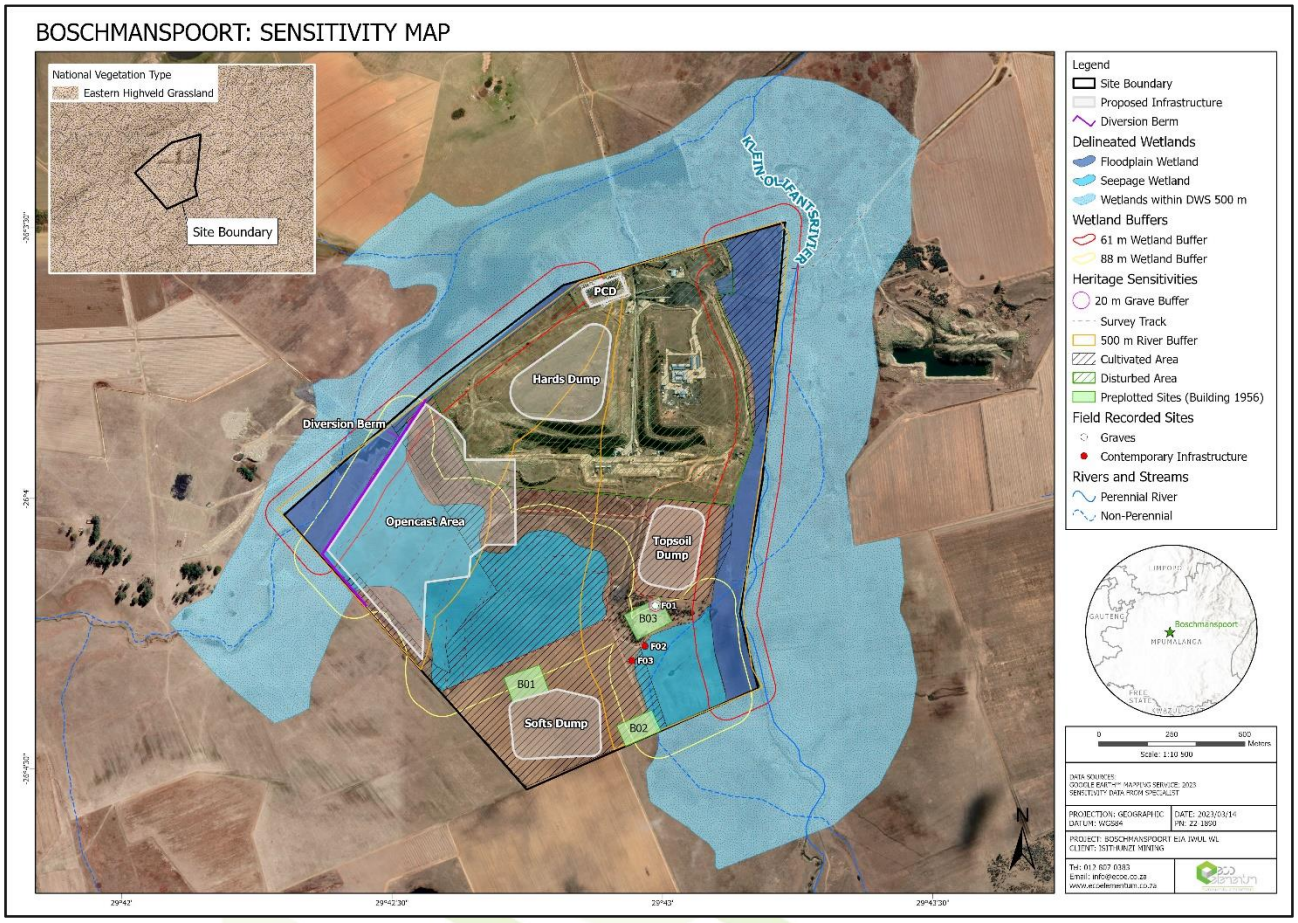


**Figure 4-10: Composite Map**

## 4.4 Description of Impact Management Objectives including Management Statements

### Determination of closure objectives.

The closure vision is supported by the objectives as listed below;

- Create a safe, physically stable rehabilitated landscape that limits long-term erosion potential and environmental degradation;
- Sustain the long term catchment water yield and ensure suitable water quality;
- Rehabilitation of the surface infrastructure where necessary to minimize infiltration into the underground water regime (the philosophy of concentration and containment);
- Rehabilitation to minimise contamination of surface water resources (the philosophy of dilution and dispersion);
- Focus on establishing a functional post-mining landscape that would ensure self-sustaining agricultural practices post mine closure where possible;
- Ensure interconnectivity between the rehabilitated landscapes with surrounding regionally biologically diverse areas;
- Encourage, if and where required, the re-instatement of terrestrial and aquatic wetland biodiversity over time; and
- Create opportunities for alternative post-mining livelihoods by aligning to the regional planning;
- Meet with prevailing environmental legal requirements outlined in this report; and
- Prevent / Minimise negative impacts and risks as identified in this report.

### Volumes and rate of water use required for the operation.

Only a small volume of water will be required for the mining activities. Approximately 500 $m^3$ of water will be used per day for mining activities. Water will also be brought onto site for potable use, this is estimated at 5 litres per person/day.

### Has a water use licence has been applied for?

A WUL will be applied for, for activities that trigger Section 21 Water Uses.

### Impacts to be mitigated in their respective phases.

## Table 4-1: Impacts to be mitigated in their respective phases, Impact Management outcomes, Impact Management Action

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| **Heritage** | | | | | | | | | | |
| Subsurface activity. | Subsurface culturally significant material. | Destruction of subsurface culturally significant material. | Operational. | Monitor material unearthed. | Monitor subsurface material during development and construction phases and contact a qualified archaeologist should culturally significant material be observed. | Prevent impact on subsurface culturally significant material. | Limit impact on subsurface culturally significant material. | National Heritage Resources Act 25 of 1999. | Control through management and monitoring. | During Operation |
| **Palaeontological** | | | | | | | | | | |
| Excavations / drilling / mining activities begin | Clearance of site and excavations | Destruction of subsurface palaeontological significant material. | Construction | Apply the Fossil Chance Find Protocol described as part of the action plan. | Fossil Chance Find Protocol<br><br>The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.<br><br>When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.<br><br>Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.<br><br>If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the | Prevent impact on subsurface palaeontological significant material. | Limit impact on subsurface palaeontological significant material. | National Heritage Resources Act 25 of 2000. | Control through management and monitoring. | During site clearance and more specifically whenever subsurface material removal occurs. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | selected material and check the dumps where feasible.<br><br>Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.<br><br>If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.<br><br>If no fossils are found and the excavations have finished then no further monitoring is required. | | | | | |
| **Noise** | | | | | | | | | | |
| Construction and clearing activities. | Offloading of construction materials;<br>Excavations and backfilling where required;<br>Concrete mixing and batching;<br>Use and maintenance of roads;<br>Machinery noise from construction related activities. | Increased Noise levels | Construction | Construct a Noise Barrier between the main noise source noise sensitive receivers<br>Equipment Maintenance<br>Implement Road rules. | • A noise barrier in the form of a berm, tree break or similar noise fence should be constructed on the mine boundary<br>• Construction and mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers.<br>• Switching off equipment when not in use.<br>• Fixed noise producing sources such as generators, pump stations and crushers to be to be either housed in enclosures or barriers put up around the noise source void the use of engine compression brakes when approaching the site entrance or driving through or in | Minimise noise disturbance. | Zero noise disturbance complaints. | SANS 10103 | Control through management and monitoring. | Prior to construction. Ongoing maintenance throughout LoM. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | the vicinity of the adjacent town.<br>• All access roads will be signposted and speed limited to minimise transport noise.<br>• Equipment with lower sound power levels would be used in preference to noisier equipment.<br>• The on-site road network will be well maintained to limit body noise from empty trucks travelling on internal roads. | | | | | |
| Operational Activities | Use and maintenance of haul roads (incl. transportation of material to site and offsite),<br>Removal of material (mining process) and stockpiling,<br>Machinery and excavation noise,<br>Trucks clearing their load bins before loading,<br>Vehicle travelling to and from site on a daily basis. | Increased Noise levels. | Operation | Construct a Noise Barrier between the main noise source noise sensitive receivers<br>Equipment Maintenance<br>Implement Road rules. | • A noise barrier in the form of a berm, tree break or similar noise fence should be constructed on the mine boundary<br>• Construction and mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers.<br>• Switching off equipment when not in use.<br>• Fixed noise producing sources such as generators, pump stations and crushers to be to be either housed in enclosures or barriers put up around the noise source<br>void the use of engine compression brakes when approaching the site entrance or driving through or in the vicinity of the adjacent town.<br>• All access roads will be signposted and speed limited to minimise transport noise.<br>• Equipment with lower sound power levels would be used in preference to noisier equipment.<br>• The on-site road network will be well maintained to limit body noise from empty trucks travelling on internal roads. | Minimise noise disturbance. | Zero noise disturbance complaints | SANS 10103 | Control through management and monitoring. | Prior to construction. Ongoing maintenance throughout LoM. |
| Decommissioning activities | Demolition & Removal of all infrastructure (incl. transportation off site),<br>Reshaping of the area that was mined, | Increased Noise levels | Closure and Decommissioning | Equipment Maintenance<br>Implement Road rules. | • mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers.<br>• Switching off equipment when not in use.<br>Avoid the use of engine compression | Minimise noise disturbance. | Zero noise disturbance complaints. | SANS 10103 | Control through management and monitoring. | Ongoing maintenance throughout LoM. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rehabilitation - spreading of soil, re-vegetation & profiling/contouring with heavy machinery, Aftercare and maintenance of rehabilitated areas. | | | | brakes when approaching the site entrance or driving through or in the vicinity of the adjacent town.<br>• All access roads will be signposted and speed limited to minimise transport noise.<br>• Equipment with lower sound power levels would be used in preference to noisier equipment. | | | | | |
| **Ecological Impacts** | | | | | | | | | | |
| Construction and operational activities | New access routes<br>Site clearing for opencast area<br>Placement of cleared topsoil into allocated stockpiles<br>Use of heavy machinery<br>Increased traffic<br>Bank erosion. | Flow alterations due to erosion and sedimentation. | Construction and Operation | • Rehabilitation of the disturbed areas;<br>• Limiting instream sedimentation;<br>• Minimising pollutants entering the watercourse<br>Erosion control measures must be employed where required. | • Design and implementation of a suitable stormwater system;<br>• Implement a programme for the clearing/eradication of alien species including long term control of such species;<br>• Water quality monitoring must take place every month during operational phases; and<br>• Wetland monitoring and biomonitoring must take place bi-annually.<br>• A topsoil stripping and stockpiling guideline must be completed to ensure rehabilitation success.<br>• Attenuation measures must include, but are not limited to - the use of sand bags, erosion control blankets, and silt fences.<br>• Long term attenuation measures, such as attenuation/infiltration trenches, swales must be established to control stormwater from hardened surfaces<br>• Vegetation clearing must be undertaken as and when necessary in phases.<br>• Install sediment barriers (silt catchers and Reno mattresses) along any drainage areas to prevent the migration of silt.<br>• Exposed soils must be rehabilitated as soon as practically possible to limit the risk of erosion.<br>• All roads need to be maintained and any erosion ditches forming along the road filled and compacted.<br>• Demarcate wetland areas to avoid unauthorised access. | prevent undesirable change in surface water flow. | improve and maintain natural flow where possible. | 0 | Modify through design measures. | Ongoing concurrent rehabilitation. |
| Construction and operational activities. | Increased traffic leading to potential accidental spills of hydrocarbon materials<br>Hazardous materials entering the watercourses<br>Acid Mine Drainage<br>Increased road runoff during rainfall events | Pollution of watercourse. | Construction, Operation. | | | prevent pollution of the downstream watercourse. | Effective pollution and dirty water management of the mining site, and no pollution of the downstream watercourse. | | Control through management and monitoring. | Ongoing concurrent rehabilitation. |
| Operational, decommissioning and rehabilitation activities. | Increased runoff from hardened surfaces<br>Further spread of plants and seedlings<br>Increased traffic. | Spread of alien vegetation. | Operational, Closure and Decommissioning. | | | prevent an increase in alien and invasive species. | effective management of alien and invasive species. | | Control through management and monitoring. | Ongoing concurrent rehabilitation. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | • No washing of any equipment in close proximity to a watercourse is permitted.<br>• No releases of any substances that could be toxic to fauna or faunal habitats within the channels or any watercourses is permitted.<br>• Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities<br>• Portable toilets must be placed on impervious level surfaces that are lipped to prevent spillage. The general consensus is that they should be within 30 m to 50 m of a work face<br>• Re-instate indigenous vegetation (grasses and indigenous trees) in disturbed areas. | | | | | |
| **Groundwater** | | | | | | | | | | |
| Surface clearing and preparation. | Removal of vegetation. | Increase in surface run-off and therefore decrease in aquifer recharge. | Construction | Re-vegetate. | Rehabilitation plan. | Re-vegetate to pre-mining conditions. | Recharge to be close to -pre-mining conditions. | SANS241:2015. | Remedy through control measures. | Storm water Management to be constructed prior to other infrastructure establishment. |
| Box cut opening. | Dewatering. | Decrease in water level should the pit floor be lower than the water level. | Construction | No management can be incorporated to limit the impacts of dewatering should the box-cut floor be lower than the groundwater level. | Quarterly monitoring of monitoring boreholes. | N/A | N/A | N/A | Control through management and monitoring | N/A |
| Topsoil and overburden stockpiling. | Leaching from stockpiles. | Acid generation in the case of carbonaceous material placement. | Operation | Should a contamination plume be detected, groundwater abstraction to contain plume. | Quarterly monitoring of monitoring boreholes. | Prevent leaching into the environment. | No spills of polluted water into the environment or contamination of the Groundwater Aquifer. | SANS241:2015 | Control through management and monitoring. | Storm water Management to be constructed prior to other infrastructure establishment. |
| ROM stockpiling. | Leaching from stockpiles. | Acid generation as a result of | Operation | Should a contamination plume be detected, | Quarterly monitoring of monitoring boreholes. | Prevent leaching into the environment. | No spills of polluted water into the | SANS241:2015 | Control through management | Storm water Management to be constructed |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | carbonaceous material. | | groundwater abstraction to contain plume. | | | environment or contamination of the Groundwater Aquifer. | | and monitoring. | prior to other infrastructure establishment. |
| Pollution Control Dams | Seepage should lining fail or dam overflow. | Contaminated water in the dams can seep to the aquifer. | Operation | Should a contamination plume be detected, groundwater abstraction to contain plume. | Quarterly monitoring of monitoring boreholes. | Prevent leaching into the environment. | No spills of polluted water into the environment or contamination of the Groundwater Aquifer. | SANS241:2015 | Control through management and monitoring. | Storm water Management to be constructed prior to other infrastructure establishment. |
| Hydrocarbon spills. | Plume migration. | Spills from mining vehicles can infiltrate to the aquifer and cause a down gradient plume migration. | Operation | Clean any hydrocarbon spills in the appropriate manner. | Report any hydrocarbon spillage. | Prevent spills and pollution on site. | Effective prevention of the pollution of the groundwater resource. | SANS241:2015 | Control through management and monitoring. | Storm water Management to be constructed prior to other infrastructure establishment. Ongoing monitoring. |
| Pit dewatering | Dewatering | The water infiltrating the pit will be removed for safe mining, causing a decrease in the water level. | Operation | No management can be incorporated to limit the impacts of dewatering. | Quarterly Monitoring. Compensate users for losses. Monitor pit inflow rates, Annual Monitoring report, Update Numerical Model. | N/A | N/A | N/A | Control through management and monitoring. | N/A |
| Topsoil and overburden removal. | Placement of topsoil and overburden into pit. | Carbonaceous material, if any in the overburden, will be placed at the bottom of the pit as to prevent or minimise the exposure to oxygen and potential acid generation. | Closure and decommissioning | Remove the top soil and overburden dumps during rehabilitation. Placement of carbonaceous material at bottom of pit. | Rehabilitation Plan- placement of topsoil and overburden in pit. | Prevent leaching into the environment. | No spills of polluted water into the environment or contamination of the Groundwater Aquifer. | SANS241:2015 | Control through management and monitoring. | During Closure |
| Backfilling. | Reshaping of area | Adequate backfilling and rehabilitation will decrease aquifer recharge. The period to decant will therefore be prolonged. | Closure and decommissioning | Carbonaceous material at deeper base of pit. Rehabilitation to direct surface runoff away from pit and recharge to pit minimized. Flow | Refer to rehabilitation plan. | Treatment of poor quality decant to an acceptable quality. | Release of acceptable quality water to the downstream environment. | SANS241:2015 | Remedy through control measures. | Passive treatment establishment before mine closure. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | paths including fracture zones sealed. | | | | | | |
| Revegetation | Reshaping of area and revegetating the area. | Increase surface runoff over the rehabilitated opencast, therefore decreasing aquifer recharge. | Rehabilitation | Remove the ROM stockpile and PCD's. This will eliminate the ROM stockpile and PCD's as potential sources. | Rehabilitation Plan. | Prevent leaching into the environment. | No spills of polluted water into the environment or contamination of the Groundwater Aquifer. | SANS241:2015 | Control through management and monitoring. | During Closure |
| Backfilling of pit. | Backfilling of the pit and no more dewatering. | Recovery of the water level in the pit as dewatering ceases. In the case of acid generation, the plume will start to move away from the pit as the water level recovered. Decanting may occur once the water level has recovered to the decanting elevation. | Rehabilitation | Keep water level in pit lower than level in nearby streams. Maintain water level below decant level (e.g. abstraction). Investigate implementation of cut-off trench. | Abstracted/decant water to be treated or handled in appropriate manner and within legislation. Continue quarterly monitoring post-closure. | Treatment of poor quality decant to an acceptable quality. | Release of acceptable quality water to the downstream environment. | SANS241:2015 | Remedy through control measures. | Passive treatment establishment before mine closure. |
| **Surface Water** | | | | | | | | | | |
| Construction activities. | Vegetation clearance and site establishment. | Sedimentation and pollution of the watercourse. | Construction Phase. | Separate clean and Dirty Water System. | Construct and implement SWMP. | To separate the clean water from entering the dirty water areas, and vice versa. | Effective onsite dirty water management and retention. | SWMP. | Modify through design measures. | Storm water Management to be constructed prior to other infrastructure establishment. |
| Open pit Mining. | Pit dewatering and drawdown. | Reduction in Baseflow. | Operational Phase. | No mitigation available. | N/A | N/A | N/A | N/A | Modify through design measures. | N/A |
| Pit dewatering. | Reduction to baseflow in the stream. | Reduced Poor Quality Water input. | Operational Phase. | No mitigation required. | N/A | N/A | N/A | N/A | N/A | N/A |
| Operational Activities. | Hydrocarbon spills Dirty Water release Sediment runoff. | Water quality deterioration. | Operational Phase. | Separate clean and Dirty Water System. | Construct and implement SWMP. | To separate the clean water from entering the dirty | Effective onsite dirty water management and retention. | SWMP | Modify through design measures. | Storm water Management to be constructed prior to other |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | water areas, and vice versa. | | | | infrastructure establishment. Ongoing monitoring. |
| Closure of the mine. | Groundwater rebound. | Decant of poor quality water. | Closure and Decommissioning. | Treat decant water before release to the environment. | Establish a Passive treatment system in the form of a constructed wetland or similar. | Treatment of poor quality decant to an acceptable quality. | Release of acceptable quality water to the downstream environment. | ISO 5667: Grab Samples Water parameters as approved in the IWULA. | Remedy through control measures. | Passive treatment establishment before mine closure. |
| **Air Quality** | | | | | | | | | | |
| Site establishment. | Removal of topsoil and vegetation. | Fugitive dust (containing TSP (total suspended particulate) will give rise to nuisance impacts as fallout dust, as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns) giving rise to health impacts. | Construction and Operational Phase. | Area of disturbance to be kept to a minimum and no unnecessary clearing of vegetation to occur<br>Reduce exposure areas<br>Avoid Dust Creation. | Demarcate areas of movement, and avoid areas where movement is not permitted.<br>Topsoil should be re-vegetated.<br>During the loading of topsoil onto trucks or stockpiles, the dropping heights should be minimised.<br>Water or binding agents such as (petroleum emulsions, polymers and adhesives) can be used for dust suppression on earth roads.<br>When using bulldozers and graders, minimise travel speed and distance and volume of traffic on the roads.<br>All stockpiles to be damped down, especially during dry weather or re-vegetated (hydro seeding is a good option for slope revegetation). | Only clear areas required for immediate operation. | minimal vegetation clearance and concurrent rehabilitation as mining progresses. | National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) - National Dust Control Regulations (Government Gazette No. 36794 - No. R 827)<br>SANS 1929:2011. | Control through management and monitoring. | Ongoing dust suppression throughout LoM. Concurrent rehabilitation of bare areas. |
| Site establishment. | Construction of surface infrastructure. | Fugitive dust (containing TSP (total suspended particulate) will give rise to nuisance impacts as fallout dust, as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns) giving rise to health impacts. | Construction and Operational Phase. | Area of disturbance to be kept to a minimum and no unnecessary clearing of vegetation to occur<br>Reduce exposure areas<br>Avoid Dust Creation. | Demarcate areas of movement, and avoid areas where movement is not permitted.<br>Dust emitted during bulldozing activity can be reduced by increasing soil dampness by watering the material being removed<br>Time the blasting with wind to ensure the dust will not be blown to the sensitive receptors<br>Material need to be removed to dedicated stockpiles to be used during rehabilitation<br>Apply dust suppressant to roads.<br>Cover Haul trucks with Tarpaulin. | Only clear areas required for immediate operation. | minimal vegetation clearance and concurrent rehabilitation as mining progresses. | National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) - National Dust Control Regulations (Government Gazette No. 36794 - No. R 827)<br>SANS 1929:2011. | Control through management and monitoring. | Ongoing dust suppression throughout LoM. Concurrent rehabilitation of bare areas. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| General transportation. | Hauling and vehicle movement on site. | Fugitive dust (containing TSP (total suspended particulate) will give rise to nuisance impacts as fallout dust, as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns) giving rise to health impacts. | Construction and Operational Phase. | Avoid Dust Creation<br>Enforce a low Speed limit. | Apply dust suppressant to roads.<br>Cover Haul trucks with Tarpaulin<br>Fit roads with Speed bumps. | prevent excessive dust creation on site. | Effective dust management on site. | National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) - National Dust Control Regulations (Government Gazette No. 36794 - No. R 827)<br>SANS 1929:2011. | Control through management and monitoring. | Ongoing dust suppression throughout LoM.<br>Concurrent rehabilitation of bare areas. |
| Site closure. | Demolition & Removal of all infrastructure. | Fugitive dust (containing TSP (total suspended particulate) will give rise to nuisance impacts as fallout dust, as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns) giving rise to health impacts. | Closure and Decommissioning. | The area of disturbance must be kept to a minimum<br>Avoid Dust Creation. | Demolition should not be performed during windy periods (August, September and October).<br>Demarcate areas of movement<br>Speed restrictions should be imposed and enforced.<br>Exhaust pipes of vehicles should be directed so that they do not raise dust.<br>Hard surfaced haul roads or standing areas should be washed down and swept to remove accumulated dust.<br>Dust suppression of roads being used during rehabilitation should be enforced. | prevent excessive dust creation on site. | Effective dust management on site. | National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) - National Dust Control Regulations (Government Gazette No. 36794 - No. R 827)<br>SANS 1929:2011. | Control through management and monitoring. | Ongoing dust suppression throughout LoM.<br>Concurrent rehabilitation of bare areas. |
| Rehabilitation. | Spreading of soil, revegetation & profiling/contouring . | Fugitive dust (containing TSP (total suspended particulate) will give rise to nuisance impacts as fallout dust, as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns) giving | Closure and Decommissioning. | Minimise exposed surface duration<br>The area of disturbance must be kept to a minimum<br>Avoid Dust Creation. | Revegetation of exposed areas<br>Demarcate areas of movement<br>Spreading of soil must be performed on less windy days.<br>Keep soil moist using sprays or water tanks, using wind breaks.<br>Speed restrictions should be imposed and enforced.<br>Exhaust pipes of vehicles should be directed so that they do not raise dust. | prevent excessive dust creation on site. | Rehabilitation of cleared areas. | National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) - National Dust Control Regulations (Government Gazette No. 36794 - No. R 827) | Control through management and monitoring. | Ongoing dust suppression throughout LoM.<br>Concurrent rehabilitation of bare areas |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | rise to health impacts. | | | | | | SANS 1929:2011. | | |
| **Social Economic** | | | | | | | | | | |
| Mine establishment. | Mining operations. | Employment and income opportunity. | Construction and Operation Phase. | Maximise Employment Opportunities, Skills and Enterprise Development. | Prioritise local labour in the recruitment process as part of the company's own recruitment policy or as part of contractor management plan during operations<br>Put a procurement strategy as well as a contractor management plan (if relevant) in place to ensure that 100% local employment target in terms of unskilled labour is met.<br>Up-skill the local labour force.<br>Develop a database of goods and services that could potentially be outsourced to the local community<br>Establish a supplier development programme as part of the Local Economic Development.<br>Where local contractors are used, put a contractor management plan in place to ensure that the local employment and procurement targets of the operations are met. | Maximise local employment opportunities and develop skills during operations. | Maximise local employment opportunities and develop skills during operations. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Prior to construction and throughout LoM. |
| Mining operations. | Employee training. | Upskilling of Labour force. | Construction and Operation Phase. | Promote Socio-Economic Development in the Local Area.. | Develop an updated Local Economic Plan for the project in consultation with the local community. Some strategic recommendations:<br>Determine whether the current allocation as per the mines MWP is in line with the targets of the Mining Charter of 2018<br>Monitor and manage the social contribution of multinational suppliers (in-house as well as suppliers to contractor and direct service providers). | Promote socio-economic development in the local area. | Promote socio-economic development in the local area. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Throughout LoM. |
| Mining operations. | Coal production and sales. | Increased Public revenue. | Construction and Operation Phase. | | | | Promote socio-economic development in the local area. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Throughout LoM. |
| Mining operations. | Social Development Plan. | Increase in Local Economic Development Funds. | Construction and Operation Phase. | | | | Promote socio-economic development in the local area. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Throughout LoM. |
| Mining operations. | Employment creation. | Project Induced In-Migration. | Construction and Operation Phase. | Minimise Impacts of Project- Induced In-Migration. | The local labour procurement strategy as well as proof of residence required should be clearly communicated in the local community and broader regional media well in advance of the construction phase. The communication strategy should ensure that unrealistic employment expectations are not created. | Minimise any potential negative impacts associated with the inflow of workers and jobseekers. | Minimise any potential negative impacts associated with the inflow of workers and jobseekers. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Throughout LoM. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ensure that foreign (outside) workers reside in suitable facilities and do not establish informal houses.<br>Information distributed as part of the existing HIV/Aids awareness campaigns undertaken in the area should again be focused on and communicated to the local workforce.<br>The general health of workers should be monitored on an on-going basis<br>Establish a forum, with representatives of the mine and local stakeholders for discussing potential issues of community conflict.<br>The area should be fenced off and security measures should ensure that no squatters are allowed on the mining right area.<br>The relevant actions related to this objective should form of the a contractor management plan. | | | | | |
| Mining operations. | Increased traffic<br>Mining related hazards<br>Increased dust<br>Water quality deterioration<br>Historical subsidence<br>Blasting. | Safety and Health Risks. | Construction and Operation Phase. | Minimise Safety and Health Risks. | Permanent security personnel should be on site.<br>The mining area must be fenced with electrical fencing and access to the area should be controlled to avoid animals or people entering the area without authorisation.<br>Speed limits on the local roads surrounding the mining sites should be enforced.<br>The mining area should be equipped with surveillance around its perimeter.<br>A Health and Safety Plan should be implemented and it must be ensured that all managers are qualified in First Aid and other relevant safety courses.<br>Ensure that a proper emergency plan that fits with the Municipal Disaster Management Plan is in place.<br>Implement a HIV/AIDS awareness programme with specific focus on communities in and nearby the mining areas, as well as on the mine employees.<br>Fire-fighting equipment should be on site | Limit any safety and health risks during operations. | Limit any safety and health risks during operations. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Throughout LoM. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | and should be in a good working condition.<br>All mining vehicles should be in a good condition and adhere to the road worthy standards.<br>Access from haul roads and internal mine roads to local main roads should be in line with the road standard and requirements to accommodate the traffic load and traffic patterns.<br>The mine to provide workers without transport with mine transport to and from work, with a safe off-loading site inside the mine premises.<br>Adhere to air pollution management plan to minimize health hazards related to coal dust particles and noxious gases .<br>Adhere to groundwater and surface water management measures to prevent any negative impacts on health due to ground or surface water pollution.<br>Suitable safety measures should be implemented to avoid subsidence. | | | | | |
| Mining operations. | Open pit establishment. | Change in sense of place. | Construction and Operation Phase. | Minimise Negative Impacts of Nuisance Factors (Noise and Dust)<br>Minimise Negative Impacts from Blasting Activities. | The mitigation measures of the Noise and Air Quality Impact Assessments are relevant.<br>Dust suppression measures should be applied if and when necessary<br>Limit the number of haul roads to limit dust creation.<br>Operational mining activities with potential noise impacts should be mitigated and should not be undertaken during night time. Noise generating activities should thus be kept to normal working hours (e.g. 7 am until 5 pm) where possible.<br>Heavy machinery and heavy vehicles should be kept in a good working order. Also, ensure that all vehicles and equipment comply with generally accepted noise levels and noise abatement regulations.<br>Personnel should be equipped with the necessary noise protection equipment<br>I&AP forum needs to be established to | Limit nuisance factors relate to noise and dust<br>Limit potential negative impacts on noise and infrastructure damage related to blasting activities. | Limit nuisance factors relate to noise and dust<br>Limit potential negative impacts on noise and infrastructure damage related to blasting activities. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Throughout LoM. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | discuss and address issues of concern. Quarterly meetings are advised. The Mine to maintain a complaints register for regular update as well as keep minutes of community forum meetings. Feedback should be provided on issues registered and resolved. The mitigation measures of the Blasting Report are relevant. These include but is not limited to: • Use a qualified blasting expert; • Close the provincial road during blasting in consultation with the relevant authority; • Monitor noise levels from blasting to ensure it is not exceeded. • Establish a baseline of the structural condition of relevant structures (houses and public infrastructure) within a 1km radius of the operation. Inspect the structures on a 6 monthly basis or at public request. • Notify all I&APs an hour before blasting takes place. • Conduct blasting in working hours (e.g. between 6:00 and 18:00). | | | | | |
| Mining operations. | Mine closure. | Job losses. | Closure and Decommissioning. | Minimise the negative economic impacts related to mine closure. | Develop mechanisms to assist employees, prior to retrenchment date in the transition phase after closure of the operations including portable skilled development programmes during the operational phase of the mine, providing assistance in accessing available and suitable jobs with other local mines or companies etc. Focus on non-core related local supply links during the operational phases of the mine to facilitate easier transitioning of local suppliers to other costumers. Plan community projects with an exit strategy of which beneficiaries are aware of. The risk of ADM should be mitigated as per the ground water management plan Rehabilitate mining area as soon as possible to prevent to prevent high | Minimise the negative economic impacts related to mine closure. | Minimise the negative economic impacts related to mine closure. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Prior to Mine closure. |
| Mining operations. | Mine Closure. | Decrease/termination of community investment funds and support to local communities. | Closure and Decommissioning. | | | | Minimise the negative economic impacts related to mine closure. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Prior to Mine closure. |
| Mine Closure. | Water quality deterioration Historical subsidence. | Safety and Health Risks. | Closure and Decommissioning. | | | | Minimise the negative economic impacts related to mine closure. | As per Social and Labour Plan (SLP) | Remedy through Social and Labour Plan. | Prior to Mine closure. |

| Activity | Aspect | Impact | Phase | Mitigation measures | Action Plan | Mitigation and management objective | Mitigation and management Goals | Compliance with standards | Mitigation type | Time period for implementation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | losses in agricultural potential<br>Investigate the potential for a housing development as a high value post-closure land-use as well as a community priority as part of a final rehabilitation plan. | | | | | |
| Increased road traffic | Road network and travelling | Degradation of road | Construction and Operational Phase | Improve road surfacing.<br>Measures suggested minimising the impact of fly rock on surrounding roads and structure.<br>Measures suggested in the Health Impact Assessment to minimize traffic related accidents.<br>Traffic calming measures to prevent speeding<br>Road maintenance.<br>Provide safe road crossing points and fencing of the main road and the mine site | Provide alternative access routes and/or temporary access points during construction and operational activities<br>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); | Zero incidents on and related to the mining operations | Maintain Road in excellent condition for the general public to still use.<br>Create effective access for required movement by residents and livestock. | Traffic management measures.<br>As per SLP | Remedy through SLP | Throughout LoM |

## Financial Provision

### *4.4.1.1 Determination of the amount of Financial Provision.*

#### *4.4.1.1.1 Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.*

The closure vision is supported by the objectives as listed below;

- Create a safe, physically stable rehabilitated landscape that limits long-term erosion potential and environmental degradation;
- Sustain the long term catchment water yield and ensure suitable water quality;
- Rehabilitation of the surface infrastructure where necessary to minimize infiltration into the underground water regime (the philosophy of concentration and containment);
- Rehabilitation to minimise contamination of surface water resources (the philosophy of dilution and dispersion);
- Focus on establishing a functional post-mining landscape that would ensure self-sustaining agricultural practices post mine closure where possible;
- Ensure interconnectivity between the rehabilitated landscapes with surrounding regionally biologically diverse areas;
- Encourage, if and where required, the re-instatement of terrestrial and aquatic wetland biodiversity over time; and
- Create opportunities for alternative post-mining livelihoods by aligning to the regional planning;
- Meet with prevailing environmental legal requirements outlined in this report; and
- Prevent / Minimise negative impacts and risks as identified in this report.

#### *4.4.1.1.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.*

The BAR and EMP will be provided to I&APs for review and comment for 30 days. The objective is to be communicated to IAP's during the public consultation process.

#### *4.4.1.1.3 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.*

The scheduling of actions for final rehabilitation, decommissioning and closure which will ensure avoidance, rehabilitation and management of impacts is presented in the table below. As the disturbance after construction occurs on surface, linking the rehabilitation plan to the mine works program is not meaningful. Rather, the schedule is linked to applicant's intention to undertake rehabilitation activities over a 1-year closure period at the end of the Life of Mine. The perceived schedule drivers of this plan are also indicated in the table. This schedule is based on implementing the actions described in this report and relates to the aspects considered in this section.

| Aspect | Scheduling | |
|---|---|---|
| | ***Quarter 1*** | ***Continuous*** |
| **Opencast workings** | Concurrent backfilling sequence and removal of salvageable equipment. | Topsoil stripping, handling, stockpiling, preservation and replacement in line with the general surface rehabilitation and revegetation actions prescribed in |
| **Surface Infrastructure related to mining operations (including plant)** | Removal, decommissioning and demolition of infrastructure. | |
| **Final void** | Backfilling and sealing. | |

| Aspect | Scheduling | |
|---|---|---|
| **Contaminated land remediation** | Hydrocarbons – Removal of fuel storage and refuelling bays<br>Chemical – contaminated equipment removal. | this report as land becomes available for rehabilitation. |
| **Quarter 2** | | |
| **Pollution Control Dams** | Management of stormwater in closure period, but capacity requirements can be assessed to remove upon closure. | |
| **Waste Management Facilities** | Removal, decommissioning and demolition of infrastructure. | |
| **Roads and parking areas** | Only roads required after closure to remain in place. | |
| **Fencing and walling** | Only fences required to remain after closure to stay in place. | |
| **Quarter 3 - 4** | | |
| **Water Management** | Monitoring, measurement and management where required. | |
| **Maintenance and aftercare** | All rehabilitated areas. | |

Appendix 4 requires that a spatial map or schedule, showing planned spatial progression throughout operations be included in the plan. However, as the spatial progression is limited to the mining footprint and the mine haul route, the inclusion of a plan showing the spatial progression will not add any further information than that included in the table above.

#### *4.4.1.1.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.*

The rehabilitation plan aims to provide a project site that is similar to the pre-mining environment through the shaping of backfilled areas, capping of boreholes, closing of trenches and vegetating of disturbed areas (where not within cultivated lands).

*4.4.1.1.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.*

| CALCULATION OF THE MINE CLOSURE QUANTUM | | | | | | | | Version 0.0: Annual Mine Closure Quantum Update for FY2022 |
|---|---|---|---|---|---|---|---|---|
| Mine: OPTIMUM COLLIERY | | | | Province: Mpumlanga | | | | |
| Evaluators: Eco Elementum (Pty) Ltd | | | | Date: Mar 2023 | | | | |
| General Information | Risk Class | High (A) | OPTIMUM COLLIERY (BOSCHMANSPOORT) | | | | | |
| | Environmental Sensitivity | Medium | | | | | | |
| | WF 1: Nature of Terrain Weighting Factor | Flat 1.00 | | | | | | |
| | WF 2: Proximity to Urban Area Weighting Factor | 1.05 | | | | | | |
| Component No | Main Activities Itemized Descriptions | [B] CPI Adjusted Master Rate | [A] Quantity | Units | [C] Multiplicition Factor | [D] Weighting Factor 1: | Sub Totals [E = A*B*C*D] | NOTES & SUPPORTING EXPLANATIONS |
| | | STEP 4.3 | STEP 4.5 | | STEP 4.3 | STEP 4.4 | | |
| 1 | Dismantling of processing plant and structures | R 17,46 | 18450,00 | m3 | 1,00 | 1,00 | R 322 108,77 | Plant structures |
| 2(A) | Demolition of steel buildings and structures | R 243,19 | 0,00 | m2 | 1,00 | 1,00 | R 0,00 | Mobile container type structures |
| 2(B) | Demolition of reinforced concrete buildings and structures | R 358,39 | 0,00 | m2 | 1,00 | 1,00 | R 0,00 | n/a |
| 3 | Rehabilitation of access roads | R 43,52 | 85643,00 | m2 | 1,00 | 1,00 | R 3 727 027,46 | Haul roads and other roads (some roads will remain in agreement with landowner) |
| 4(A) | Demolition and rehabilitation of electrified railway lines | R 422,38 | 0,00 | m | 1,00 | 1,00 | R 0,00 | n/a |
| 4(B) | Demolition and rehabilitation of non-electrified railway lines | R 230,39 | 0,00 | m | 1,00 | 1,00 | R 0,00 | n/a |
| 5 | Demolition of housing and facilities | R 486,38 | 0,00 | m2 | 1,00 | 1,00 | R 0,00 | Mobile container type structures |
| 6 | Opencast rehabilitation including final voids and ramps | R 247 541,65 | 25,00 | ha | 0,52 | 1,00 | R 3 218 041,39 | Total opencast and voids |
| 7 | Sealing of shafts, adits and inclines | R 130,55 | 0,00 | m3 | 1,00 | 1,00 | R 0,00 | n/a |
| 8(A) | Rehabilitation of overburden and spoils | R 169 376,89 | 14,06 | ha | 1,00 | 1,00 | R 2 389 875,07 | Total overburden and spoils |
| 8(B) | Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste) | R 211 703,14 | 0,00 | ha | 1,00 | 1,00 | R 0,00 | n/a |
| 8(C) | Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste) | R 614 886,28 | 1,37 | ha | 0,80 | 1,00 | R 673 315,36 | Crusshing & Screening, ROM & PCD |
| 9 | Rehabilitation of subsided areas | R 142 330,05 | 0,00 | ha | 1,00 | 1,00 | R 0,00 | n/a |
| 10 | areas | R 134 650,37 | 5,00 | ha | 1,00 | 1,00 | R 673 251,85 | General surface disturbance areas |
| 11 | River diversions | R 134 650,37 | 0,00 | ha | 1,00 | 1,00 | R 0,00 | n/a |
| 12 | Fencing | R 153,59 | 5477,00 | m | 1,00 | 1,00 | R 841 232,01 | Removal of all fencing |
| 13 | polluted water and managing the impact on groundwater, including treatment, when required) | R 51 197,86 | 1,37 | ha | 0,67 | 1,00 | R 46 994,51 | Refer item 8(C) |
| 14 | 2 to 3 years of maintenance and after care | R 17 919,25 | 45,43 | ha | 1,00 | 1,00 | R 814 071,55 | Entire disturbed footprint |
| 15 | Specialist study | R 165 000,00 | 1,00 | report | 1,00 | 1,00 | R 165 000,00 | Final closure study: GNR1147 Format |
| | | | | | | Subtotal (1 to 15 above) | R 12 871 517,98 | |
| | Subtotal 1 | | Weighting Factor 2 | | | 1,05 | R 13 515 093,88 | |
| 1 | Preliminary and General | | 12% of Subtotal 1 if less than R100mil | | | | R 1 621 811,27 | |
| | | | 6% of Sub Total 1 if more than R100mil | | | | | |
| 2 | Contingency | | 10% of Sub Total 1 | | | | R 1 351 509,39 | |
| | Subtotal 2 (Subtotal 1 plus sum of management and contingency) | | | | | | R 2 973 320,65 | |
| | Subtotal 3 | | | | | | R 16 488 414,54 | |
| | GRAND TOTAL (Subtotal 3 plus 15% VAT) | | | | | | R 18 961 676,72 | |

**Figure 4-11: Financial Provision**

*4.4.1.1.6 Confirm that the financial provision will be provided as determined.*

The applicant hereby commits to undertaking to provide the calculated amount in the form of either method provided in section 53 of the MPRDA Regulations and the financial provisioning regulations, 2015 Published under Government Notice R1147 (GN R. 39425 of 2015). It should however be noted that no new guideline for determining the quantum for closure and rehabilitation has been published and therefore the guideline published under the MPRDA regulation was used to assess the quantum for closure liability.

MECHANISMS FOR MONITORING COMPLIANCE WITH A PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON, INCLUDING –

*4.4.1.1.7 Monitoring of Impact Management Actions (Table 4-2).*

*4.4.1.1.8 Monitoring and reporting frequency (Table 4-2).*

*4.4.1.1.9 Responsible persons (Table 4-2).*

*4.4.1.1.10 Time period for implementing impact management actions (Table 4-2).*

*4.4.1.1.11 Mechanism for monitoring compliance (Table 4-2).*

**Table 4-2: Monitoring compliance**

| Source activity | Impacts requiring monitoring programmes | Functional requirements for monitoring. | Roles and responsibilities (for the execution of the monitoring programmes) | Monitoring and reporting frequency and time periods for implementing impact management actions. |
|---|---|---|---|---|
| **Construction, Operation and Decommissioning Activities** | Water Quality | ISO 5667 Grab Samples. | Independent Specialist. | Monthly as per WUL. |
| **Construction, Operation and Decommissioning Activities** | Water Quantity | Water Balance to be Updated Annually Flow Meter Reading and Update of Datasheet. | SHEQ/ Engineering. | Daily |
| **Construction, Operation and Decommissioning Activities** | Bio - Monitoring | SASS 5 and IHAS<br>Sampling Sites are to be established upstream and downstream of all Potential Impact. | Aquatic Ecologist | Bi-Annually |
| **Construction, Operation and Decommissioning Activities** | Storm Water Management | Visual Inspection<br>Check the system for blockages and possible spillage areas. | SHEQ/ Engineering | After heavy rainfall. |
| **Construction, Operation and Decommissioning Activities** | Biodiversity Assessment | Align the Fauna & Flora<br>Compare the annual findings with those of the Baseline Studies. | Ecologist | Annually |
| **Construction, Operation and** | Alien Invasive Control Program (AICP) | Implement an Alien Invasive Control Programme. | Ecologist | Bi-Annually |

| Source activity | Impacts requiring monitoring programmes | Functional requirements for monitoring. | Roles and responsibilities (for the execution of the monitoring programmes) | Monitoring and reporting frequency and time periods for implementing impact management actions. |
|---|---|---|---|---|
| **Decommissioning Activities** | | During the Biodiversity Assessment a qualified ecologist must be contracted to ensure that the implementation of the AICP are adequately addressed. | | |
| **Construction, Operation and Decommissioning Activities** | Vegetation and Rehabilitation. | RSIP to be adhered to As specified in EMP. | Ecologist | Bi-Annually |
| **Construction, Operation and Decommissioning Activities** | Groundwater Quality. | SANAS Standards As specified in Geo-Hydro Report. | Independent Specialist. | Quarterly |
| **Construction, Operation and Decommissioning Activities** | Groundwater Levels. | Depth meters.<br>Determine the groundwater fluctuation over a LOM. | Independent Specialist. | Determine the groundwater fluctuation over a LOM. |
| **Construction, Operation and Decommissioning Activities** | Dust Fallout. | Implement a Monitoring Programme Gravimetric Dust Fallout. | To be analysed by an Accredited Laboratory Independent Specialist. | Monthly. |
| **Construction, Operation and Decommissioning Activities** | Environmental Noise & Vibration. | Implement a Monitoring Programme SANAS Standards Noise monitoring are to be done to determine the effect of mining, and associated activities, on the receptors. | Independent Specialist (Noise Specialist). | Annually. |
| **Construction, Operation and Decommissioning Activities** | Visual Inspection of receptors. | Implement Monitoring Schedule in-house Physical Census Any incidents of cracking must be recorded and addressed. | SHEQ/ Engineering. | Before and after each blasting event. |

#### *4.4.1.1.12 Indicate the frequency of the submission of the performance assessment/ environmental audit report.*

A performance assessment/ environmental audit will be undertaken as stipulated in Table 4-2 above. The performance assessment will be conducted internally twice a year and by an external consultant annually throughout the life of operation as required under NEMA. This is conducted to assess the adequacy and compliance to the EMP, EA and the relevant legislation. The reports should be submitted to the DMRE.

#### *4.4.1.1.13 Emergency Preparedness, Response and Environmental Awareness Plan*

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

An environmental awareness training manual will be developed for the project.

All employees must be provided with environmental awareness training to inform them of any environmental risks that may result from their work and of the manner in which the risks must be dealt with to avoid pollution or the degradation of the environment.

Employees should be provided with environmental awareness training before operations start. All new employees should be provided with environmental awareness training. Environmental awareness and training is an important aspect of the implementation of the EMP. The onus is on the different parties involved in the various stages of the life cycle of the project to be environmentally conscious. Hence, it is suggested that all members of the project team are familiar with the findings of the site-specific EA report and the EMP. For instance, the contractor is responsible for the lack of environmental knowledge of his/her crew members. The contractor could forward internal environmental awareness and training procedures to the project manager and environmental officer for comment prior to the commencement of the project. Likewise, the above is applicable to the programming, design, operations and maintenance, and decommissioning teams. Environmental awareness ensures that environmental accidents are minimized and environmental compliance maximized.

All staff and contractors will be submitted to an annual training / awareness course as to inform the staff of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment.

Section 39 (3) (c) requires that an applicant who prepares an Environmental Management Programme or Environmental Management Plan must "develop an environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risks which may result from the work and the manner in which the risks must be dealt with in order to avoid pollution and degradation of the environment". Environmental Awareness is required not only for management and employees (as described in Section 39 (3) (c) but also for visitors to the site. the following strategies and plans will be put into place for each of the parties.

**Visitor Environmental Awareness**

Visitor/sub-contractor environmental awareness will be generated through the provision of a signboard describing very briefly the environmental considerations applicable to them. The signboard should contain the following information:

- Statement of the applicant's commitment to environmental principles;
- List of the "rules" to which the visitor must abide. This will include:
  - No littering. Dispose of all waste in the bins provided;
  - No fires;
  - Stay on demarcated roadways and paths only;
  - Kindly report any environmental infringements they may notice;

- Check your vehicle/equipment for diesel/oil leaks.

**Senior and Middle Management Environmental Awareness:**

Achieving environmental awareness at upper levels of management is slightly different from the process at the operational level. There is often a fair level of the general value of environmental awareness but site-specific issues will most often need to be communicated. This will be achieved by:

- Management must make themselves fully familiar with the EMP.
- Ensuring that there is a spare copy of the approved EMP at his/her disposal; management is encouraged to make notes in the document regarding the difficulty / ease of implementing the environmental management measures. These notes should be sent to the consultants to assist in future revisions of the EMP;
- The manager must ensure that the operators perform regular monitoring of their workstations / areas.

During the management's execution of their activities/being at the site, the management must constantly be aware of and observant of especially the following:

- Dust levels - movement outside of demarcated areas;
- Litter management - general housekeeping;
- Erosion during rainy season.

Topsoil management - fuel/oil management/leaks/changes;

- Success of operational re-vegetation; and
- Alien vegetation.

**Operator / Workforce Environmental Awareness:**

Achieving environmental awareness amongst the operators and labour is probably the most important because they are usually present at the place where most environmental transgressions take place or in fact cause them. It is the aim of increased environmental awareness to reduce any such environmental transgressions.

Increasing environmental awareness at these levels can be achieved through the following strategies:

- Induction environmental training must take place prior to any contract period.
- Training: Each and every employee (contractor or not) must go through an environmental training process where at least the following items area covered:
  - The oil/fuel management policy must be explained to the employees. The reason for the policy must also be explained (i.e. to not impact on groundwater, surface water, soil quality etc.);
  - The domestic and industrial waste management policy & method must also form part of the training;
  - The topsoil handling method and the reasons for preserving topsoil (i.e. post prospecting re vegetation, erosion prevention etc.);
  - Alien vegetation management: How to recognize and remove such species;
  - Protection of the natural veld by not driving/manoeuvring or walking through the demarcated protection areas. Reporting that demarcation posts/tape is broken or removed;

Emergency management procedures such as dealing with oil spills or fires must also be drilled; and

- Such training will, in this case, be carried out by the site manager/resident engineer.

**Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.**

Training, as detailed above, will address the specific measures and actions as listed in the EMP and also conditions of the EA. In this way the team will be provided the knowledge required to conduct the mining activities without resulting in environmental non-compliance, the liability of which would lie with the applicant. Secondly, informing the team of the EMP

will also assist the team in identifying if an impact is likely to occur / has occurred and communicate this appropriately to the Environmental Manager.

In order for appropriate action to be taken, proper communications network and reporting protocol must be established, with the team and the site manager reporting all environmental issues to the Environmental Manager and then all social issues to the General Manager.

#### *4.4.1.1.14 Specific information required by the Competent Authority*

The following specific information will be required by the competent authority:

- The financial provision will be reviewed annually.

## 1) 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.** that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein. ☒

**Signature of the Environmental Assessment Practitioner:**

Eco Elementum

**Name of Company:**

18/04/2023

**Date:**

**-END-**

# APPENDIX A: EAP CV

# APPENDIX B: PUBLIC PARTICIPATION REPORT

# APPENDIX C: CONCEPTUAL SITE LAYOUT AND MAPS

# APPENDIX D: SPECIALIST STUDIES