ENVIRONMENTAL & ENGINEERING

DRAFT REPORT

MANDLAGLO COMMODITIES (PTY) LTD

TALA BETHAL COAL MINE

INTEGRATED ENVIRONMENTAL AUTHORISATIONS –

BASIC ASSESSMENT REPORT

MP 30/5/1/2/2/10191 MR | MP-00165-MR/102

REPORT REF: 22-1977-AUTH (TALA BETHAL NEW WASH PLANT S102 AND IWULA)

PROPOSED SECTION 102 AMENDMENT OF THE CURRENT ENVIRONMENTAL AUTHORISATIONS IN RESPECT TO PORTION 1 OF THE FARM KAFFERSTAD 195 IS, STEVE TSHWETE LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

VERSION A.A

Document and Quality Control:

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AA – draft	01/11/2022	Marungwane Ramashapa		First draft for review / comments
BB – draft	08/11/2022	Jane Mahaba		Technical Review
CC– draft				Quality review
DD – draft				Client review
Approved for Distribution:				
0.0				

Quality Control by:

Nature of Signoff:	Responsible Person:	Role / Responsibility	Qualification
Author	Marungwane Ramashapa	Environmental Assessment Practitioner	MSc Geography BSc Hns Geography BSc Life and Environmental Sciences
Technical Reviewer	Jane Mahaba	Senior Environmental Assessment Practitioner	BSc Ecology, Environment and Conservation SACNASP – Cert.Nat.Sci 119631 EAPASA– Reg.EAP 2019/1551

Updated – 11/11/2022

DISCLAIMER:

This is a legally binding document and many of the actions and recommendations remain the responsibility of the client (as the owner/lessee of the property).

EAP - was independent and performed the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application; have expertise in conducting environmental impact assessments or undertaking specialist work as required, including knowledge of the Act, these Regulations and any guidelines that have relevance to the proposed activity; ensure compliance with these Regulations;

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Take into account, to the extent possible, the matters referred to in regulation 18 when preparing the application and any report, plan or document relating to the application; disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing-

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).

The author utilised his/her best scientific and professional knowledge in preparing this report and the content herein contained is and remains confidential in nature, save where otherwise ordered by a Court of law.

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EXECUTIVE SUMMARY

Background

Mandlaglo Commodities (Pty) Ltd (hereinafter Mandlaglo) holds a Mining Right (MR) (Ref: MP 30/5/1/2/2/10191 MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA) and a Water Use Licence (06/B11A/ABCGIJ/9696) in terms of the National Water Act, Act No. 36 of 1998 (NWA). Mandlaglo is currently operating Tala Bethal Coal Mine, an underground mining operation located near Hendrina, in the Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province of South Africa.

The proposed project entails the amendment of the Mining Right (MR) to include a new opencast section and the addition of a Wash Plant to the current surface infrastructure for on-site coal beneficiation, this will require amendments to their currently approved authorisations. The amendment will apply to Portion 1 of Farm Kafferstad 195 IS.

Mandlaglo has appointed Eco Elementum (hereinafter EcoE) as independent environmental assessment practitioners (EAPs) to undertake the required amendment processes for the environmental authorisations, as they apply to Portion 1 of Farm Kafferstad 195 IS. A Basic Assessment (BA) process is required in terms of NEMA Regulations, as amended for the application of the Section 102 MR amendment.

Table 1-1: Basic Assessment Timeline

Date	Aspect
20/09/2022	Section 102 Mining Right Application on SAMRAD.
N/A	Mining Right Amendment Application Acceptance received from DMR.
11/11/2022	Advert Placed in the Middelburg Observer Newspaper.
11/11/2022	Interested and Affected Parties notified via email and SMS.
11/11/2022	30-day Public Participation commenced for the NEMA BA Process.
13/12/2022	Submission of the Final Basic Assessment Report (BAR).

The obtaining of a MR from the DMRE is governed by the MPRDA, 2002. The MPRDA requires compliance with related legislation, specifically NEMA, as amended. This Draft BAR includes, amongst others, the following information as required in terms of 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 1 of the Farm Kafferstad 195 IS.
Application area (Ha)	Approximately 145 Ha. Surface disturbance: Approximately 59.8 Ha
Magisterial district:	Steve Tshwete Local Municipality Nkangala District Municipality Bethal Magisterial District
Distance and direction from nearest town	Approximately 11 km southwest of Hendrina and 20 km northeast of Bethal.
21 digit Surveyor General Code for each farm portion	T0IS00000000019500001
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 (EA) submitted in support of the application for a Section 102 Mining Right Amendment for the mining of coal. Mandlaglo Commodities (Pty) Ltd (hereinafter Mandlaglo) holds a Mining Right (MR) (Ref: MP 30/5/1/2/2/10191 MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA) and a Water Use Licence (06/B11A/ABCGIJ/9696) in terms of the National Water Act, Act No. 36 of 1998 (NWA). Mandlaglo is currently operating Tala Bethal Coal Mine, a mining operation in the Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province of South Africa. They intend on adding an opencast section and developing a Washplant on Portion 1 of Farm Kafferstad 195 IS, this will require amendments to their currently approved authorisations. Environmental Authorisation Application in terms of the National Environmental Management Act (NEMA), Act No. 107 of 1998, and the 2014 Environmental Impact Assessment (EIA) Regulations (as amended) will be required. The intention to develop and operate a Washplant will also require application for an Integrated Water Use Licence (IWUL) Amendment in terms of the NWA and the National Environmental Management: Waste Act, Act No. 59 of 2008 as amended (NEM:WA); read with the requirements of the MPRDA..

Project Schedule

The 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
KAFFERSTAD	195	IS	1	STRYDOM GERT MARTHINUS
KAFFERSTAD	195	IS	1	STRYDOM TRUDIE

Surrounding landowners are listed in the table below.

Table 1-4: Surrounding Landowners

Farm			Ptn	Owner
KAFFERSTAD	195	IS	6	STRYDOM GERT MARTHINUS AND STRYDOM TRUDIE
KAFFERSTAD	195	IS	7	SORGENFRI PTY LTD
KAFFERSTAD	195	IS	9	MEYER DE JAGER FAMILIE TRUST
KAFFERSTAD	195	IS	10	KAFFERSTAD PLASE BOERDERY PTY LTD
KAFFERSTAD	195	IS	11	WILLEMSE ADAM JOHANNES
KAFFERSTAD	195	IS	13	WYKOM HOLDINGS PTY LTD
KAFFERSTAD	309	IS	RE/30	Information not available on Windeed – Further investigation will occur during PPP
VLAKLAAGTE	223	IS	RE/5	WYKOM BOERDERY CC
VLAKLAAGTE	223	IS	2	ANLIZMAR PTY LTD

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 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 will be followed and based on reciprocal dissemination of information. The following were/will be undertaken during the PPP for the Tala Bethal Section 102 Project:

- Identification of I&APs;
- Consultation with selected landowners;
- Notification of I&APs regarding the proposed project via newspaper advert (in the Middleburg Observer); the placing of 3 x site notices at conspicuous places, the sending of notices to affected parties via email (in the form of Background Information Documents) and sms'.
- A public information meeting (open day) with I&APs will be held at Hendrina Public Library;
- Gathering comments, issues and concerns from I&APs;
- Responding to I&AP comments, issues and concerns;
- Compilation and submission of results of consultation report to the DMRE; and
- Providing I&APs with the opportunity to review and comment on the BAR.

Location

The study area is on Portion 1 of Farm Kafferstad 195 IS located 11 km southwest of Hendrina and 20 km northeast of Bethal. The study area falls within the Steve Tshwete Local Municipality of Nkangala District Municipality, Mpumalanga

Province. The vegetation classification by Mucina & Rutherfords (2006) categorises the study area as Eastern Highveld Grassland vegetation unit of the Grassland Biome. This falls into the conservation status of 'Vulnerable' according to the Mpumalanga Biodiversity Sector Plan (MBSP) (Lotter, M.C., *et al.,* 2014) and in the National List of Threatened Ecosystems (SANBI & DEAT, 2011). Mucina & Rutherford (2006) classifies the vegetation as 'Endangered'. The Eastern Highveld Grassland is typically associated with summer rainfall regions. This Biome covers approximately 28% of South Africa.

Impacts

The impacts were assessed, and the key impacts were rated as Moderate to High after mitigation. The impacts are summarised below.

Table 1-5: Summary of the Key Project Impacts

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							
Open pit Mining	Pit dewatering and drawdown	Reduction in Baseflow.	Operation	Negative	Med - High	Negative	Med - High
Operational activities	Operational activities	Flow alteration due to erosion and sedimentation	Operation	Negative	High	Negative	Med - high
Operational activities	Operational activities	Pollution of watercourse	Operation	Negative	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
Increased road traffic	Road network and traveling	Degradation of road	Construction and Operation Phase	Negative	High	Negative	Med
Mining Operations	Mine area access restrictions	Change in access and movement to resident and livestock	Construction and Operation Phase	Negative	High	Negative	Med

Reasoned opinion

The EAP believes that the authorisation for the activity on the Portion 1 of the Farm Kafferstad 195 IS should be granted. The site area overlaps with a transformed landscape (i.e previous cultivation activities) with major watercourse and features avoided as far as possible. The risks of the proposed Wash Plant development and opencast section are minimal and can be mitigated by following the mitigation measures stipulated in the EMP. 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.
- Adhere to all monitoring requirements.
- 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". 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 - (a) Maintenance of the quality of the water resource to the extent that the water resource may be used in an ecologically sustainable way; (b) Prevention of the degradation of the water resource; and (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 - (a) if that power or duty has been assigned by the Minister to a catchment management agency, that catchment management agency; or (b) if that power or duty has not been so assigned, the Minister;
Water Resource	includes a watercourse, surface water, estuary, or aquifer;

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

CARA:	Conservation of Agricultural Resources Act, 43 of 1983
DEA:	Department of Environmental Affairs (The former Department of Environmental Affairs and Tourism)
DMR:	The Department of Mineral Resources (The former Department of Minerals and Energy)
DWA:	Department of Water Affairs (Is now referred to the Department of Water and Sanitation – DWS)
EA:	Environmental Authorisation
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
ELCA:	Environmental Legal Compliance Assessment
EMP:	Environmental Management Plan
EMPPA:	Environmental Management Programme Performance Assessment
EMPr:	Environmental Management Programme
EMS:	Environmental Management System
GM:	General Manager
GN:	Government Notice
I&AP:	Interested & Affected Parties
IEM:	Integrated Environmental Management Series
ISO:	International Standards Organisation
IWULA:	Integrated Water Use Licence Application
IWUL:	Integrated Water Use License
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
N/R:	Applicable, but not required at the time of the audit
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
RWD:	Return Water Dam
ROM:	Run of Mine
SAHRA:	South African Heritage Resources Authority
SHEQ:	Safety, Health, Environment and Quality
SOP:	Standard Operating Procedure
SWMP:	Strategic 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 AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 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: **MANDLAGLO COMMODITIES (PTY) LTD**

TEL NO: 082 578 6936

FAX NO: 086 696 4891

POSTAL ADDRESS: PO BOX 1677
FERNDALE
2160

PHYSICAL ADDRESS: 10 PONY STREET,
TIGERVALLEY OFFICE PARK,
SILVERLAKES,
PRETORIA
0001

FILE REFERENCE NUMBER SAMRAD: MP-00165-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

3.1.1 Details of the EAP

Name of The Practitioner:	Marungwane Ramashapa
Tel No.:	012 807 0383
e-mail address:	Maru@ecoe.co.za

3.1.2 Expertise of the EAP

3.1.2.1 The qualifications of the EAP

Name and Surname	Marungwane Ramashapa
Project Role and Responsibility	Report Author/Compiler Project Administrator
Company	Eco Elementum (Pty) Ltd
Position	Environmental Consultant
Location	361 Oberon Ave, Glenfield Office Park, Nika Building, 1st Floor, Faerie Glen, Pretoria 0081
Email	Maru@ecoe.co.za
Telephone Number	012 807 0383
Education	MSc Geography, University of Johannesburg BSc Hns Geography, University of Johannesburg BSc Life and Environmental Sciences; Geography and Geology, University of Johannesburg
Professional skills	Project Management. Project Administration. Monitoring and Compliance. Compilation of Environmental Management. Compilation of Environmental Impact Assessment. Government Department Liaison.

Name and Surname	Jane Mahaba
Project Role and Responsibility	Registered EAP (*EAPASA– Reg. EAP 2019/1551*) Project Manager Technical Reviewer
Company	Eco Elementum (Pty) Ltd
Location	361 Oberon Ave, Glenfield Office Park, Nika Building, 1st Floor, Faerie Glen, Pretoria 0081
Email	Jane@ecoe.co.za
Telephone Number	012 807 0383

Education	BSc Ecology, Environment and Conservation
Professional skills	Project Management., Environmental Advisory, Environmental Auditing and Policy Review, Green Economy initiative advisory, Business Development, Development of ESG offering and Market Research. Environmental Management, Sustainability, Compliance Auditing, Different Permit Applications, Stakeholder Engagement. Specialist Management.

Please refer to the CVs attached in Appendix A.

3.1.2.2 Summary of the EAP's past experience.

Table 3-1: Qualifications of EAP

Name	Marungwane Ramashapa
Skills	- Scoping and Environmental Impact Assessments. - Basic Assessments. - Compilation of Environmental Management Programmes. - Compilation of Mining Permit and Mining Right Applications. - Water Use License Application reports. - Environmental Compliance Auditing. - Environmental Control Officer. - Environmental Awareness. - External & Internal Auditing. - Public Consultation & Stakeholder Engagement. - Specialist coordination. - Project Management. - Project Administration.
Experience	Marungwane Ramashapa's environmental consultancy experience includes the Project administration and Project management of environmental authorisation process Projects. This has included, but is not limited to, undertaking Mining Permit, Mining Rights, Basic Assessment, Scoping & EIA report writing. Other environmental processes she has undertaken include Environmental compliance monitoring, auditing and reporting, Water Use Licensing Application and Stakeholder Engagements and Public Participation Processes.

Name	Marungwane Ramashapa
Skills	Environmental Project Management (Mining, Industrial and Infrastructure), Management and co-ordination of: specialists, Project Budget and Programme and all Project Plans. Responsible. For development of terms of reference and project Proposals as well as: Stakeholder Engagement, Client Liaison, and Management, Business Development and Sustainability Advisory.
Experience	Jane has more than 14 years' experience in the field of Environmental Management. Her experience includes various aspects of environmental management including permitting, stakeholder engagement (including authority consultation), compliance monitoring and auditing. She worked on projects in the Built environment, mining, industrial and government sectors and these projects required various permits and licenses in terms of the different environmental and associated legislation. In recent years she worked on expanding her knowledge in the sustainability space and continued to develop herself. Jane is extremely passionate about the environment and communities.

3.2 LOCATION OF THE OVERALL ACTIVITY

Table 3-2: Location of the activity

Farm Name:	Portion 1 of the Farm Kafferstad 195 IS
Application area (Ha)	Approximately 145 Ha. Surface disturbance: Approximately 59.8 Ha
Magisterial district:	Steve Tshwete Local Municipality Nkangala District Municipality Magisterial District of Bethal
Distance and direction from nearest town	Approximately 11 km southwest of Hendrina and 20 km northeast of Bethal.
21 digit Surveyor General Code for each farm portion	T0IS00000000019500001
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 (EA) submitted in support of the application for a Section 102 Mining Right Amendment for the mining of coal. Mandlaglo Commodities (Pty) Ltd (hereinafter Mandlaglo) holds a Mining Right (MR) (Ref: MP 30/5/1/2/2/10191 MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA) and a Water Use Licence (06/B11A/ABCGIJ/9696) in terms of the National Water Act, Act No. 36 of 1998 (NWA). Mandlaglo is currently operating Tala Bethal Coal Mine, a mining operation in the Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province of South Africa. They intend on adding an opencast section and developing a Washplant on Portion 1 of Farm Kafferstad 195 IS, this will require amendments to their currently approved authorisations. Environmental Authorisation Application in terms of the National Environmental Management Act (NEMA), Act No. 107 of 1998, and the 2014 Environmental Impact Assessment (EIA) Regulations (as amended) will be required. The intention to develop and operate a Wash Plant will also require application for an Integrated Water Use Licence (IWUL) Amendment in terms of the NWA and the National Environmental Management: Waste Act, Act No. 59 of 2008 as amended (NEM:WA); read with the requirements of the MPRDA.

3.3 LOCALITY MAP

(show nearest town, scale not smaller than 1:250000)

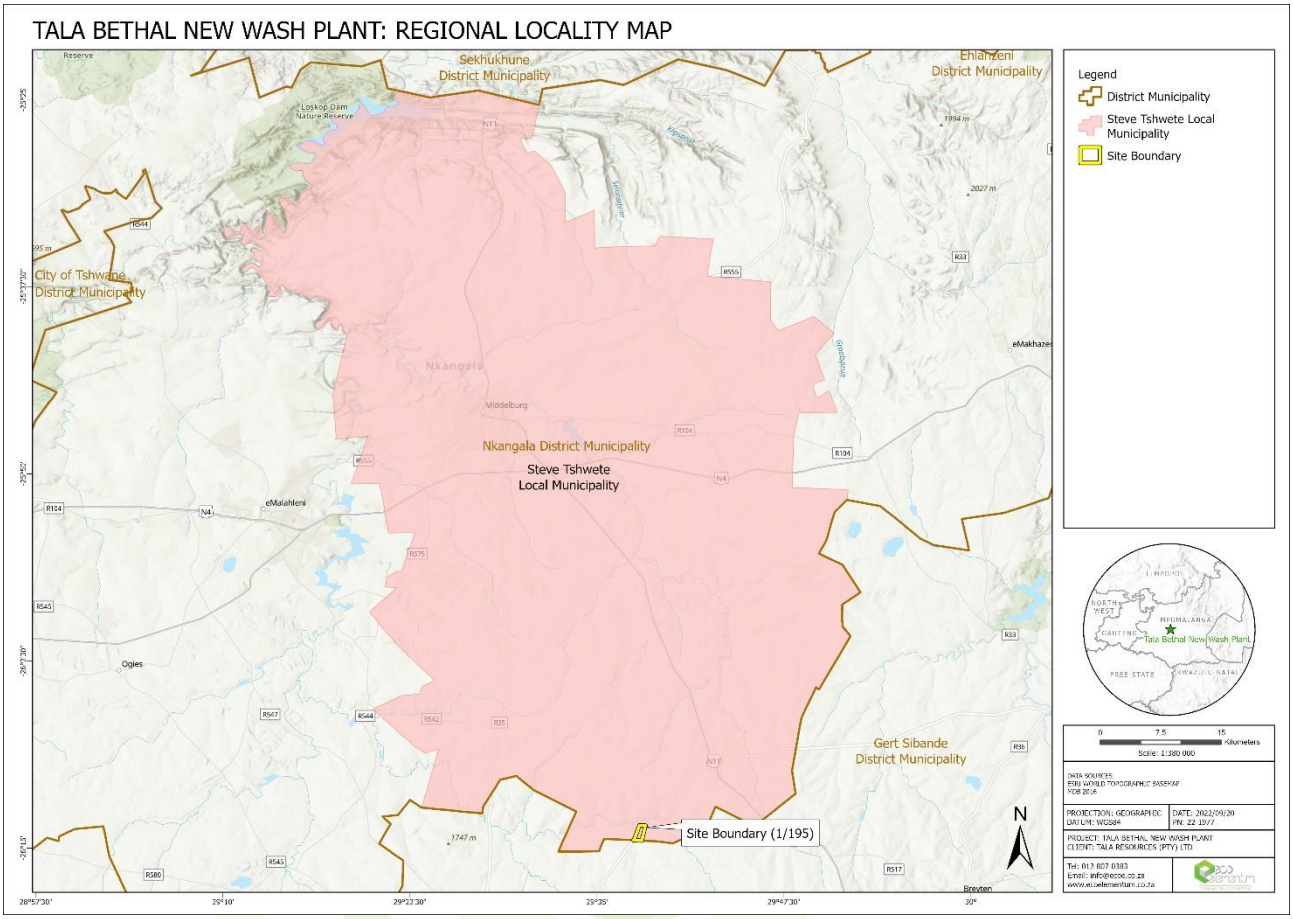


Figure 3-1: Regional Locality Map

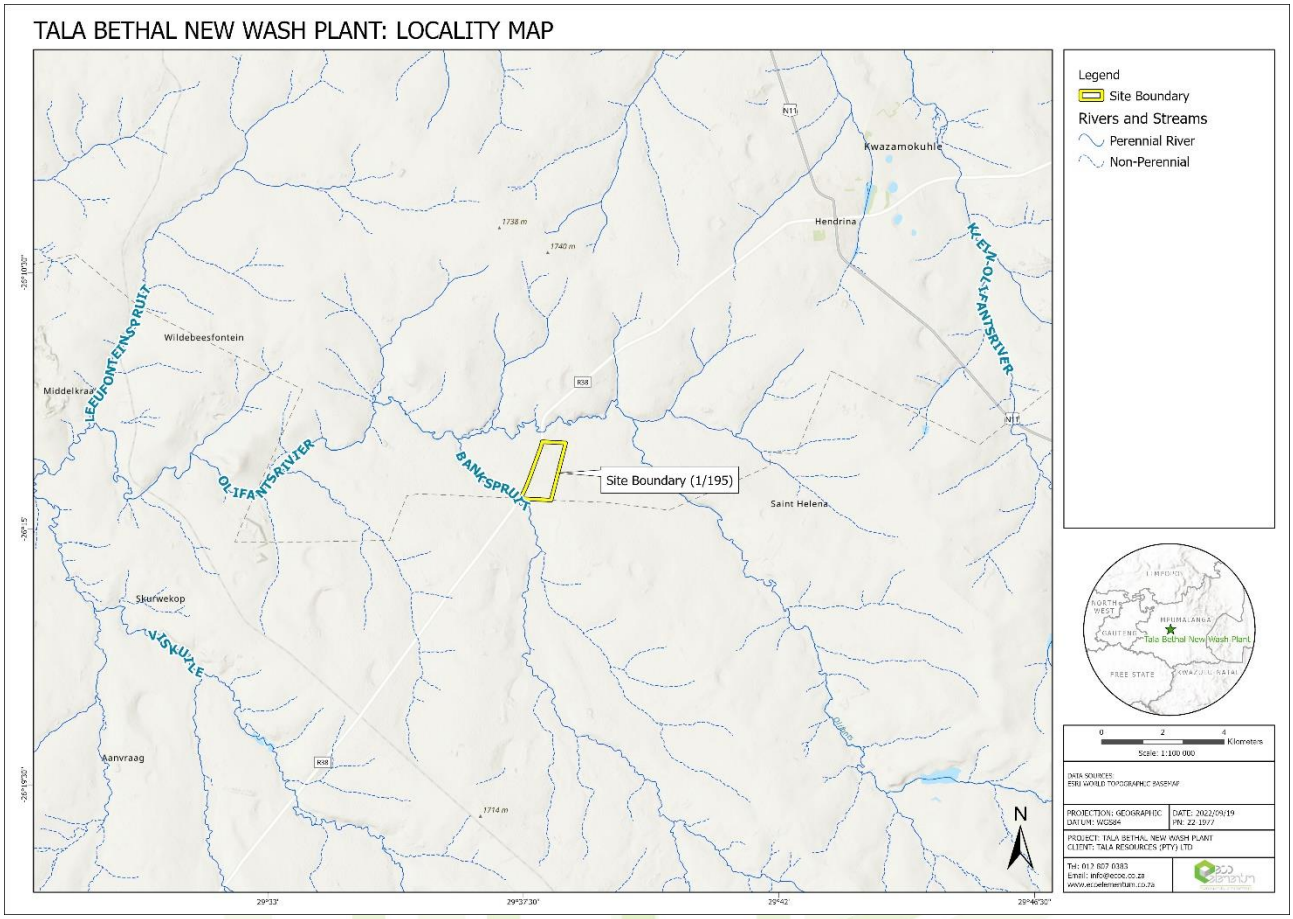


Figure 3-2: Locality Map

3.4 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY.

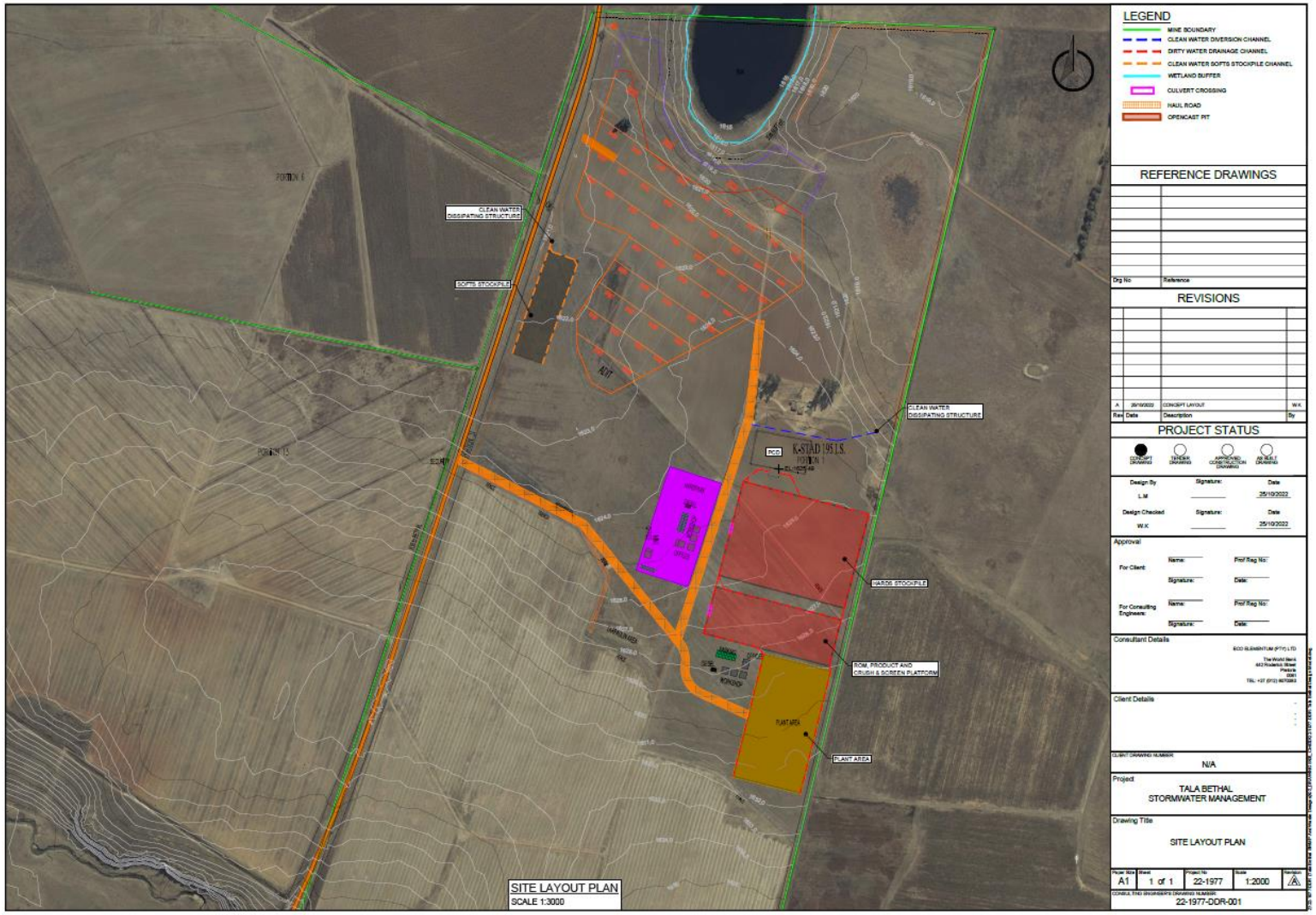


Figure 3-3: Activities Map

3.4.1 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. For the Tala Bethal Section 102 Project, the listed activities are listed under Regulation Listing Notice 1. Please refer to the following table for the details in terms of the listed activities.

Table 3-3: Listed and specific activities

APPLICABLE LISTING NOTICE (GNR 327, GNR 325 or GNR 324; as amended).		Name of Activity	Aerial extent of the Activity Ha or m²	Waste Management Authorisation
Listing Notice 1 (GNR 327)				
10	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where— (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	Process / Waste / Return Water pipeline infrastructure	To be determined	No
14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	Storage of diesel	To be determined	No
21D	Any activity including the operation that activity which requires an amendment or variation to a right or a 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 an amendment.	Section 102 amendment of the Mining Right (MR) to include the development of a Wash Plant and a new opencast section on Portion 1 of the Farm Kafferstad 195 IS.	Approximately 145 Ha. Surface disturbance: Approximately 59.8 Ha	No
34	The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding— (i) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act,	Section 102 amendment of the MR to include the development of a Wash Plant and a new opencast section on Portion 1 of the Farm Kafferstad 195 IS. This will trigger	Approximately 145 Ha. Surface disturbance: Approximately 59.8 Ha	NEMWA Category B: Activity 10, 11.

	2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (ii) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15 000 cubic metres per day; or (iii) the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic meters or less per day.	new Section 21 Water Uses and will require amendment of WUL.		
National Environmental Management: Waste Act, 2008 (NEM:WA) Category B				
10	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).	The proposed Section 102 MR amendment activities will trigger NEMWA Category B: Activity 10, 11.		
11	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).			
Mineral and Petroleum Resources Development Act, 2002 (MRPDA)				
102	Mining Right/Mining Permit/Prospecting Right/Section 102 EMP Amendment. (Refer to NEMA Activities above)	Section 102 amendment of the MR to include the development of a Wash Plant and a new opencast section on Portion 1 of the Farm Kafferstad 195 IS.		
National Water Act, 1998 (NWA) Section 21 Water Uses				
21(a)	Taking water from a water resource.	Abstraction of wastewater from the PCD. Abstraction from the borehole for domestic use.		
21(c)	Impeding or diverting the flow of water in a watercourse.	Opencast mine workings and development of a Wash Plant within 500m buffer of a wetland.		
21(i)	Altering the bed, banks, course or characteristic of a water course.	Opencast mine workings and development of a Wash Plant within 500m buffer of a wetland.		
21g	Disposing of waste in a manner which may detrimentally impact on a water resource.	Construction and operation of Wash Plant infrastructure. Use of a septic tank. Development and use of stockpile areas. PCD construction and operation. Dust suppression.		NEMWA Category B: Activity 10, 11.

		Backfilling.		
21j	Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.	Dewatering: removal of groundwater for safe continuation of mining.		

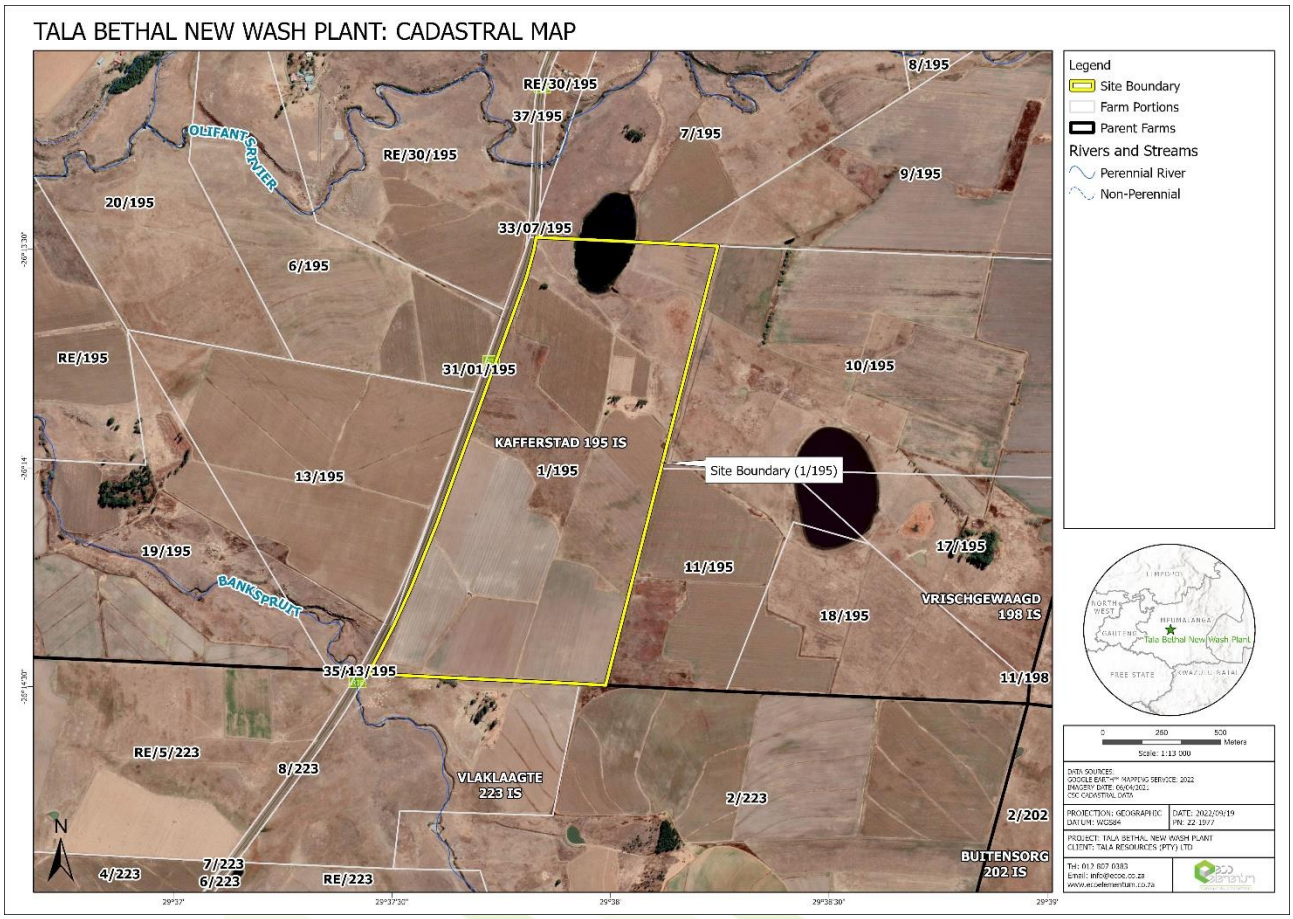


Figure 3-4: Proposed location where listed activities will occur

3.4.2 Description of Activities to be Undertaken

Mandlaglo Commodities (Pty) Ltd (hereinafter Mandlaglo) is currently operating Tala Bethal Coal Mine, an underground mining operation located near Hendrina, in the Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province of South Africa. Mandlaglo holds a Mining Right (MR) (Ref: MP 30/5/1/2/2/10191 MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA) and a Water Use Licence (06/B11A/ABCGIJ/9696) in terms of the National Water Act, Act No. 36 of 1998 (NWA).

The proposed project entails the amendment of the MR to include a new opencast section and the addition of a Wash Plant to the current surface infrastructure for on-site coal beneficiation. This amendment will apply to Portion 1 of Farm Kafferstad 195 IS and will entail revisions to Mandlaglo's current authorisations. The intention to develop and operate a Wash Plant will also require application for an Integrated Water Use Licence (IWUL) Amendment in terms of the NWA and the National Environmental Management: Waste Act, Act No. 59 of 2008 as amended (NEM:WA); read with the requirements of the MPRDA.

Mandlaglo has appointed Eco Elementum (hereinafter EcoE) has been appointed as independent environmental assessment practitioners (EAPs) to undertake the required amendment processes for the environmental authorisations, as

they apply to Portion 1 of Farm Kafferstad 195 IS. A Basic Assessment (BA) process is required in terms of NEMA Regulations, as amended for the application of the Section 102 MR amendment.

The current Tala Bethal Coal Mine's Operational Phase consists of the following:

- Coal mining using underground mining methods;
- The stockpiling of ROM and transporting to an off-site beneficiation plant;
- The disposal of mine affected water into the Pollution Control Dams (PCDs);
- The transporting of coal products; and
- The utilization of mine infrastructure.

The proposed amendment will include:

- Addition of a Wash Plant Infrastructure; and
- Addition of a new opencast section.

The Decommissioning Phase will be begin once all economically exploitable coal reserves have been extracted. The combined Life of Mine (LoM) for the Tala Bethal Coal Mine is estimated more than 10 years. The decommissioning phase will consist of:

- The removal of all mine infrastructure;
- The filling of all remaining voids and final shaping of the rehabilitated opencast pit;
- The removal of the carbonaceous layer from the product stockpiling area and haul roads;
- The ripping of all infrastructure areas; and
- The seeding of ripped and rehabilitated surfaces.

The mine closure phase will be dedicated to the implementation of a closure plan and the maintenance of rehabilitated areas.

Site Preparation

The new opencast section for the proposed amendment will be situated on Portion 1 of the Farm Kafferstad 195 IS. Site preparation mainly deals with the stripping and stockpiling of topsoil prior to the mining activities commencing. This process is undertaken to safeguard the quality and quantity of available valuable topsoil resources in the area as part of soil management practices. The main objectives of soil management are to:

- 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 should be located outside proposed mine disturbance areas;

- Stockpiles should be constructed using dozers rather than scrapers in order to minimise the structural degradation of the soil;
- Stockpiles should be constructed to have a "rough" surface condition to reduce erosion hazard, improve drainage and promote revegetation; and
- Stockpiles should be revegetated with the appropriate fertilisers and seeds to minimise weed infestation, maintain soil organic matter levels, soil structure, 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 soon as feasible after these structures are completed or as areas are no longer required. Soil surveys will be conducted to determine the depth of topsoil over the open cut area, beneath proposed mine waste infrastructure emplacements and Wash Plant infrastructure areas. It should be noted that it is important to ensure that only topsoil be recovered during site preparation. No underlying material should be inadvertently collected as it is unsuitable for reuse in rehabilitation.

A generalised best practice protocol for soil handling is presented below and includes measures which optimise the retention of soil characteristics (in terms of nutrients and micro-organisms) favourable to plant growth. This protocol will be, as far as possible, implemented for the stockpiles at the Tala Bethal Section 102 Project area.

- 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 will have a maximum height of 3 m to limit the potential for anaerobic conditions to develop within the soil pile;
- Topsoil stockpiles will have an embankment grade of approximately 1V:4H in order to limit the potential for erosion of the outer pile face;
- Topsoil stockpiles will be seeded and fertilised to promote vegetation growth; 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 at Portion 1 of Farm Kafferstad 195 IS. 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, while 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).

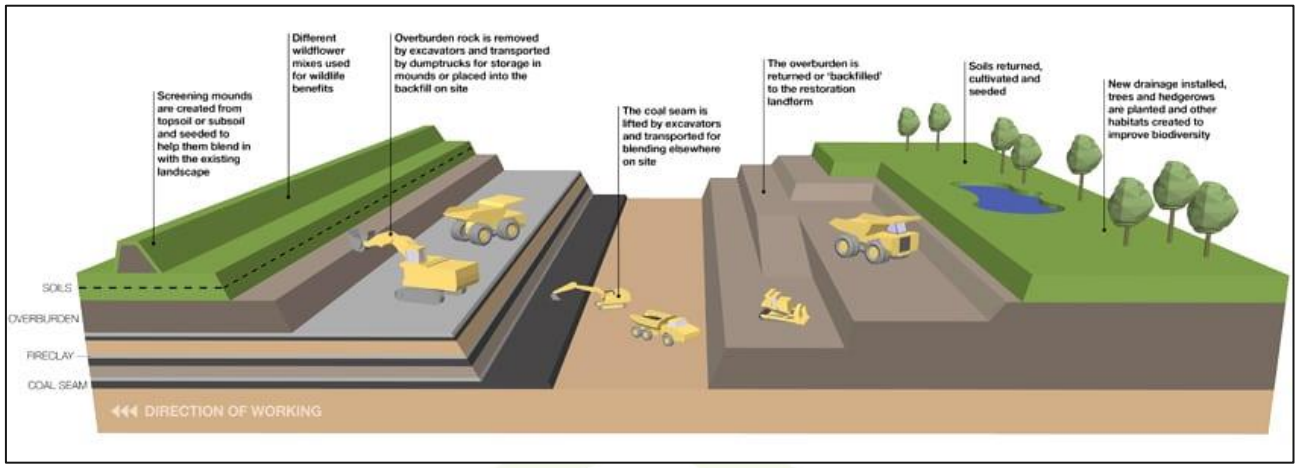


Figure 3-5: Typical Opencast Concurrent Roll Over Rehabilitation Mining Technique

ROM Coal

The Run of Mine (RoM) will be stockpiled on a lined platform near the Plant Area. The addition of a Wash Plant is proposed for the project for on-site beneficiation of coal, this will include crushing, screening and washing of the ROM.

The coal beneficiation or enrichment process is achieved by taking advantage of the density difference which is the physical properties of the coal mined mineral. Raw coal material, which is fed into heavy medium, sinks while the shale (refuses) float and these products are taken separately and the beneficiation or enrichment process takes place.

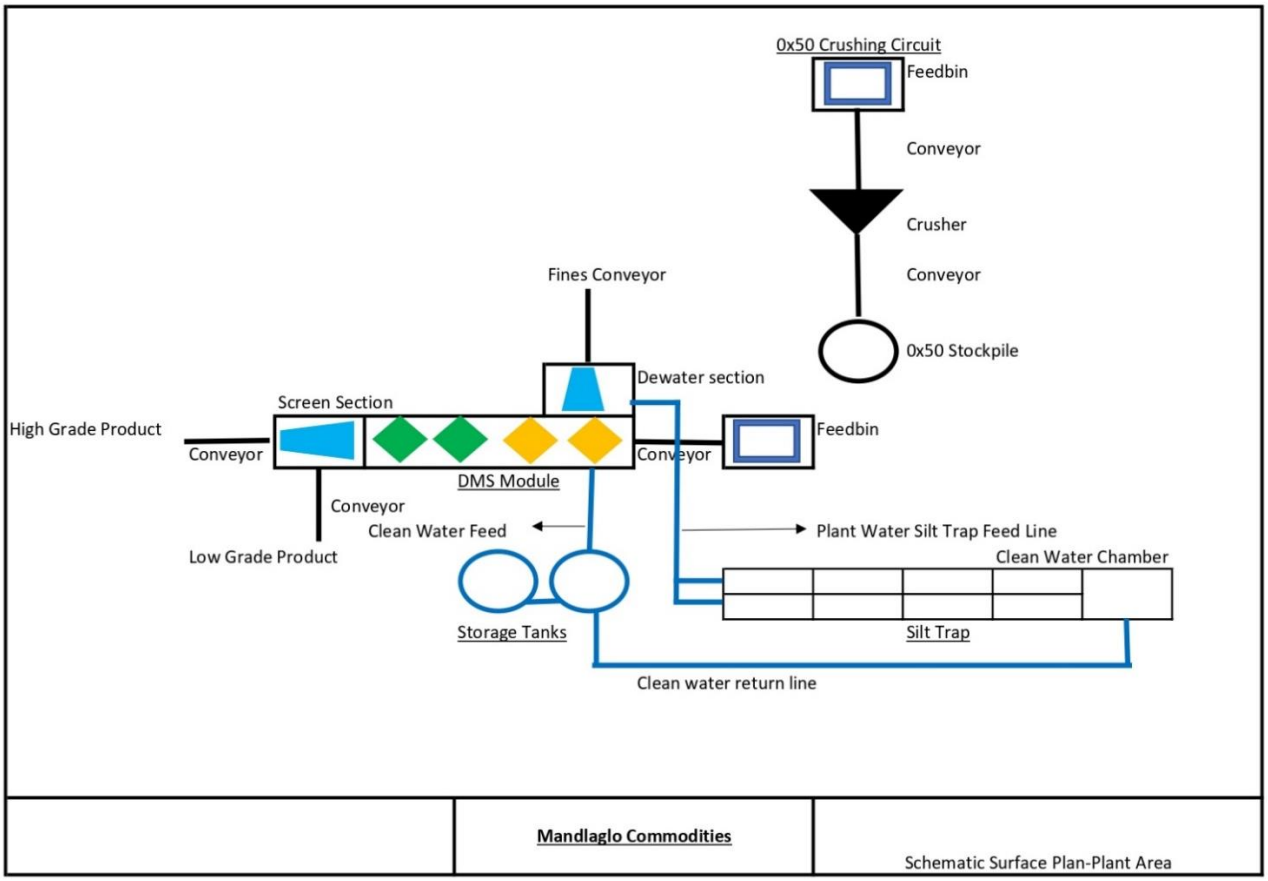


Figure 3-6: Schematic of Coal Beneficiation Process

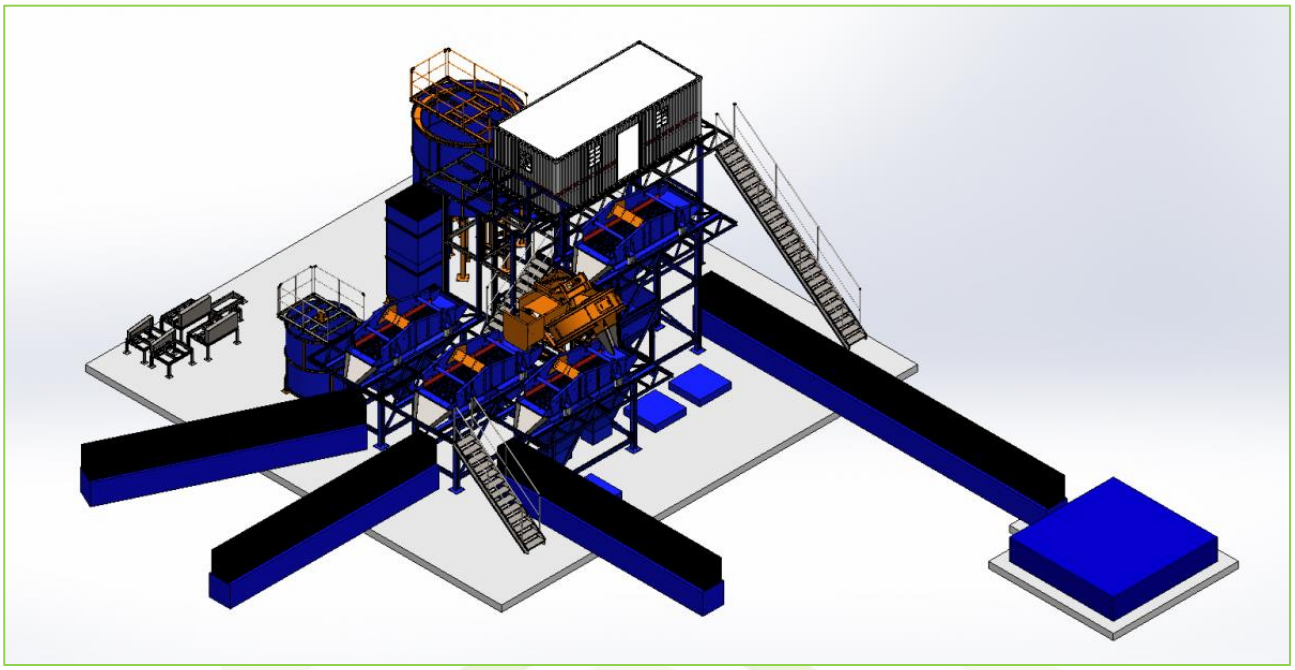


Figure 3-7: Typical Coal Washing Plant

Access and Haul Roads Construction

Portion 1 of the Farm Kafferstad 195 IS will be accessed via the R38 towards and from Hendrina, Mpumalanga. The site will require the construction of haul roads. The haul road will be used to access the mine offices, ablution facilities, workshop complex, plant area, PCD and mining area. Coal transportation trucks will also use this road to enter and exit the mine premises, including travelling to the weighbridge. In the construction of the haul roads, where possible, access roads should follow slope contours and vegetation should be left in place at the sides of the road to protect the soils.

Temporary Site Offices and Security Offices

To minimise construction requirements relating to the development of the mine and security offices, Mandlaglo will make use of temporary site and security offices. The Figure 3-8 provides an example of the container-type office trailers which will be used onsite. The use of office trailers is advantageous as they are available for purchase off-the-shelf and don't need to be constructed ensuring a smaller footprint is disturbed. Keeping the disturbance area to a minimal extent and ensuring ease of mine closure and rehabilitation after LoM make the temporary offices ideal, especially considering the short duration of the proposed activities and requirement of these offices.

The mine offices for the project will be situated on the eastern section of Portion 1 of the Farm Kafferstad 195 IS, while the security office will be at the entrance of the mining area next to the main entrance road R38.

Figure 3-8: Typical semi temporary site offices and security office

Temporary Sanitation and Changehouse Facilities

The sanitation and changehouse facilities on-site will also be container-type trailer structures which can be easily established and easily removed after the decommissioning of the site. A septic tank system will be implemented to manage the water used within the change house and ablution facilities (Figure 3-9). 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. Sewage will be removed utilising a 'honey-sucker' truck, or similar, transported and disposed of at an appropriate, licenced facility off-site.

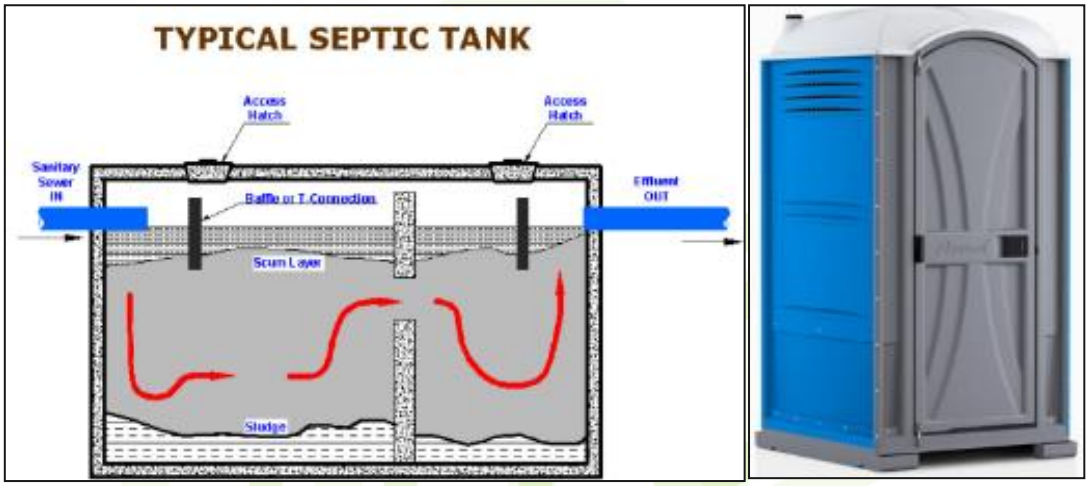


Figure 3-9: Typical septic tank cross section and chemical toilet illustration

Mobile Fuel Storage

Fuel, in the form of diesel, will be stored onsite using a mobile fuel storage tank (Figure 3-10). The fuel storage tank will be equipped with a drip tray designed to hold 110% the capacity of the tanks. The fuel bowser will be stored off site. The figures below illustrate a generic mobile fuel storage tank.

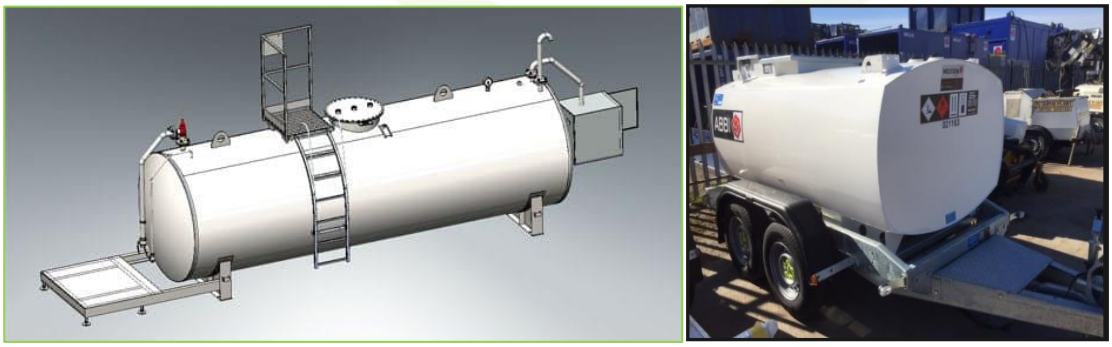


Figure 3-10: Typical mobile fuel storage trailer with bunded tray

Pollution Control Dam (Evaporation and Dust Suppression Usages)

The development of a Pollution Control Dam (PCD) responsible for the storage of process and dirty water is proposed for the mining area. The dirty water runoff from the product platform, stockpile areas and haul road areas are conveyed to the proposed PCD by means of concrete dirty water channels. Provisions such as a diversion berm are made to ensure a clear

split between the clean water runoff and the dirty water runoff on-site. The total amount of clean water that could potentially enter the PCD will thus be limited and will discharge into the environment. A concrete silt trap will be required for the PCD for maintenance. In the case where water for dust suppression is limited during the dry season, alternative methods of dust suppression such as applying chemicals ('Dust-a-side) on the roads may be considered.

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 on Portion 1, Farm Kafferstad 195 IS.

Figure 3-11: Lined PCD illustration

Clean and Dirty Water Separation

Effective surface water management and monitoring is essential for long term sustainability and protection of the receiving water environment. There is a legal obligation on the water user to establish a monitoring programme on site which needs to be registered on the National Monitoring System administered by D:RQS.

A detailed surface water management plan was 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.

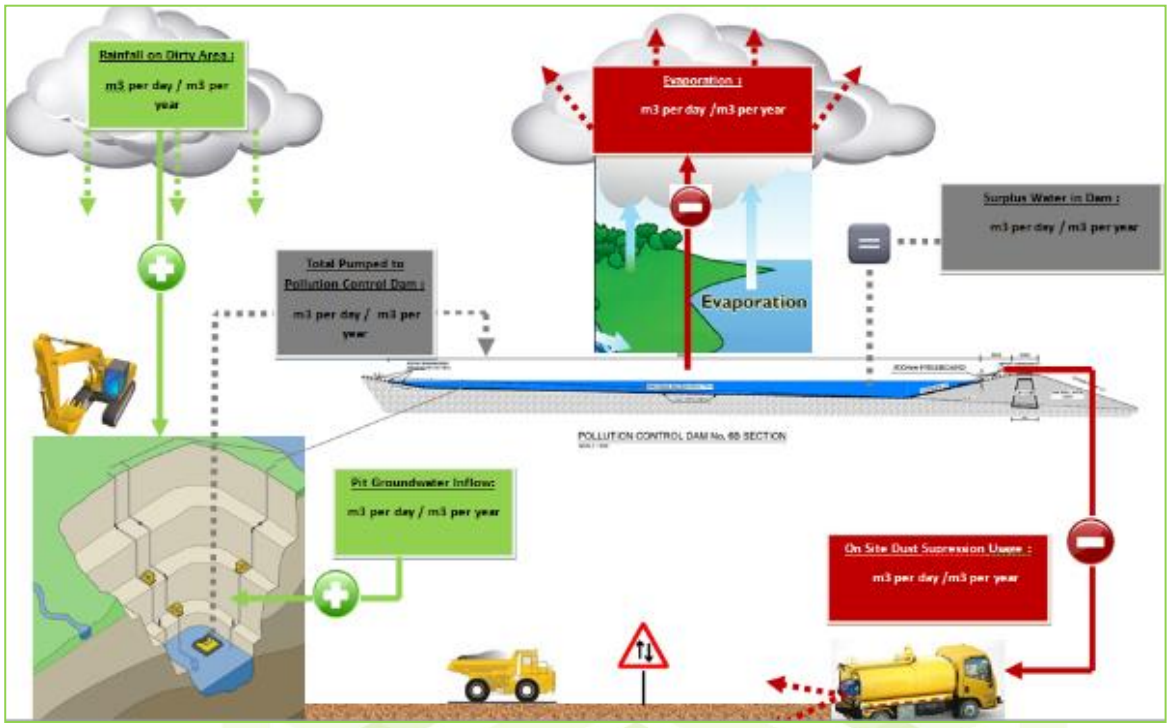


Figure 3-12: Typical water balance considerations during the design of a clean and dirty water separation system

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 necessary for the WUL Amendment Application.

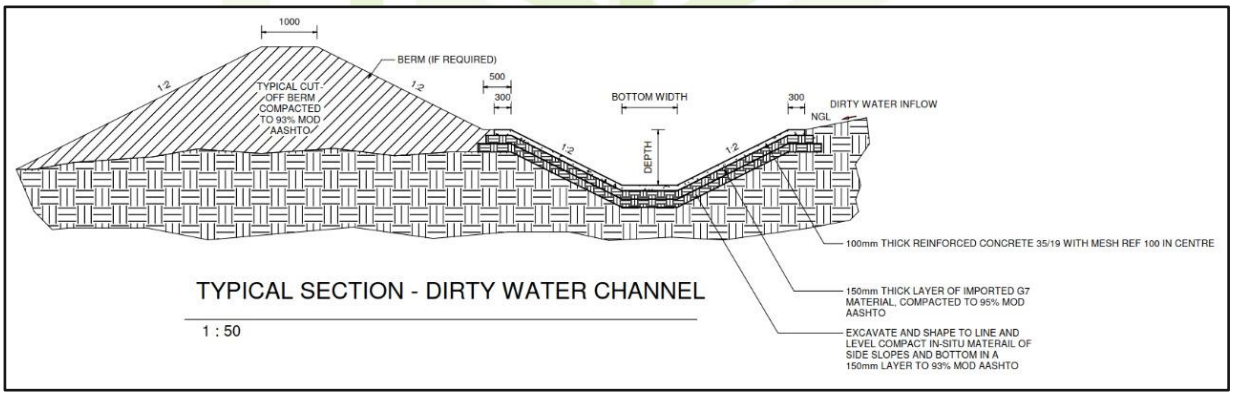


Figure 3-13: Typical Channel/Berm Cross Section for Polluted Water Diversion

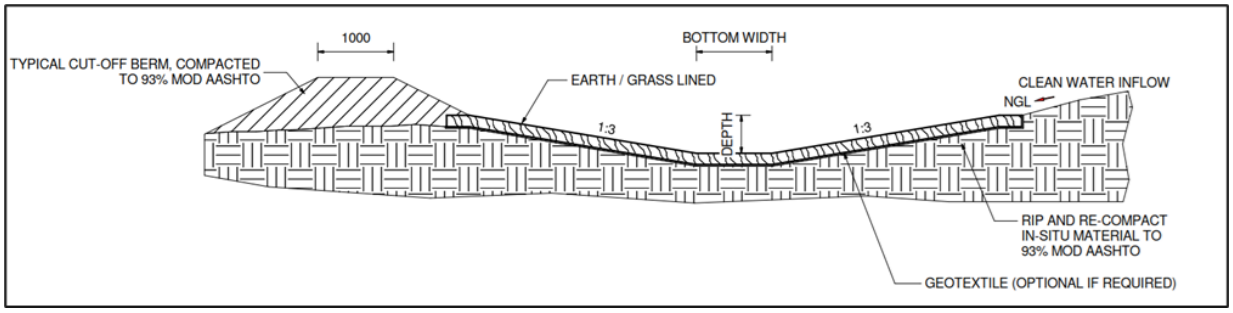


Figure 3-14: Typical Channel/Berm Cross Section for Clean Water Diversion

Fencing

The entire Portion 1 on Kafferstad 195 IS will be fenced to promote safety and deter trespassing on the property during the construction and operational phases. Fences will be clearly demarcated, with the appropriate signage 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 3-15: Typical mine fence signage

Staff and Visitors Parking

Mandlaglo will construct a parking area near the Plant Area. Designated parking areas will be constructed by compaction of the subsoil after removal, storage and preservation of the valuable layer of topsoil. Reverse parking will be mandatory at all parking bays. Storm water management control around these areas will be implemented while the necessary signage will be erected to ensure optimal safety. 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 LoM. 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 where 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.

Waste Management

General 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 3-4: Policy and legislative table

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT? (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)	Section 102 - The project requires a Mining Right (MR) amendment from the DMRE.	Mandlaglo is in possession of a MR (MP 30/5/1/2/2/10191 MR) which was granted on 29 October 2020. A Section 102 MR and IWULA amendment application has been made to the DMRE, 27 September 2022.
National Environmental Management Act (NEMA) (107 of 1998)	Section 28 of the NEMA includes a far-reaching general "Duty of Care" which stipulates the need to protect the environment from degradation and pollution. In terms of the listed activities, a BA process is required.	Mandlaglo is in possession of Environmental Authorisation (MP30/5/1/2/3/2/1/10191 EA) dated 29 October 2020. A Section 102 MR and IWULA amendment application has been made to the DMRE, 27 September 2022.
NEMA Environmental Impact Assessment (EIA) Regulations 2014, as amended	In terms of the listed activities, a BA process and Environmental Management Plan (EMP) is required. 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 MR application lodged 20 September 2022 on SAMRAD (Ref: MP-00165-MR/102).
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 will store small quantities of diesel on site for short periods of time. The mining operation will result in waste-generating activities. Stockpiling will require a Waste Licence according to NEMWA, 2018 as amended, Category B, activity 10 and 11.
The South African Constitution (Act 108 of 1996) The South African Constitution 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.	An open and participatory public participation process will be followed. An EMP and awareness plan will be designed according to the issues raised during this process.
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	An upload of the BAR will be done on the SAHRIS online system for comment.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT? (E.g., In terms of the National Water Act a Water Use License has/ has not been applied for.)
	regards to the management of national heritage resources were relevant to this application.	
National Environmental Biodiversity Act The National Environmental Management Biodiversity Act (NEM:BA), 2004 (Act No.10 of 2004), provides for: (i) the management and conservation of South Africa`s biodiversity within the framework of the National Environmental Management Act, 1998; (ii) the protection of species and ecosystems that warrant national protection; (iii) the sustainable use of indigenous biological resources; (iv) the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; (v) the establishment and functions of a South African National Biodiversity Institute;	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.
National Water Act (Act No. 36 of 1998) (NWA)	The proposed activities require amendments to the Water Use License.	Mandlaglo is in possession of an approved Water Use Licence (06/B11A/ABCGIJ/9696) in terms of NWA. The development of a Wash Plant and a new opencast section will require an amendment to the licence. An IWUL amendment will be applied for as part of the project.
National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004);	On-site dust monitoring is required from the construction phase.	As part of the approved EMP, dust suppression methods will be employed on the study area.
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) **The National Development Plan outlines what we should do to eradicate poverty, increase employment and reduce inequality**	Used to identify the Need and Desirability of the project and its alignment with the National Policy.	This will form part of the project background and the basis of the socio-economic evaluation.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT? (E.g., In terms of the National Water Act a Water Use License has/ has not been applied for.)
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.		
Municipal Systems Act, 2000 (Act No. 32 of 2000) **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 Integrated Development Planning (IDP) and Spatial Development Framework (SDF).	Used to assess the Need and Desirability of the project.
Mining Charter **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 and 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 4th 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.

Portion 1 of the Farm Kafferstad 195 IS falls within Mandlaglo's approved MR boundary and is located within the Witbank Coalfields, well known as the most important coal producing coalfields in South Africa. The site for the new opencast section is preferred due to the shallow coal reserve and the heavily or moderately modified nature of the site. No alternative mining site locations were considered during the study as the project location is bound to the current location due to the underlying geology and the approved MR area. The stormwater management infrastructure of the proposed site will be based on the most effective way to handle clean and dirty water separation. This will also be determined by the positioning of the Wash Plant.

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 mining sector contributes several positive socio-economic benefits which will stimulate local economy and the increase the quality of life for the surrounding communities. The option of not approving the proposed activities will result in the loss of employment opportunity and skills development which would have possible if the project progresses.

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

The resource location was determined through drilling exercises in order to locate the areas that will be most economical to mine, and the extent of the resource that will be mined. The opencast section's location was chosen due to the shallow nature of the coal resource. The proposed layout of the surface infrastructure was determined using an integrated approach which considered the area's topology and contours, space availability, floodplain and watercourse buffers, existing infrastructure, servitudes and drainage flow directions.

The stormwater management infrastructure of the proposed site will be based on the most effective way to handle clean and dirty water separation. This infrastructure will be located around the site near the Wash Plant area, the coal platforms and PCD. The environmental sensitivities of the area were considered when considering the site layout for any possible infrastructure.

3.8.1 Details of the development footprint alternatives considered.

With reference to the site plan provided as Appendix 4 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 site is located on Portion 1 of the Farm Kafferstad 195 IS which is 11 km southwest of Hendrina and 20 km northeast of Bethal. The farm falls within the Witbank Coalfields. The landcover for the majority of the area is categorised as commercial annual crops which are rain-fed and overlaps with heavily transformed landscape. The area has extensive alterations from agricultural land. The project location is bound to the current location due to the underlying geology and the MR extent.

b) The type of activity to be undertaken;

The coal resource varies in depth and thus it is proposed that the resource is mined using two different mining methods. For the shallower resource, opencast roll-over mining is seen as the most efficient mining method. This would include undertaking concurrent rehabilitation as mining progresses. This will reduce the cost required for rehabilitation after cessation of mining activities.

It is proposed that the deeper coal reserve on Portion 1 of Farm Kafferstad 195 IS be mined through underground mining. This will be undertaken using the bord and pillar method by means of drill and blast will be undertaken in areas where the coal resource is at greater depths. The underground will be accessed via a boxcut adit.

c) The design or layout of the activity;

The proposed layout of the surface infrastructure was determined using an integrated approach which considered the area's topology and contours, space availability, floodplain and watercourse buffers, existing infrastructure, servitudes and drainage flow directions.

For the proposed amendment project on Portion 1 of Farm Kafferstad 195 IS most of the infrastructure will be on the eastern portion of the Farm due to the proposed opencast section being dictated by the shallow coal reserve and the MR extent. The proposed layout has been based on the most effective and cost sensitive way to handle clean and dirty water separation. The surrounding wetlands have also helped model the surface layout and infrastructure.

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

The coal resource varies in depth and thus it is proposed that the resource is mined using two different mining methods. For the shallower resource, opencast roll-over mining is seen as the most efficient mining method. This would include undertaking concurrent rehabilitation as mining progresses. This will reduce the cost required for rehabilitation after cessation of mining activities.

It is proposed that the deeper coal reserve on Portion 1 of Farm Kafferstad 195 IS be mined through underground mining. This will be undertaken using the bord and pillar method by means of drill and blast will be undertaken in areas where the coal resource is at greater depths. The underground will be accessed via a boxcut adit.

Alternative technologies which will be considered for the proposed project will focus on the management of water, dust, and noise. These will be considered for the mitigation measures in this report.

f) The option of not implementing the activity.

Should the applicant not have the opportunity to amend the MR the socio-economic benefits which the project could provide will not come to fruition. The opportunity for job creation and resource utilisation will be lost.

3.8.2 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 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 was followed and was based on reciprocal dissemination of information. The following tasks were/will be undertaken during the PPP:

- Identification of I&APs;
- Consultation with selected landowners;
- Notification of I&APs regarding the proposed project via newspaper advert (in the Witbank News); the placing of 3 x site notices at conspicuous places, the sending of notices to affected parties via email (in the form of Background Information Documents) and sms'.
- A public information meeting (open day) with I&APs will be held at the Hendrina Public Library;
- Gathering comments, issues and concerns from I&APs;
- Responding to I&AP comments, issues and concerns;
- Compilation and submission of results of consultation report to the DMRE; and
- Providing I&APs with the opportunity to review and comment on the BAR.

Landowner and property detail

The registered owners of the farms were listed as follows:

Table 3-5: Directly affected landowners

Farm			Ptn	Owner
KAFFERSTAD	195	IS	1	STRYDOM GERT MARTHINUS
KAFFERSTAD	195	IS	1	STRYDOM TRUDIE

Surrounding landowners who were contacted are listed below.

Table 3-6: Surrounding Landowners

Farm			Ptn	Owner
KAFFERSTAD	195	IS	6	STRYDOM GERT MARTHINUS AND STRYDOM TRUDIE
KAFFERSTAD	195	IS	7	SORGENFRI PTY LTD
KAFFERSTAD	195	IS	9	MEYER DE JAGER FAMILIE TRUST
KAFFERSTAD	195	IS	10	KAFFERSTAD PLASE BOERDERY PTY LTD
KAFFERSTAD	195	IS	11	WILLEMSE ADAM JOHANNES
KAFFERSTAD	195	IS	13	WYKOM HOLDINGS PTY LTD
KAFFERSTAD	309	IS	RE/30	Information not available on Windeed – Further investigation will occur during PPP
VLAKLAAGTE	223	IS	RE/5	WYKOM BOERDERY CC
VLAKLAAGTE	223	IS	2	ANLIZMAR PTY LTD

Site Notices

Three (3) Site notices (Figure 3-16) will be placed around the proposed mining site in accordance with Regulation 41(2)(a), (3) and (4) of the Environmental Impact Assessment (EIA) Regulations published under Government Notice R982 in *Government Gazette* 38282 of 4 December 2014 (as amended).

PUBLIC PARTICIPATION NOTICE:
ENVIRONMENTAL AUTHORISATION APPLICATIONS
FOR TALA BETHAL COAL MINE SECTION 102 AND IWULA AMENDMENTS

MR REF: MP 30/5/1/2/2/10191 MR S102 REF:MP-00165-MR/102 ECO ELEMENTUM REF: 22-1977-AUTH

DATE OF PUBLICATION: 11 NOVEMBER 2022

NOTICE OF PUBLIC PARTICIPATION PROCESS FOR THE PROPOSED ENVIRONMENTAL AUTHORISATION AND WATER USE LICENCE AMENDMENT APPLICATIONS IN SUPPORT OF THE TALA BETHAL COAL MINE SECTION 102 AMENDMENT FOR THE ADDITION OF A WASH PLANT AND NEW OPENCAST SECTION ON PORTION 1 OF THE FARM KAFFERSTAD 195 IS, STEVE TSHWETE LOCAL MUNICIPALITY, MPUMALANGA PROVINCE OF SOUTH AFRICA

Notice is hereby given in terms of the Minerals and Petroleum Resources 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 (EIA) 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 Mandlagio Commodities (Pty) Ltd has applied for a Section 102 Mining Right Amendment on Portion 1 of the Farm Kafferstad 195 IS, Steve Tshwete Local Municipality, Mpumalanga Province Of South Africa. Eco Elementum has been appointed to undertake the Amendment of the Environmental Authorisations and would like to engage Interested and Affected Parties (I&APs) and the local property owners in respect to the activities proposed on abovementioned property.

PROJECT TITLE: Tala Bethal Section 102 EA and IWUL Amendment (22-1977-AUTH)

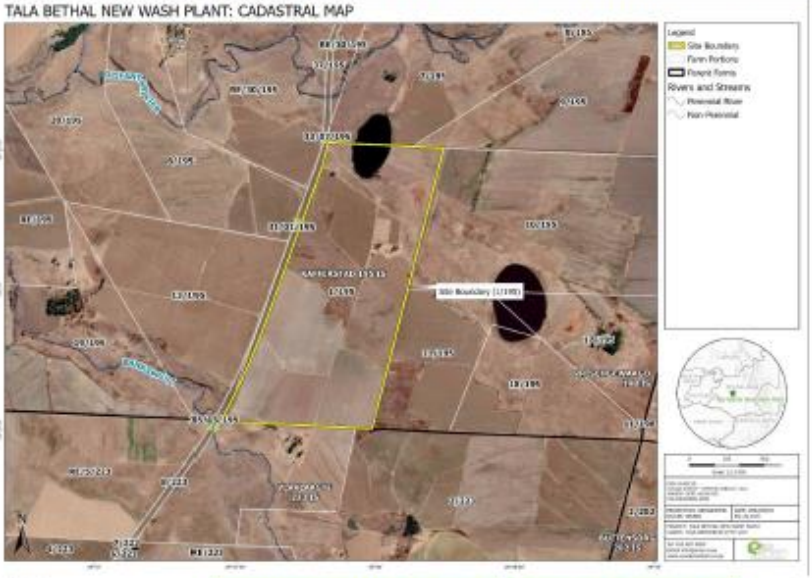
PROJECT:
The proposed project entails the amendment of the Mining Right (MR) to include a new opencast section and the addition of a Wash Plant to the current surface infrastructure for on-site coal beneficiation. The project will be located near Hendrina, within Steve Tshwete Local Municipality, Mpumalanga Province.

The intent to mine requires the following applications and subsequent approvals prior to commencement:

- **Mining Right (MPRDA):** Section 102
- **Environmental Authorisation:** NEMA and EIA Regulations namely: GNR 327 – Listed Activities 10, 14, 21D, and 34.
- **Waste License (NEMWA):** Category B: Activity 10, 11
- **An Integrated Water Use License** in terms of the NWA Section 21 water uses including 21(a) For the return water dams and abstraction from a borehole for domestic use, 21(g) For the Wash Plant infrastructure, sceptic tank, stockpiles, dust suppression and PCD and 21(j) For the removal of groundwater for safe continuation of mining.

To this effect, an integrated environmental application process will be followed by means of the BA Process. The Draft Basic Assessment Report (DBAR) will be made available for a 30-day public review period (11 November to 12 December 2022) on the website (http://ecoelementum.co.za/downloads/) and per download link (upon request). Interested and Affected Parties (I&APs) are invited to register and provide written comments. I&APs should refer to the relevant reference number(s), and must provide their comments together with their name, contact details (preferred method of notification, e.g. e-mail or sms) to the contact person indicated below.

TALA BETHAL NEW WASH PLANT: CADASTRAL MAP



ENVIRONMENTAL & ENGINEERING

Queries regarding this matter should be referred to:

Ms. Marungwane Ramashapa
Office: 012 807 0383
Email: Maru@ecoe.co.za
Project Ref: 22-1977-AUTH

In order to ensure that you are identified and registered as an **interested and/or affected party**, please submit your name, contact information and interest in the matter to the contact person provided.

Figure 3-16: 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 EIA Regulations published under Government Notice R982 in *Government Gazette* 38282 of 4 December 2014 (as amended).

Advert placement

An advert was placed in Middleburg Observer and was published Friday 11 November 2022 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).

Proof of notification

Email

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

Submission of Draft Basic Assessment Report

The DBAR was submitted to the following Commenting Authorities (CAs) for comment:

Department	Attention to
Department of Agriculture forestry and fisheries	Doreen Sithole
Mpumalanga Provincial Government DARDLEA	Dineo Tswai
Nkangala District Municipality	Charles Makula
Mpumalanga Department of Mineral Resources	Prisca Maluleka
Department: Water Affairs - Bronkhorstspruit	Adivhaho Rambuda
Steve Tshwete Local Municipality	Ms. D Lambrecht
Mpumalanga Tourism and Park Agency	Phumla Nkosi
South African Heritage Resources Agency (SAHRA)	Online submission

3.8.3 Summary of issues raised by I&APs

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

This section will be completed after the initial commenting period.

3.8.4 The Environmental attributes associated with the alternatives. (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

3.8.4.1 Baseline Environment

3.8.4.1.1 Type of environment affected by the proposed activity.

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

CLIMATE

The study area falls within the summer rainfall region and the average annual rainfall is approximately 794 mm. The average annual temperature is 15.1 ºC. In the summer months' maximum average daily temperatures are predicted to be 22°C to 25°C on average with a maximum of 30°C possible during hot days, dropping to a predicted 9°C to 13°C on average at night and 3°C minimum on cold nights. During winter months the average day time temperature average of 4°C to 20°C range while cold winter night time temperatures predicted to drop to -2°C.

Falling in a summer rainfall area, the location is predicted to receive the most precipitation in the summer months of October to March overall. November to January are predicted the highest rainfall months with between 80 mm to 93 mm predicted per month during these months. February, March and April are predicted to receive 25 mm to 52 mm precipitation. All other months are predicted to receive less than 25 mm precipitation on average during the month.

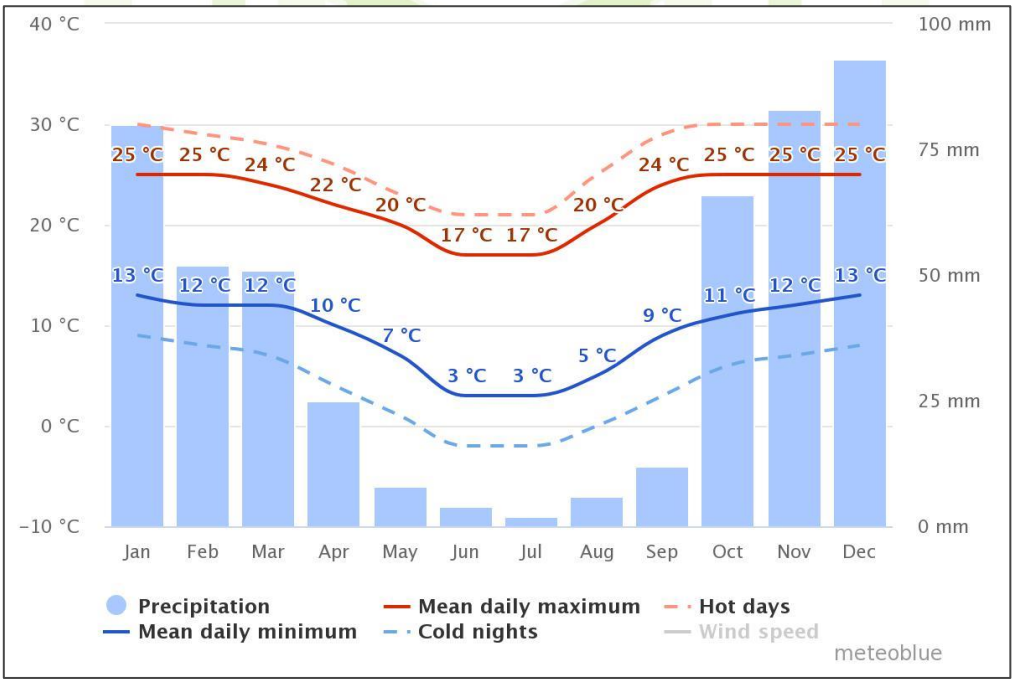


Figure 3-17: Temp and precipitation simulation results from the NEMS model for the proposed Tala - Bethal Coal project area (1985 - current)

GEOLOGY

Regional Geology

The study area of the proposed project is underlain by rocks from the Karoo Supergroup. The site is situated in the Witbank Coalfields which is the most important coal producing coalfields in South Africa (Figure 3-18). 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 upper most coal seam. The number 2 and 4 seams are the most exploited throughout the Witbank Coalfields.

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 its 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.

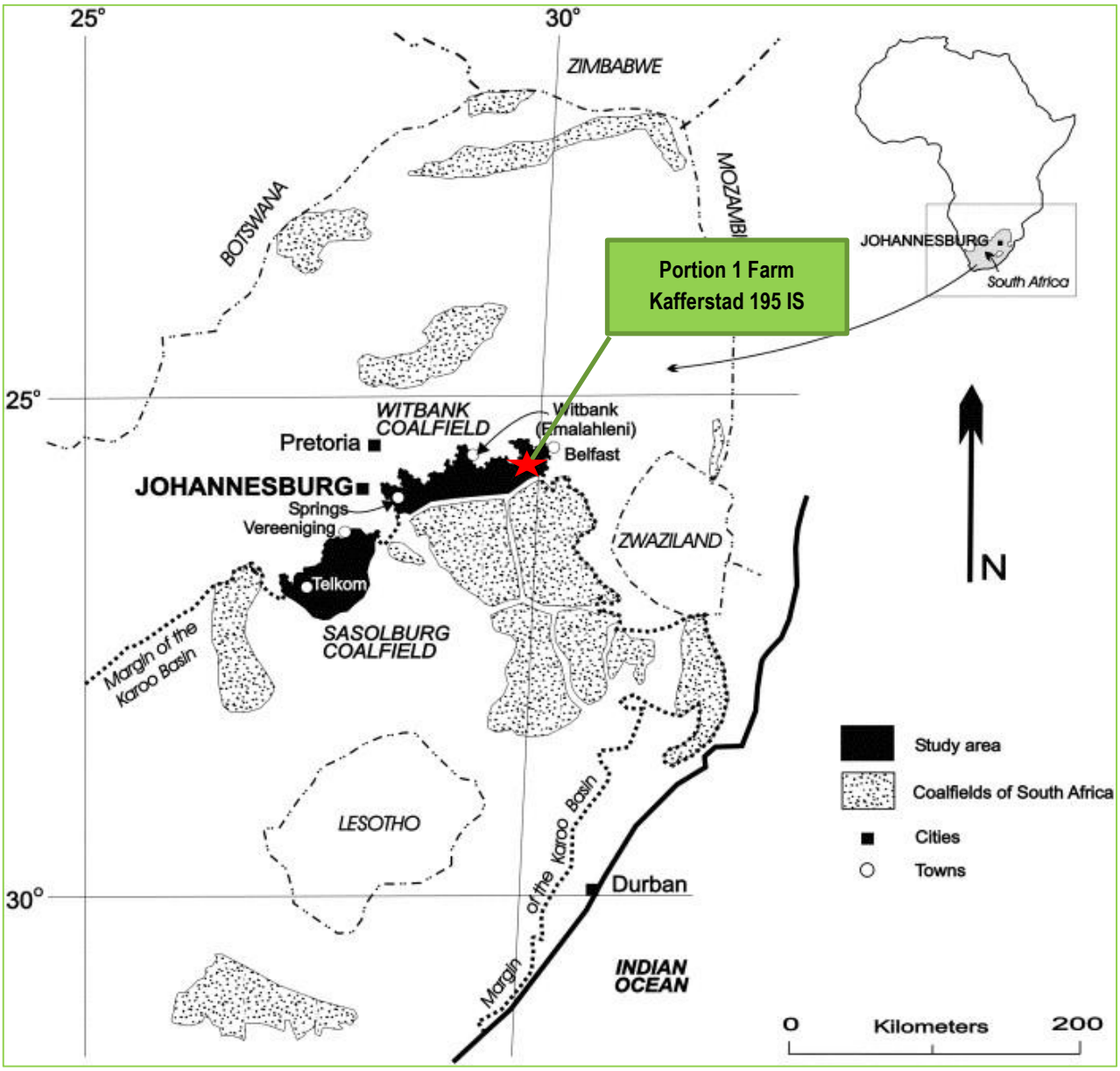


Figure 3-18: Witbank Coalfields and position of the study area in relation to it (Denis et.al., 2007).

Local Geology and Soils

The desktop study indicates that sandstone, mudstone, siltstone, gritstone and coal from the Vryheid Formation make up the geology of the site. Red to yellow sandy soils of the Ba and Bb land types found on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup). Land types Bb (65%) and Ba (30%).

HYDROGEOLOGY

A detailed Geohydrological Impact Assessment will be conducted and included in the Final BAR.

From a regional perspective, three main aquifers have been identified for the proposed project area:

- A shallow upper aquifer, known as the weathered Karoo aquifer;
- The fractured Karoo Rock aquifer, containing coal seam and dolerite intrusion aquifers; and
- The fractured pre-Karoo aquifer.

The weathered Karoo aquifer consists of in-situ weathered or transported material and extends down to the effective weathering depth, generally between 5 and 15 m below surface. This aquifer is generally of a good quality and is used for domestic and stock watering purposes by means of shallow boreholes or seasonal springs and seeps.

The fractured Karoo aquifer occurs in the deeper Karoo strata and is generally separated from the pre-Karoo aquifer by the Dwyka tillites, which are impermeable. Water strikes in the fractured Karoo aquifer are associated with bedding plane fractures, faults and the contact zones with dolerite dykes and sills. Levels vary, but are generally between 5 and 20 m below surface, unless active dewatering due to human activity takes place.

The weathered and fractured Karoo aquifers are classified as minor aquifer systems, but they are regionally important as sources for domestic and stock watering. The yields generally preclude commercial irrigation. These aquifers also provide the base flow for surface water systems. The pre-Karoo Aquifer consists of the basement granites, and water strikes are associated with faults and areas of weathering. The aquifer is confined due to the Dwyka tillites and water levels are highly variable.

Hydraulic Conductivity

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

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

Aquifer testing was not conducted as part of this basic assessment as the monitoring boreholes for Portion 1 of Farm Kafferstad195 IS were not yet drilled. Aquifer testing should be conducted on newly drilled monitoring boreholes to determine the site-specific aquifer parameters.

The aquifer characteristics in the area is 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 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 increases with the exposure to water and oxygen often accelerates 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 continuous which increases the acid generation.

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.

The results below represent the waste classification typically observed in the coal mining environment (Figure 3-19). Similar results were found for the project 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 3-7) 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 3-7: 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

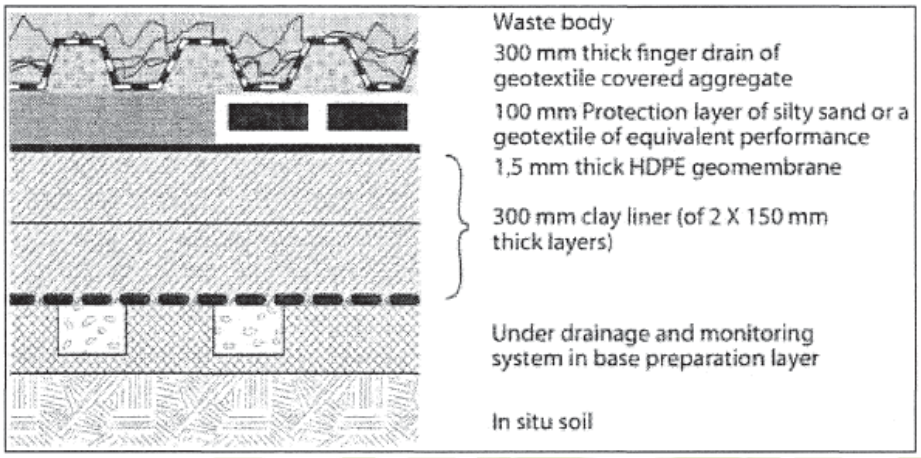


Figure 3-19: Class C landfill site liner requirements.

Groundwater Vulnerability

Groundwater vulnerability refers to the likelihood of contamination to reach a certain area/receptor after it has been introduced to the surface. For the project area, the vulnerability was estimated from the Aquifer Vulnerability map of South Africa (DWA, 2013) and by the Groundwater Vulnerability Classification System. According to the Aquifer Vulnerability map, Portion 1 of Farm Kafferstad 195 IS is located in a moderate vulnerability rating area. Therefore, an area that if continuously exposed to contamination may be vulnerable to some pollutants.

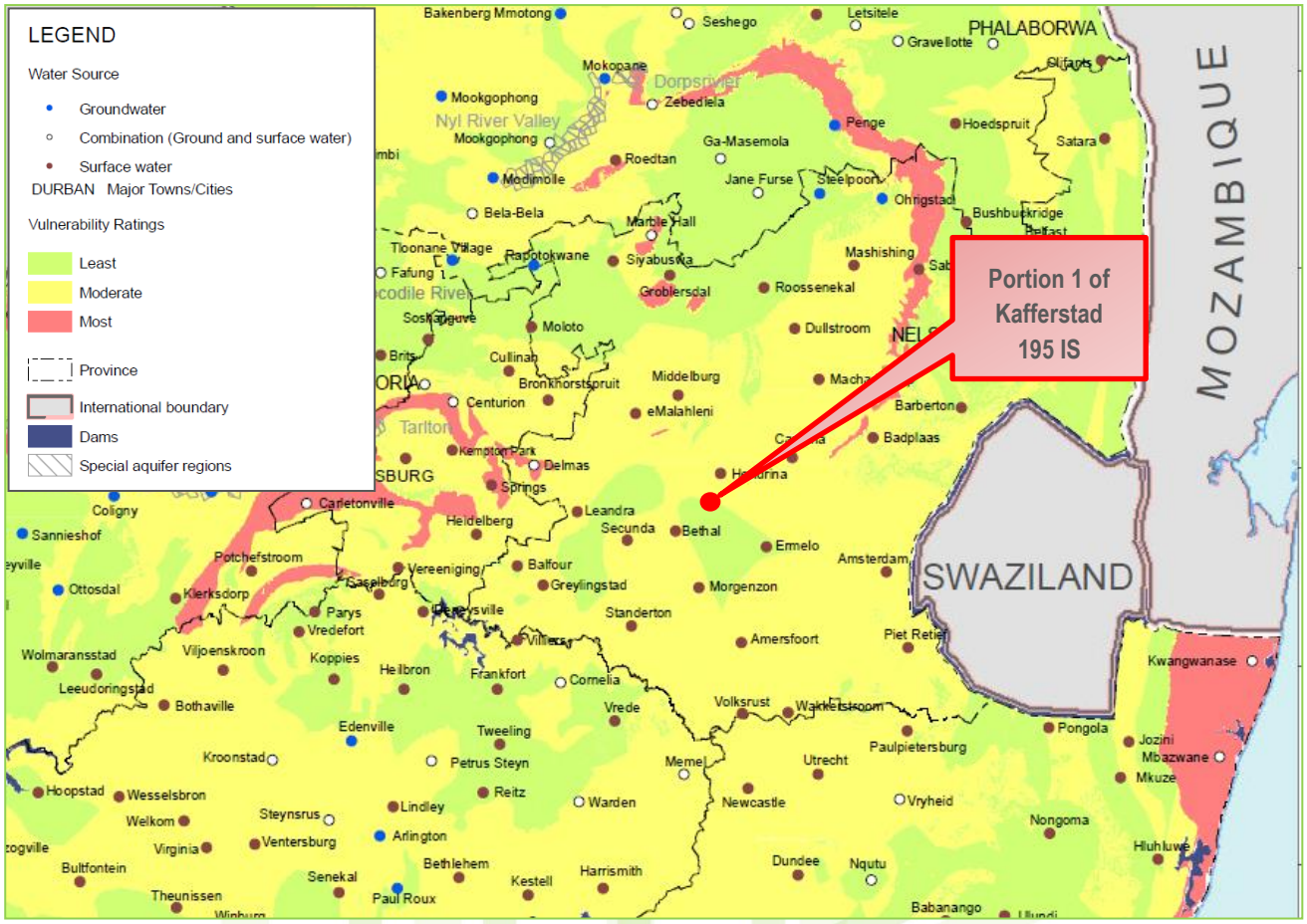


Figure 3-20: Aquifer vulnerability rating of the propsosed project area (DWA, 2013)

The Groundwater Vulnerability Classification System incorporates the Parsons Aquifer Classification System and the drinking water guidelines from the Department of Water Affairs and Forestry.

Table 3-8: Groundwater Vulnerability Classification System

Rating	Depth to Water Level	Groundwater Quality	Aquifer Type- Parsons
1	> 10 m	Poor (TDS > 2 400 mg/l).	Non-Aquifer System.
2	6 – 10 m	Marginal (TDS > 1 000 < 2 400 mg/l).	Minor Aquifer System.
3	3 – 6 m	Good (TDS > 450 < 1 000 mg/l).	Major Aquifer System.
4	0 – 3 m	Excellent (TDS < 450 mg/l).	Sole Aquifer System.

Table 3-9: Groundwater Vulnerability Rating

Rating	Vulnerability
≤ 4	Low
> 4 ≤ 8	Medium
≥ 9	High

According to the Groundwater Vulnerability Classification System, the proposed project area aquifer is expected to fall within a medium vulnerability rating. When groundwater qualities and levels are available, the rating will be completed.

Table 3-10: Groundwater Vulnerability Rating

Rating	
Depth to water level	2
Groundwater quality	3
Aquifer Type	2
Total Score	7

According to the Groundwater Vulnerability Classification System and knowledge of the surrounding area, the project area aquifer is likely to score a rating of 7 which is indicative of a medium vulnerability.

Aquifer Classification

According to the Aquifer Classification map (DWA, 2012), Portion 1 of Farm Kafferstad 195 IS is situated in a minor aquifer classification area. Aquifer classification is based on the Parsons System (1995). Qualities in these aquifers can vary and are typically moderately yielding aquifers.

Table 3-11: Aquifer System Management Classes.

Sole Aquifer System	An aquifer that is used to supply 50% or more of domestic water for a given area, and for which there is no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.
Major Aquifer System	Highly permeable formation, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (less than 150 mS/m).
Minor Aquifer System	These can be fractured or potentially fractured rocks that do not have a primary permeability, or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large volumes of water, they are important both for local suppliers and in supplying base flow for rivers.
Non-Aquifer System	These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks, although impermeable, does take place, and needs to be considered when assessing the risk associated with persistent pollutants.
Special Aquifer System	An aquifer designated as such by the Minister of Water Affairs, after due process.

Aquifer Protection Classification

As part of policy and regulation development and implementation, the aquifer classification used in Table 3-11 alone is not sufficient. To minimise misinterpretation, the decision support tool in Table 3-12 also needs to be incorporated as part of aquifer classification (Parsons, 1995). The combination of the Aquifer System Management Classification and the Aquifer Vulnerability Classification rating is referred to as the Groundwater Quality Management (GQM) classification, which provide a level of aquifer protection.

GQM = Aquifer System Management x Aquifer Vulnerability

Table 3-12: GQM Classification for the proposed project area.

Aquifer System Management Classification		Aquifer Vulnerability Classification		GQM		GQM
Class	Points	Class	Points	Index	Level of protection	Portion 1 of Farm Kafferstad 195 IS
Sole Source Aquifer System	6	High	3	<1	Limited	
Major Aquifer System	4			1 - 3	Low	
Minor Aquifer System	**2**	**Medium**	**2**	**3 - 6**	**Medium**	**4**
Non-aquifer System	0	Low	1	6 - 10	High	
Special Aquifer System	0-6			>10	Strictly non-degradation	

The level of protection for the project area according to the GQM Index is 4. The DWA has also compiled a susceptibility map for South Africa (2013) - Figure 3-21. This map indicates the qualitative measure of the relative ease with which an aquifer can potentially be contaminated. According to the aquifer susceptibility map, the project area is classified as low susceptible to contamination.

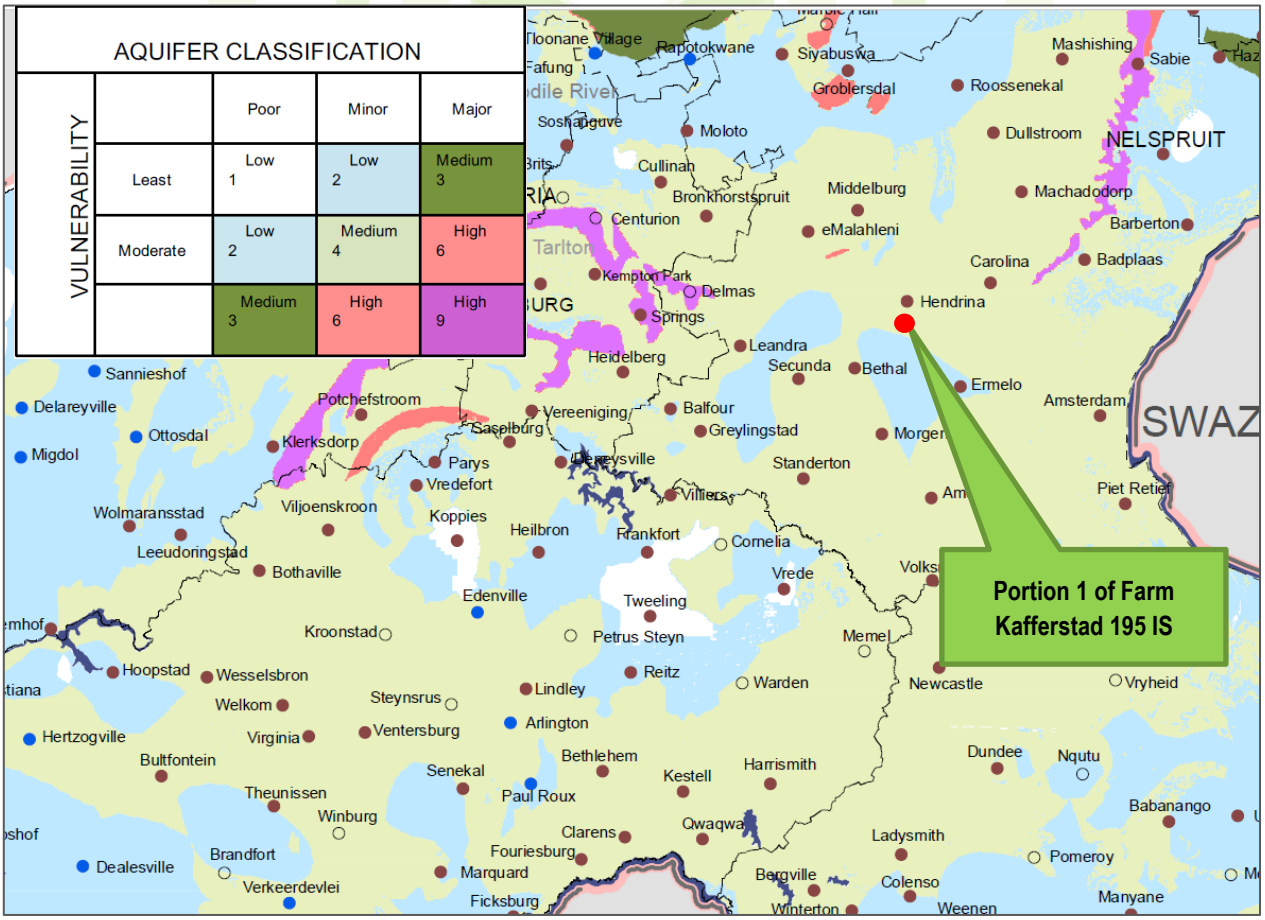


Figure 3-21: Aquifer susceptibility map for the project area.

WETLANDS

Catchment description

The study area falls within the B11A Quaternary Catchment of the Olifants Water Management Area (WMA). The closest perennial rivers to the study area are the Olifants River that flows approximately 332 m to the north and the Bankspruit that flows 1 km to the south. A non-perennial pan is located near the north-eastern corner of the study area, while a perennial pan intersects the northern boundary of the study aera. The Willem Brummer Dam is located 40 km to the southeast and the Trichardtsfontein Dam 48 km to the southwest.

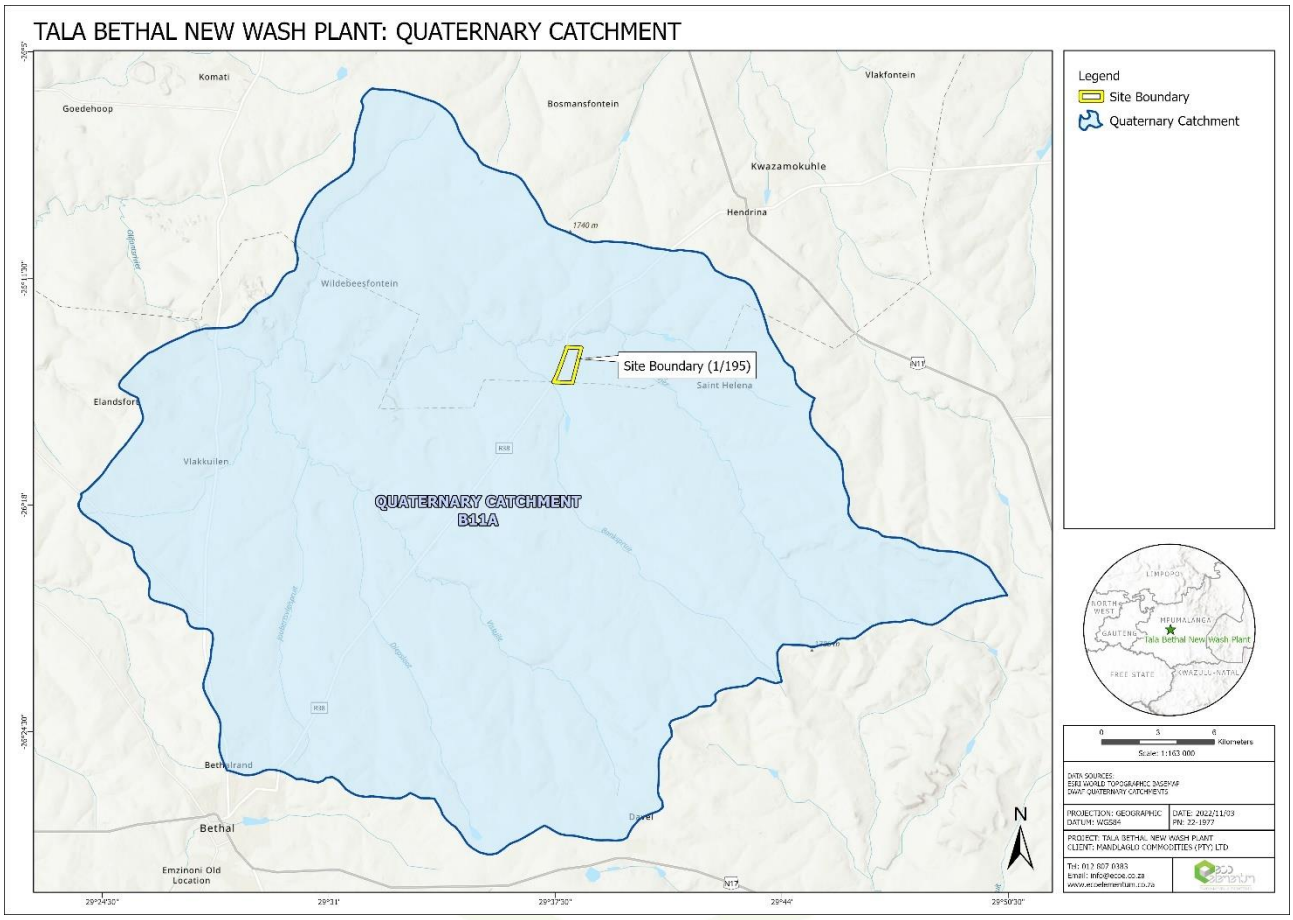


Figure 3-22: Quaternary Catchment of Portion 1 of Farm Kafferstad 195 IS

Wetland terrain indicator

The study site can be characterised as having slightly to moderately undulating plains, including some low hills and pan depressions. A Digital Elevation Model (DEM) of the aerial photography of the site may be found below (Figure 3-23). These areas identified during the desktop assessment where then assessed in more detail during the field investigation.

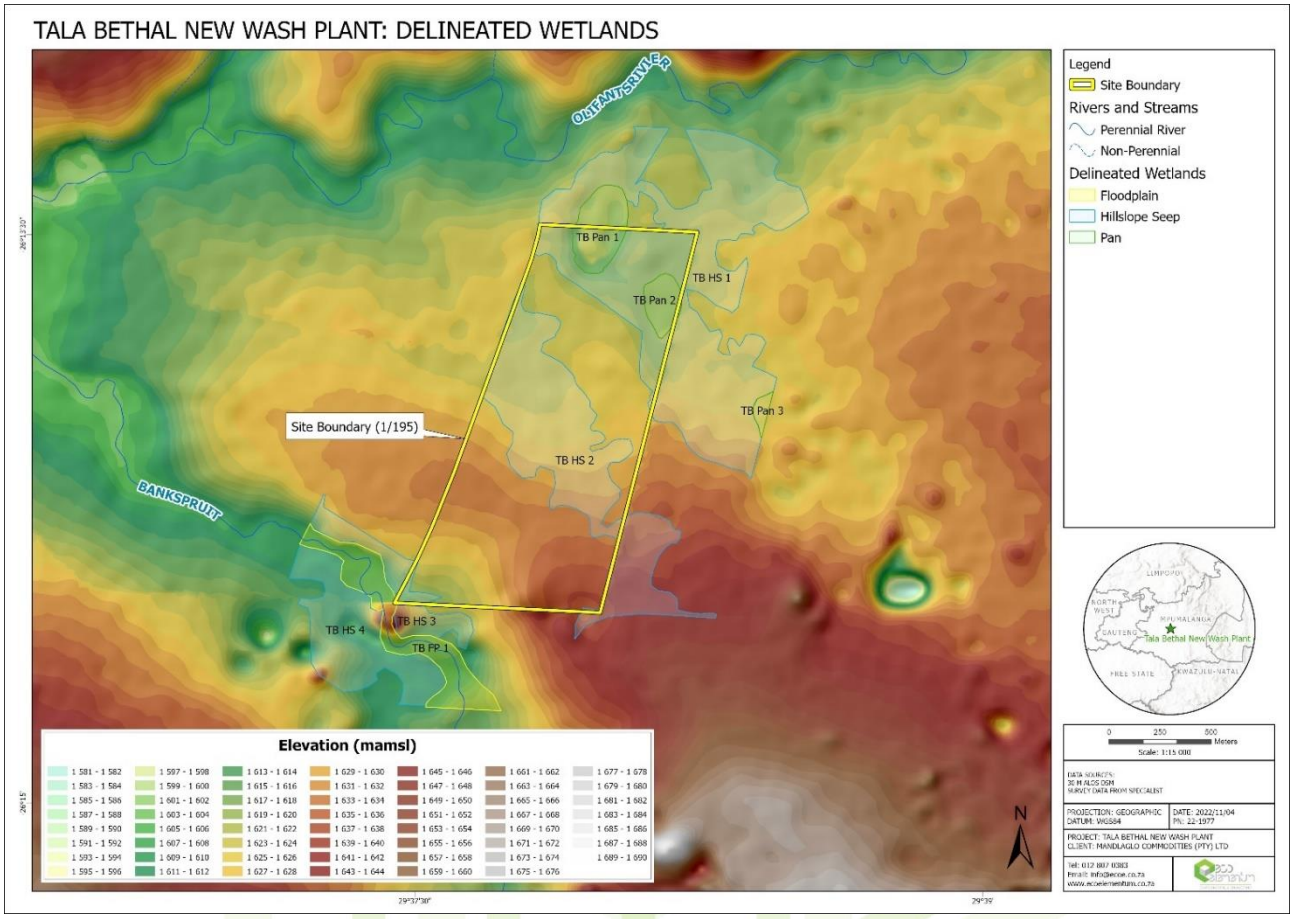


Figure 3-23: Terrain indicator - Digital Elevation Model of the site

Wetland delineation

The classification of the wetlands in the study area was divided into different hydrogeomorphic types based on the report; *Further development of a proposed national wetland classification system for South Africa (SANBI, 2009)*. Three (3) different Hydrogeomorphic (HGM) units were identified within the three (3) wetland systems delineation on site:

- Tala Bethal Wetland System 1:
  - Permanent Open water Pan (TB Pan1)
  - Seasonal Grass Pan (TB Pan 2)
  - Hillslope Seepage Wetlands (TB HS1)
- Tala Bethal Wetland System 2
  - Isolated Hillslope Seepage Wetland (TB HS2)
- Tala Bethal Wetland System 3
  - Channelled Valley Bottom Wetland (TB CVB)
  - Hillslope Seepage Wetlands (TB HS3 and HS4).

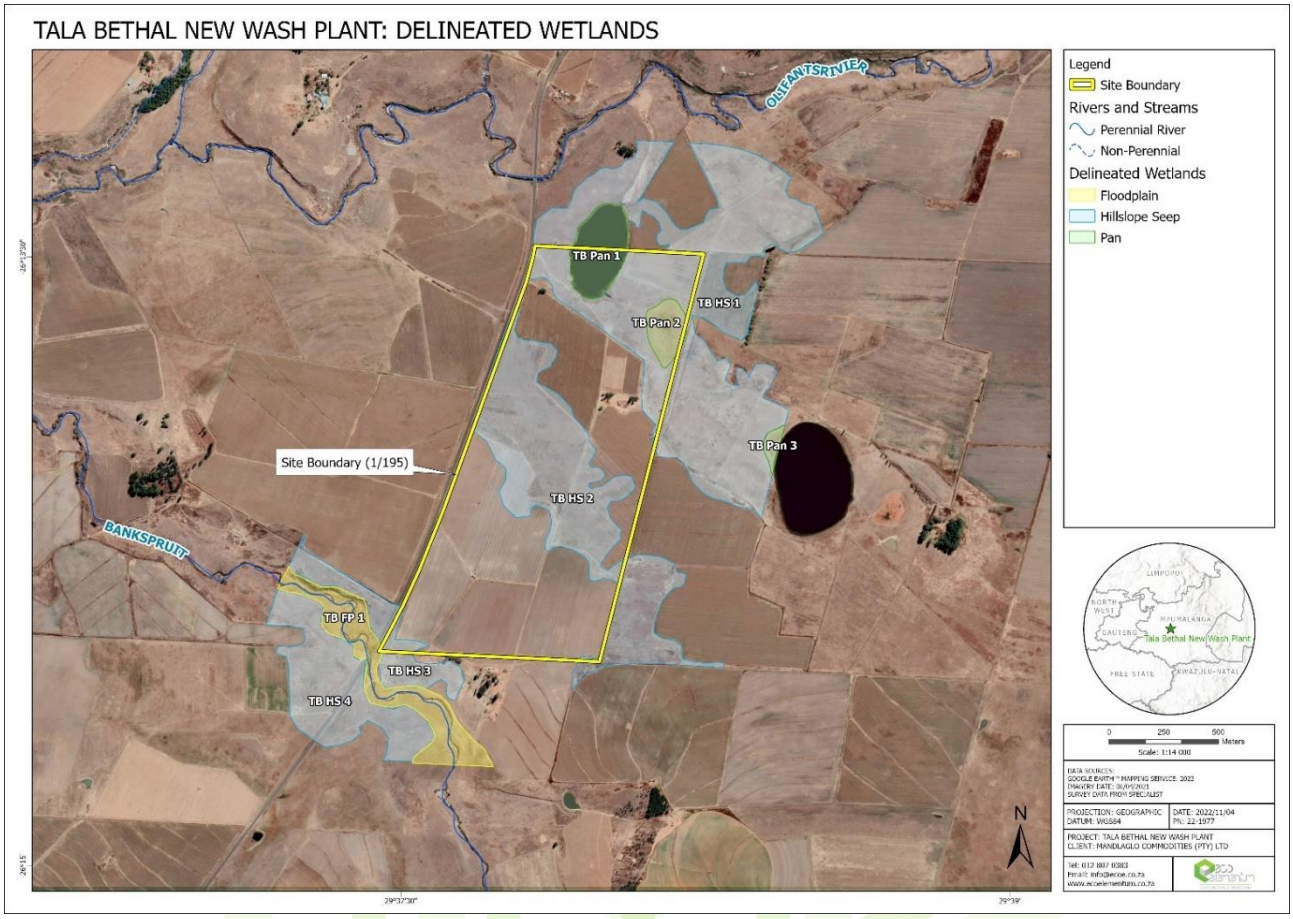


Figure 3-24: Delineated wetlands within the 500m buffer of the project area

	
Fountain within the Hillslope Seepage Wetland associated with the Pan1 and 2	Looking upslope to the south-west of the Hillslope seepage wetland associated with Pan1 and 2. Dominant species present were *Cyperus esculentus, Cyperus compressus, Centella asiatica*, and *Leersia hexandra*

Crinum bulbispermum within the Hillslope Seepage wetland associated with the Pans.

Grass Pan (TB Pan 2) dominated by *Leersia hexandra*, with tufts of *Schoenoplectus* sp and *Cyperus* sp

The Present Ecological status (PES) for the Wetland Units were divided into the Hydrology component, Geomorphology component and Vegetation component. The overall combined PES ranged from B to D as can be seen in Table 3-13**Error! Reference source not found.**.

Table 3-13: PES as determined by the WET-Health tool

Site	Parameter	*Hydrology*	*Geomorphology*	*Vegetation*	Overall Score
TB Pan 1	Score	1,5	3,7	1,1	**2,1**
	Category	B	C	B	**C**
	Trajectory	(↓)	(↓)	(→)	(↓)
TB Pan 2	Score	1,5	3,7	1,5	**2,2**
	Category	B	C	B	**C**
	Trajectory	(↓)	(↓)	(↓)	(↓)
TB HS1	Score	3	3,8	1,3	**2,7**
	Category	C	C	B	**B**
	Trajectory	(↓)	(↓)	(↓)	(↓)
TB HS2	Score	4	5,8	2,3	**4,0**
	Category	C	D	C	**D**
	Trajectory	(↓↓)	(↓↓)	(↓)	(↓↓)
TB HS3, HS4, CVB	Score	4,8	4	3,9	**4,2**
	Category	D	C	C	**D**
	Trajectory	(↓↓)	(↓↓)	(↓)	(↓↓)

TB Pan1 was only moderately modified with grazing, drainage trenches and some cultivation prevalent within the direct catchment. Artificial trenches had been dug in the past to most likely drain excess water from the pan to the Olifants River and also between TB Pan 2 and TB Pan 1 to drain excess water from the immediate catchment, possibly to dry out larger areas for cultivation and/or grazing. The effects of the trenches were limited and both pans were still largely in tact.

The effects of grazing and runoff from cultivated areas has had a more noticeable effect on TB Pan2 and HS1, although also still only moderately modified at most. Care should be taken to keep mining activities and vehicles out of the 100m buffer of Pan 1 specifically.

The Bankspruit Channelled Valley Bottom wetland and adjacent Hillslope seeps have been impacted by vegetation clearance and mining activities within the wetland systems, which is the main cause for the largely modified state assigned to the system.

The Ecological Importance and Sensitivity (EIS) was calculated, and the scores ranged from Low to Moderate sensitivity and importance within the landscape. Hydrological function was rated as Moderate due to the connectivity of majority of the wetlands within the landscape and the role it plays it feeding into the Olifants River to the North and Bankspruit to the South. Human Benefits were rated as Low as the wetlands weren't specifically utilised for human benefit in the form of a harvestable resource, and mostly as a water source to aid in cultivation and grazing for livestock. The Ecological Importance of the wetlands could be seen in the form of suitable habitat for wetland fauna and flora and also due to the fact that protected floral species are present in abundance within the pans and associated Hillslope Seep. The Low Ecological Importance of the isolated Hillslope Seep can be attributed to the encroachment of cultivation in the wetland boundary and subsequent sediment and nutrient runoff impacting on the ecological state.

Table 3-14: Ecological Importance and Sensitivity

	TB Pan 1	TB Pan 2	TB HS1	TB HS2	TB HS3, HS4, CVB
Biodiversity support	2	2	2	1	2
Landscape scale	3	3	2	2	2
Sensitivity of the wetland	1	1	1	2	3
ECOLOGICAL IMPORTANCE & SENSITIVITY	**2**	**2**	**2**	**1**	**2**
	Moderate	Moderate	Moderate	Low	Moderate
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	**2**	**2**	**2**	**2**	**2**
	Moderate	Moderate	Moderate	Moderate	Moderate
DIRECT HUMAN BENEFITS	**1**	**1**	**1**	**1**	**1**
	Low	Low	Low	Low	Low

ECOLOGICAL

Critical Biodiversity Areas

Critical Biodiversity Areas are those areas required to meet biodiversity thresholds. CBA's are areas of terrestrial or aquatic features (or riparian vegetation alongside CBA aquatic features) which must be protected in their natural state to maintain biodiversity and ecosystem functioning (Desmet et al., 2013). According to Desmet et al (2013), these CBAs include:

i) Areas that need to be protected in order to meet national biodiversity pattern thresholds (target area); ii) Areas required to ensure the continued existence and functioning of species and ecosystems (including the delivery of ecosystem services); and/or iii) Important locations for biodiversity features or rare species.

The majority of the application area falls overlaps with heavily transformed landscape and a small section of other natural areas. These sections were confirmed to be transformed landscape during the site visit with extensive alterations from agricultural land and industrial activities.

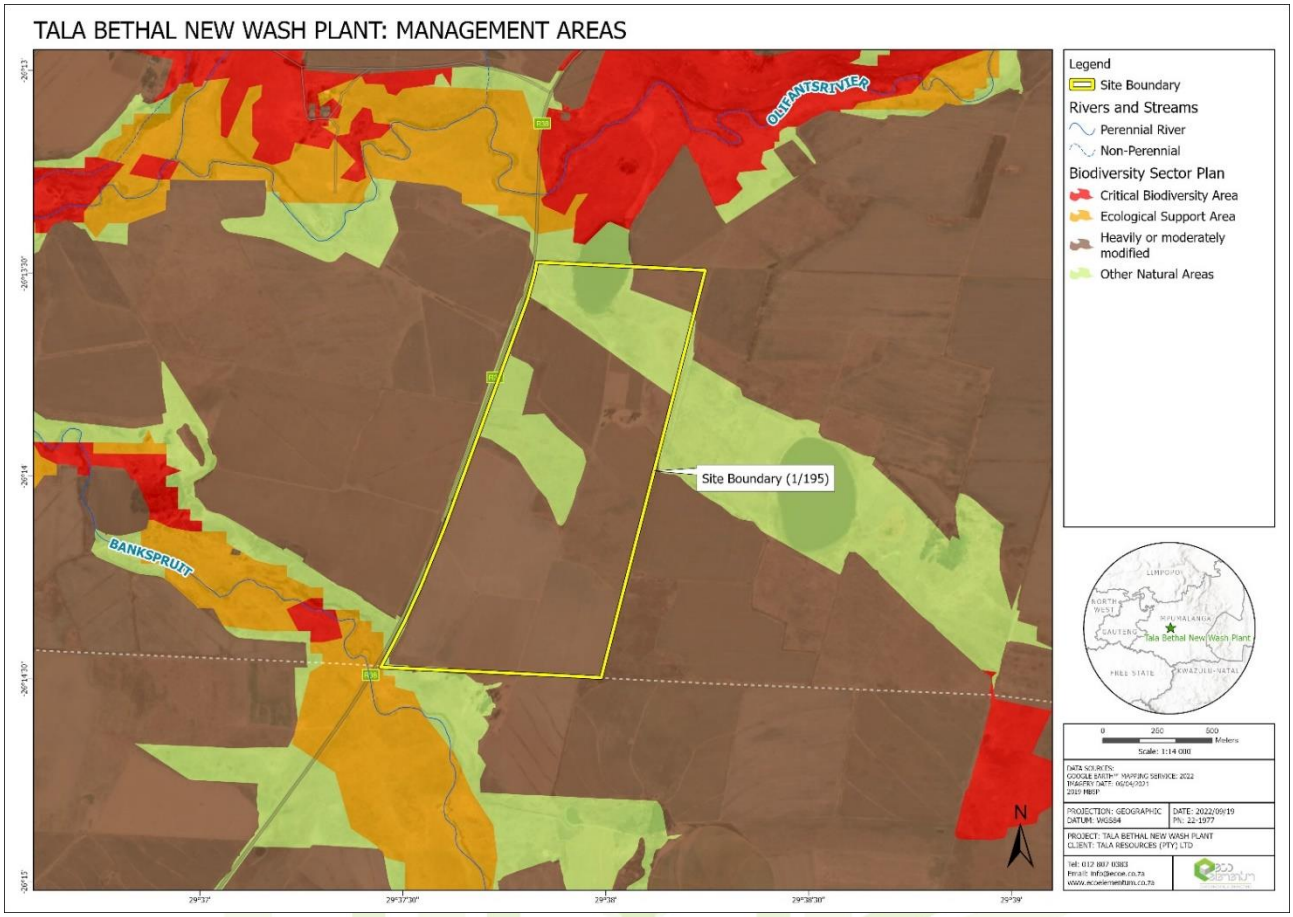


Figure 3-25: Management areas associated with the site

Threatened Ecosystems and Protected areas

The mining area does overlap with the Eastern Highveld Grassland vegetation type which is considered as endangered ecosystems.

Vegetation

The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Acacia caffra, Celtis africana, Diospyros lycioides* subsp *lycioides, Parinari capensis, Protea caffra, P. welwitschii* and *Rhus magalismontanum*).

Important Taxa associated with the area include:

Graminoids: *Aristida aequiglumis* (d), *A. congesta* (d), *A. junciformis* subsp. *galpinii* (d), *Brachiaria serrata* (d), *Cynodon dactylon* (d), *Digitaria monodactyla* (d), *D. tricholaenoides* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *E. racemosa* (d), *E. sclerantha* (d), *Heteropogon contortus* (d), *Loudetia simplex* (d), *Microchloa caffra* (d), *Monocymbium ceresiiforme* (d), *Setaria sphacelata* (d), *Sporobolus africanus* (d), *S. pectinatus* (d), *Themeda triandra* (d), *Trachypogon spicatus* (d), *Tristachya leucothrix* (d), *T. rehmannii* (d), *Alloteropsis semialata* subsp. *eckloniana, Andropogon appendiculatus, A. schirensis, Bewsia biflora, Ctenium concinnum, Diheteropogon amplectens, Eragrostis capensis, E. gummiflua, E. patentissima, Harpochloa falx, Panicum natalense, Rendlia altera, Schizachyrium sanguineum, Setaria nigrirostris, Urelytrum agropyroides.*

Herbs: *Berkheya setifera* (d), *Haplocarpha scaposa* (d), *Justicia anagalloides* (d), *Pelargonium luridum* (d), *Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, E. transvaalensis* subsp. *setilobus,*

Helichrysum aureonitens, H. caespititium, H. callicomum, H. oreophilum, H. rugulosum, Ipomoea crassipes, Pentanisia prunelloides subsp. *latifolia, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata.*

Geophytic Herbs*: Gladiolus crassifolius, Haemanthus humilis* subsp. *hirsutus, Hypoxis rigidula* var. *pilosissima, Ledebouria ovatifolia.*

Succulent Herb: *Aloe ecklonis.*

Low Shrubs*: Anthospermum rigidum* subsp. *pumilum, Stoebe plumosa.*

Alien Invasive Vegetation

National Environmental Management: Biodiversity Act (No. 10 of 2004) categorises four invasive species according to Section 21 and are as follows:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management programme;
- Category 2: Invasive species controlled by area, and;
- Category 3: Invasive species controlled by activity.

Certain species have different alien invasive categories for different provinces in South Africa. Table 3-15 lists the alien species commonly associated with the project area and it's surroundings. This list also provides their respective alien categories. Commonly observed alien invasive plants included *Acacia mearnsii* (Black Wattle); *Populas spp.* (Grey and White poplar); *Eucalyptus tereticornis* (Forest red gum) *and Verbena bonariensis* (Tall verbena).

Table 3-15: Alien Invasive Plants identified surrounding the mining areas.

Species Name	Common Name	Category
Acacia dealbata	Silver Wattle	2
Acacia elata	Pepper tree wattle	1b
Acacia mearnsii	Black Wattle	2
Arundo donax	Spanish/Giant Reed	1b
Bidens pilosa	Black Jack	Not Listed
Cirsium vulgare	Spear thistle, Scotch thistle	1b
Convolvulus arvensis	Field bindweed, Wild morning glory	1b
Cortaderia jubata	Pampas Grass	1b
Datura ferox	Large thornapple	1b
Datura stramonium	Common thornapple	1b
Eucalyptus tereticornis	Forest red gum	1b
Ipomoea purpurea	Morning Glory	1b
Populus alba	White popular	2
Populus canescens	Grey Poplar	2
Ricinus communis	Castor Oil Plant	2
Robinia pseudoacacia	Black Locust tree	1b
Solanum mauritianum	Bugweed	1b
Tagetes minuta	Khaki Weed	Not Listed
Verbena bonariensis	Tall Verbena	1b

HERITAGE / ARCHAEOLOGICAL

Historical topographical maps & aerial images

Archaeological reconnaissance of the study area was conducted during October 2022 through a combination of a systematic and unsystematic pedestrian survey of the proposed 35 ha infrastructure area, as well as the remaining 110.2 ha mine boundary. Where applicable, the transects were spaced between 60 m and 70 m apart. General site conditions were recorded via photographic record.

Also, the study area was inspected on Google Earth, historical topographical maps, and historical aerial imagery in order to identify potential heritage remains. The historical topographical maps dating to 1965, 1984, 1996, and 2009, as well as the historical aerial images dating to 1955, 1968, 1978, 1984, 1991, and 2005, proved useful in terms of providing an indication of potential heritage sites and past land uses associated with the study area.

Three (3) potential sites were identified on historical aerial imagery and topographical maps and were inspected during the pedestrian survey. An additional two (2) sites were identified and recorded during the site visit.

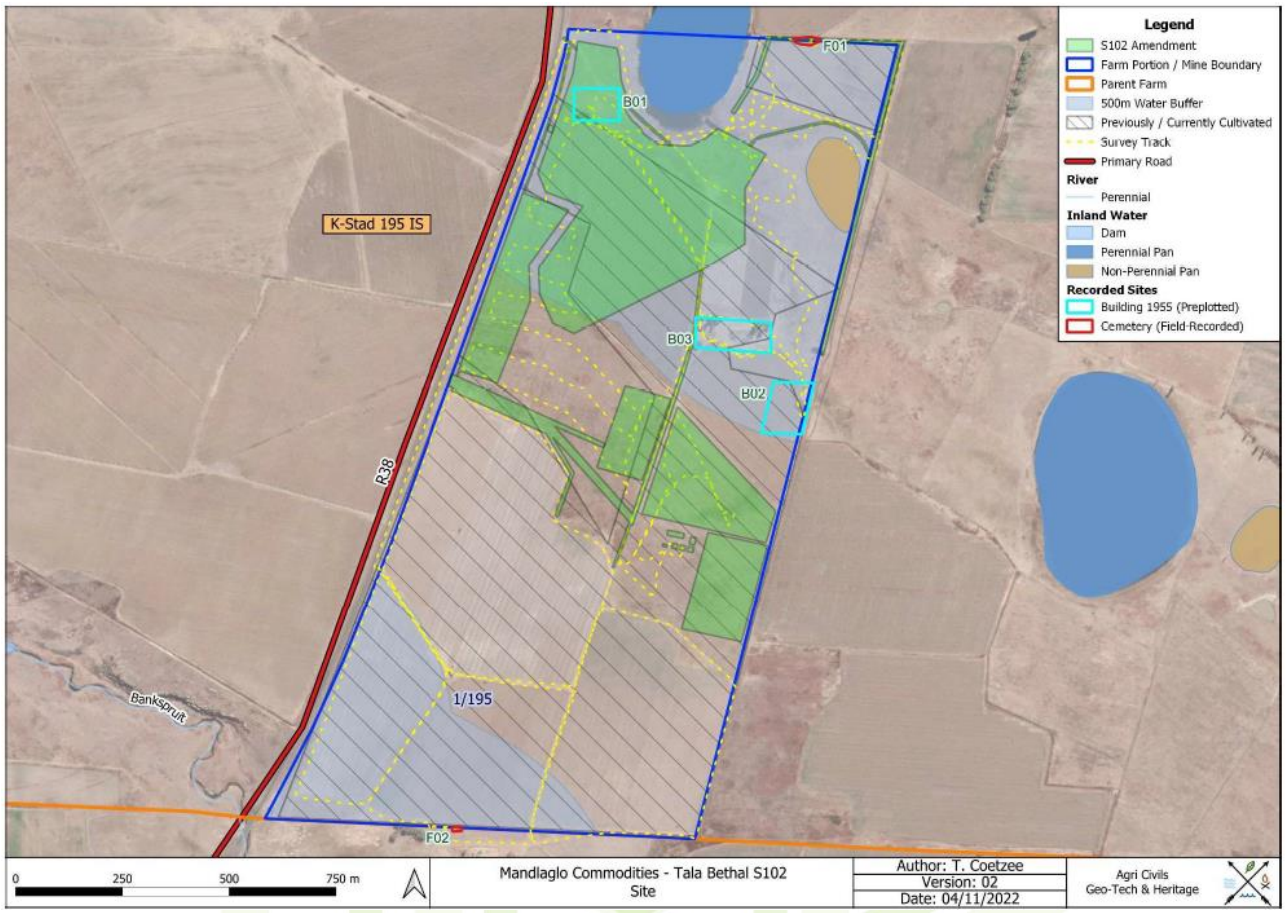


Figure 3-26: Study area with survey track portrayed on a 2021 satellite image

The demarcated development footprint area is characterised by a combination of previously/currently cultivated land, open veldt utilised as pasture, and sections already disturbed by mining development. According to historical aerial imagery and topographical maps, parts of the study area were cultivated as early as 1955. During later years, the majority of the area was cultivated, suggesting a general lower significance and potential impact to cultural resources.

One building was noted on historical aerial imagery within the demarcated development footprint (Site B01). The building, however, was demolished and the site is not associated with surface remains, but potentially sensitive subsurface cultural material might be located within the site boundary. Should such material be discovered, a qualified archaeologist must be contacted. Sites located outside of the development footprint include: One demolished historical building (B02), an intact historical building (B03) and two cemeteries (F01 & F02).

Archaeological and Historical Remains

Stone Age Remains

No Stone Age archaeological remains were located within the demarcated study area. The heritage studies conducted in the vicinity of the study area also did not locate any Stone Age remains.

According to Bergh (1999), the closest Stone Age site is Welgelegen Shelter, a LSA site located in the vicinity of Ermelo approximately 50 km to the southeast. Because such sites are often associated with water sources, Stone Age material is more likely to be encountered within the 500 m river buffer zone of the study area.

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), indicating the potential existence of Iron Age sites in the greater area.

Historical

Three sites dating to the Historic Period were noted on the historical aerial imagery dating to 1955, as shown in the table below.

Table 3-16: Site co-ordinates and descriptions of buildings found onsite.

Name	Off. Name	Latitude	Longitude	Description	Age	Current Status	Estimated Extent	ID Source	Farm Portion	Intersecting Development
B01	2629BA-B01	-26.226129	29.631088	Building	Historical	Demolished – No surface remains	0.7 ha	Aerial 1955	1/195	Yes
B02	2629BA-B02	-26.232519	29.635109	Building	Historical	Demolished - Foundation mound	1.0 ha	Aerial 1955	1/195	No
B03	2629BA-B03	-26.230985	29.633966	Building	Historical	Intact	1.1 ha	Aerial 1955	1/195	No

Building Site B01, located near the north-western corner of the study area and within the proposed infrastructure area, is visible on the 1955 aerial image only (Appendix A, Figure 34 of the AIA report attached). The building, however, is not indicated on the 1965 topographical map and is not visible on the 1968 aerial image (Appendix A: Figures 35 & 36 of the AIA report attached). The building, therefore, appears to have been demolished between 1955 and 1965. The site inspection also revealed that the entire area has been disturbed by modern construction activities and no material remains were observed (Figure 3-27).

Figure 3-27: Environment associated with Site B01.

Building Site B02 is located along the eastern border of the study area and approximately 100 m northeast of the nearest proposed infrastructure. The site is indicated as a hut on the 1965 topographical map and is also visible on the 1968 and 1978 aerial images (Appendix A: Figures 35 – 37 of the AIA report attached). Since the building is not visible on any subsequent datasets, it can be deducted that the building was demolished between 1978 and 1984 (Appendix A: Figures 37 – 39 of the AIA report attached). The site inspecting confirmed the presence of a foundation mound and the absence of material culture (Figure 20).

Figure 3-28: Foundation mound at Site B02.

Building Site B03, located near the eastern border of the study area and outside of the proposed infrastructure area, is visible on all the historical aerial images and topographical maps. The site inspection also confirmed the existence of the building. This suggests that the building at Site B03 is the original building. The building measures approximately 11 m X 11 m and is constructed from stone and has a corrugated iron roof. The domestic area around the building measures approximately 1.1 ha and the border of the area is located approximately 100 m southeast of the proposed opencast area. Associated infrastructure include a windpump, cement dam and temporary corrugated iron structures possibly housing small stock (Figure 3-29). At present, the building is occupied.

Figure 3-29: Northern perspective of the building at Site B03

Contemporary Remains/Natural

No contemporary/natural sites were recorded within the study area. The heritage study conducted by Huffman & Steel (1995) recorded contemporary angular settlement remains.

Graves

Two cemeteries were identified during the site inspection (Table 3-17).

Table 3-17: Graves within the study area

Name	Type	Source	Year	Current Status	Age
F01	Cemetery	Field	Unknown	Intact – Dilapidated	Potentially Historical
F02	Cemetery	Field	Unknown	Intact – Dilapidated	Potentially Historical

Cemetery F01 is located along the northern border of the study area and consists of approximately eight graves oriented in an east-west direction. Two graves are associated with formal surface dressings and six graves with informal surface dressings. Due to dense vegetation cover and small surface indications, additional graves might be located in the cemetery. One of the formal headstones, consisting of bricks and cement, is intact, while the other formal headstone is in a dilapidated state. The informal surface dressings consist of elongated stone cairns without headstones. The cemetery is not fenced-off and appears not to be in use anymore, but it is likely to be still visited, especially since a clay pot was observed at one of the informal graves. No dates were noted on the surface features and the only inscription noted was as follows:

“Meykie

Mlotshwa”

The age of the cemetery is therefore unknown, but appear to exceed 60 years of age. Based on the current development layout, the cemetery will be impacted by a berm, while the opencast area will be located approximately 266 m to the southwest.

Cemetery F02 partially intersects the southern border of the study area and is located approximately 700 southwest of the nearest proposed development. The cemetery is located within a cultivated field, appears to be no longer in use, is not fenced-off and consists of at least one formal and eight informal graves. The formal surface decoration consists of brick and cement and is in a dilapidated state, while the informal surface decorations consist of highly obscured elongated stone cairns without headstones. All the observed graves are oriented in an east-west direction and are not associated with grave goods. It is therefore unclear if the cemetery is still visited. Since no inscriptions were noted, the age of the cemetery is unknown, but is likely to exceed 60 years of age.

The heritage studies conducted by Huffman & Steel (1995) and the National Cultural History Museum (2003), recorded the presence of several graves and cemeteries.

The 500 m water buffer, a zone generally associated with a higher heritage site probability, intersects the demarcated study area. However, the majority of the study area is associated with previously/currently cultivated land that is not considered to be sensitive from a heritage perspective.

Geological context

The site lies in the north-central part of the Karoo basin where the early Karoo Supergroup strata unconformably overlie the much older quartzites of the Transvaal Supergroup, in the Transvaal Basin. Intruding through the Pretoria Group rocks are sills and dykes composed of diabase, a volcanic and non-fossiliferous rock. Along the rivers and streams much young reworked sands and alluvium overly the older strata.

The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. It is bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks. Representing some 120 million years (300 – 183Ma), the Karoo Supergroup rocks have preserved a diversity of fossil plants, insects, vertebrates and invertebrates.

During the Carboniferous Period, South Africa was part of the huge continental landmass known as Gondwanaland and it was positioned over the South Pole. As a result, there were several ice sheets that formed and melted, and covered most

of South Africa (Visser, 1986, 1989; Isbell et al., 2012). Gradual melting of the ice as the continental mass moved northwards and the earth warmed, formed fine-grained sediments in the large inland sea. These are the oldest rocks in the system and are exposed around the outer part of the ancient Karoo Basin and are known as the Dwyka Group (Johnson et al., 2006).

Overlying the Dwyka Group rocks are rocks of the Ecca Group that are Early Permian in age. There are eleven formations recognised in this group but they do not all extend throughout the Karoo Basin. In the Free State, Mpumalanga and KwaZulu Natal, from the base upwards are the Pietermaritzburg Formation, Vryheid Formation and the Volksrust Formation. All of these sediments have varying proportions of sandstones, mudstones, shales and siltstones and represent shallow to deep water settings, deltas, rivers, streams and overbank depositional environments.

Palaeontological context

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 Coalfields, 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; fig 16).

AIR QUALITY

A detailed Air Quality Impact Assessment is currently underway and will be included in the Final BAR.

South Africa is located in the sub-tropics where high pressures and subsidence dominate. However, the southern part of the continent can serve as a source of hot air that intrudes sub-tropics, and that sometimes lead to convective movement of air masses. On average, a low pressure will develop over the southern part of the continent, while the normal high pressures will remain over the surrounding oceans. These high pressures are known as Indian High-Pressure Cells and Atlantic High pressure Cells. The intrusion of continents will allow for the development of circulation patterns that draw moisture (rain) from either tropics (hot air masses over equator) or from the mid-latitude and temperate latitudes.

Southern Africa is influenced by two major high pressure cells, in addition to various circulation systems prevailing in the adjacent tropical and temperate latitudes. The mean circulation of the atmosphere over Southern Africa is anticyclonic throughout the year (except near the surface) due to the dominance of the three high pressure cells, namely South Atlantic High Pressure, off the west coast, the South Indian High Pressure off the east coast and the Continental High Pressure over the interior.

It is these climatic conditions and circulation movements that are responsible for the distribution and dispersion of air pollutants within the proposed project area and between neighbouring provinces and countries bordering South Africa.

Site-Specific Dispersion Potential

A period wind rose for the site is presented in Figure 3-30 below. Wind roses comprise of 16 spokes which represents the direction from which winds blew during the period. The colours reflect the different categories of wind speeds. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories.

Based on an evaluation of the meteorological data simulations run from a global NEMS weather model at ~30 km resolution from 1985 to current of the project area. The following deductions regarding the prevailing wind direction and wind frequency can be assessed. Looking at Figure 3-30 below, the predominant wind direction is predicted to occur mainly from the ENE approximately 1200 hours per year respectively. A secondary direction is predicted from E 800 hours per year, respectively, with wind speeds higher than 5 km/h.

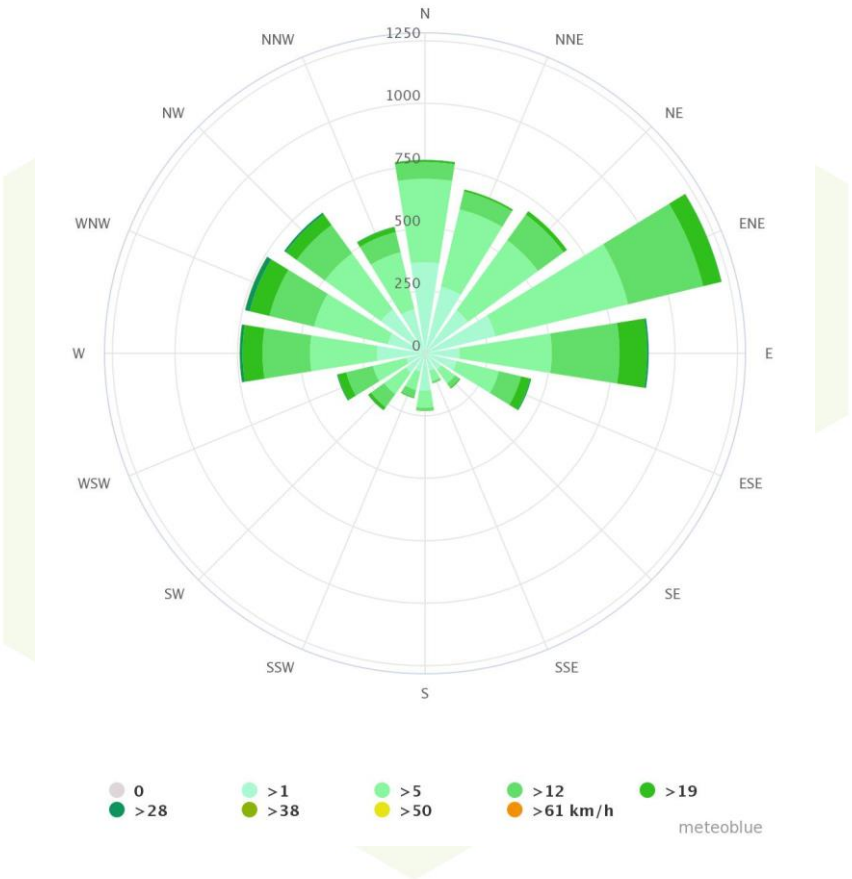


Figure 3-30: NEMS 30 km simulation model wind rose for the proposed project area for the period 1985 to current

BLASTING & NOISE ASSESSMENT

The proposed opencast mining operation is located in the Witbank Coalfield which is well known for its abundant coal mining operations and lies in close proximity to several other mining operations, towns and other infrastructures. The proposed opencast section has been noted as shallow. In areas where softs are generally thick, blasting will not be required to extract the coal. However, in other areas, where there is proposed underground mining section, blasting will be necessary.

The use of blasting as a method of coal extraction is a fundamental part of the mining method common in the industry. Ground vibrations and air blasts are undesirable outcomes of blasting.

The calculated outcomes of blasting indicate that buildings are more especially susceptible to blasting induced ground vibrations, while other structures are more resilient to the effects of blasting. There is a high probability of ground vibration induced damage to buildings and structures close to them in the proposed area.

Air blast represents another 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.

Once mining commences a proper operational blast design and code of practice will be compiled, implemented, monitored, evaluated and improved. This approach will assist in ensuring that blasting has the minimal effect on the surrounding environment and structures.

Mandlaglo has received approval to blast within a 100 m distance from National Route R38 Section 2. The following conditions have been set with the given approval:

- No blasting or mining shall be conducted within a distance of 60 metres measured from the common boundary of the national road and Mandlaglo Colliery.
- Mandlaglo Colliery is not exempted from the provisions of any other act, regulation or by-laws.
- SANRAL reserves the right to rescind this approval at any time, if the applicant does not strictly adhere to the conditions of this approval.
- The applicant accepts the conditions in writing before the commencement of mining and blasting within 200 metres from the R32-2 road reserve boundaries.

Ground Vibration

Explosives are used to break rock through the shock waves and gasses yielded from the explosion. Ground vibration is a natural result from blasting activities. The far field vibrations are inevitable, but un-desirable by products of blasting operations. The shock wave energy that travels beyond the zone of rock breakage is wasted and could cause damage and annoyance. The level or intensity of these far field vibration is however dependant on various factors. Some of these factors can be controlled to yield desired levels of ground vibration and still produce enough rock breakage energy.

Factors influencing ground vibration are the charge mass per delay, distance from the blast, the delay period and the geometry of the blast. These factors are controlled by planned design and proper blast preparation.

- The larger the charge mass per delay - not the total mass of the blast, the greater the vibration energy yielded. Blasts are timed to produce effective relief and rock movement for successful breakage of the rock. A certain quantity of holes will detonate within the same time frame or delay and it is the maximum total explosive mass per such delay that will have the greatest influence. All calculations are based on the maximum charge detonating on a specific delay.
- Secondly is the distance between the blast and the point of interest / concern. Ground vibrations attenuate over distance at a rate determined by the mass per delay, timing and geology. Each geological interface a shock wave encounters will reduce the vibration energy due to reflections of the shock wave. Closer to the blast will yield high levels and further from the blast will yield lower levels.
- Thirdly the geology of the blast medium and surroundings has influences as well. High density materials have high shock wave transferability where low density materials have low transferability of the shock waves. Solid rock i.e. norite will yield higher levels of ground vibration than sand for the same distance and charge mass. The

precise geology in the path of a shock wave cannot be observed easily, but can be tested for if necessary in typical signature trace studies - which are discussed shortly below.

Normally, in order to determine effective control measures, it will be required to do signature hole trace study. This process consists of charging and blasting test holes that are measured for ground vibration and air blast at various distances. Signature trace data can then be used to determine site specific constants for prediction of ground vibration and assist in determining timing of blasts in order to minimize the effect of vibration.

Air blast

Air blast or air-overpressure is pressure acting and should not be confused with sound that is within audible range (detected by the human ear). Sound is also a build up from pressure but is at a completely different frequency to air blast. Air blast is normally associated with frequency levels less than 20 Hz, which is the threshold for hearing. Air blast is the direct result from the blast process although influenced by meteorological conditions the final blast layout, timing, stemming, accessories used, covered or not covered etc. all has an influence on the outcome of the result.

The three main causes of air blasts can be observed as:

- Direct rock displacement at the blast; the air pressure pulse (APP).
- Vibrating ground some distance away from the blast; rock pressure pulse (RPP).
- Venting of blast holes or blowouts; the gas release pulse (GRP).

Fly Rock

Blasting practices require some movement of rock to facilitate the excavation process. The extent of movement is dependent on the scale and type of operation. For example, blasting activities within large coal mines are designed to cast the blasted material much greater distances than practices in a quarrying or hard rock operation. This movement should be in the direction of the free face, and therefore the orientation of the blasting is important. Material or elements travelling outside of this expected range may be considered to be fly rock.

Fly rock from blasting can result from three mechanisms due to the lack of confinement of the energy in the explosive column. The main mechanisms are:

- Face burst - burden conditions usually control fly rock distances in front of the face.
- Cratering - If the stemming height to hole diameter ratio is too small or the collar rock is weak.
- Rifling - If the stemming material is ejected with insufficient stemming height or inappropriate stemming material is used.

In short the following list is typical causes of fly rock:

- Burden to small.
- Burden to large.
- Stemming length to short.
- Out of sequence initiation of blast holes.
- Drilling inaccuracies.
- Incorrect blast hole angles.
- Over charged blast holes.

It is possible to blast without any fly rock with proper confinement of the explosive charges within blast holes using proper stemming procedures and materials. Stemming is further required to ensure that explosive energy is efficiently used to its

maximum. Free blasting with no control on stemming cannot be allowed as this will result in poor blast results and possible damage to any nearby structures.

Noxious Fumes

Explosives currently used are required to be oxygen balanced. Oxygen balance refers to the stoichiometry of the chemical reaction and the nature of gases produced from the detonation of the explosives. The creation of poisonous fumes such as nitrous oxides and carbon monoxide are particular undesirable. These fumes present themselves as red brown cloud after the blast detonated. It has been reported that 10 to 20 ppm has been mildly irritating. Exposure to 150 ppm or more (no time period given) has been reported to cause death from pulmonary edema. It has been predicted that 50% lethality would occur following exposure to 174 ppm for 1 hour. Anybody exposed must be taken to hospital for proper treatment.

Factors contributing to undesirable fumes are typically: poor quality control on explosive manufacture, damage to explosive, lack of confinement, insufficient charge diameter, excessive sleep time, and specific types of ground can also contribute to fumes.

Poor quality control on explosives will yield improper balance of the explosive product. This is typically in the form of too little or too much fuel oil or incorrect quantities of additives to the mixture. Improper quality will cause break down on the explosives product that may result in poor performance. A “burning” may occur that increases the probability of fumes in the form of NO and NO_2.

Damage to explosives occur when deep blast hole is charged from the top of the hole and literally fall into the hole and get damage at the bottom. The bottom is normally the point of initiation and damaged explosives will not initiate properly. A slow reaction to detonation is forced and again contributes negatively to the explosives performance and fume creating capability.

Studies showed that inadvertent emulsion admixture with drill cuttings can also be a significant contributing factor to NOx production. The NO production from the detonation of emulsion equally mixed (by mass) with drill cuttings increased by a factor of 2.7 over that of emulsion alone. The corresponding NO_2 production increased by a factor of 9 while propagating at a steady Velocity of Detonation.

Water also has visible effect on the generation of fumes from emulsion explosives. Tests have shown that the detonation velocity may not be influenced as much but the volumes of fumes generated were significantly higher.

Further is also known that for certain ground types, especially the oxidized type materials could have an advert effect on explosives as well. These ground materials types tend to react with the explosives and causes more than expected fumes.

Drill diameter is also contributing factor to explosive performance and the subsequent generation of fumes. Explosives are diameter dependant for optimal performance. If diameter is too small for a specific product improper detonation will occur and may result in a burning of the product rather than detonation. This will have an adverse effect of more fumes created. Each explosive product has a critical diameter. It is the smallest diameter where failure to detonate properly occurs. ANFO blends are normally not good for small diameter blast holes and emulsion explosives can be sued in the smaller diameter blast holes.

SOCIAL

The proposed project is located in Steve Tshwete Local Municipality (STLM), 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.

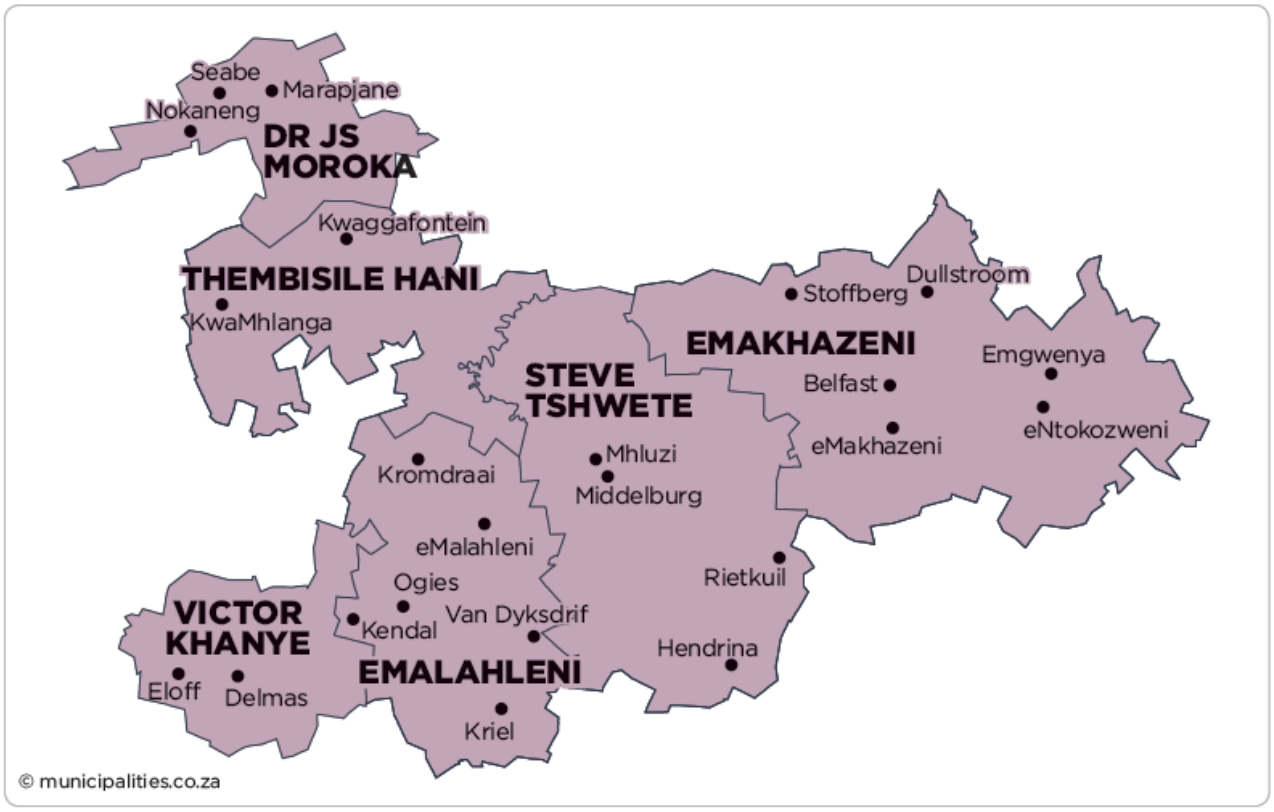


Figure 3-31: Nkangala District and Local Municipalities Map

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 & 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 R 55 369 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.

3.8.4.2 Description of the current land uses.

Portion 1 of the Farm Kafferstad 195 IS may be accessed via the R38 towards Hendrina, Mpumalanga. When the surrounding environment is considered, the region is associated with crop cultivation and mining activity. On a local scale, the area is associated with cultivated land and a wetland system on the eastern side. The site is considered to be heavily or moderately modified in nature.

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

The study area has been categorised as heavily to moderately modified in nature. I was previously cultivated, and vegetation has since re-established. The area is associated with rain-fed agricultural land, natural grasslands, natural pans, dry pans, and coal mines in the distance.

3.8.4.4 Environmental and current land use map.

(Show all environmental and current land use features)

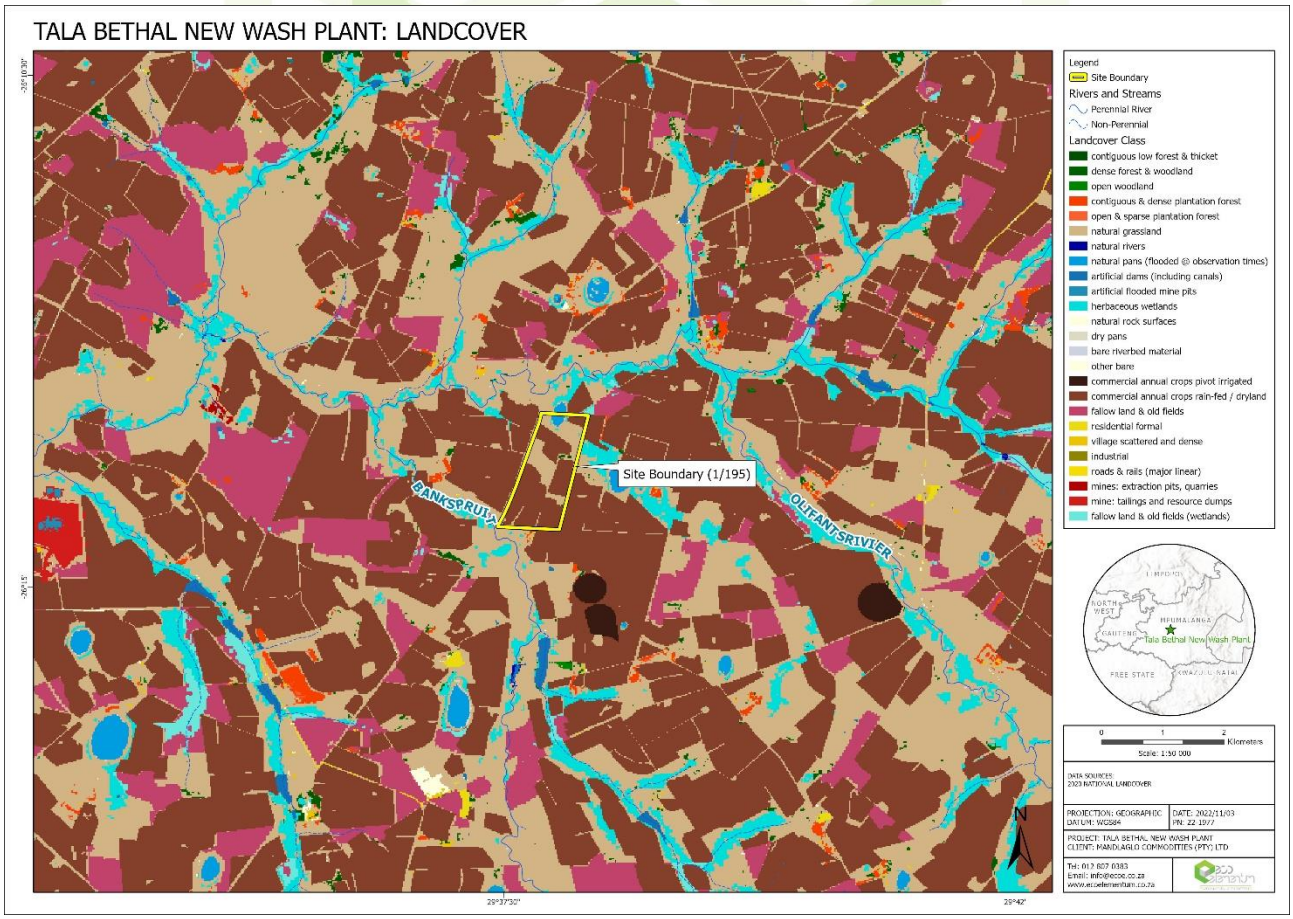


Figure 3-32: Land cover of the study area

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

Impact on Wetland

The following possible impacts to the pan have been identified should the proposed development go ahead:

- Loss of wetland habitat
- Loss of species of conservation concern
- Change in hydrological connectivity of the HGM units
- Sedimentation of the HGM units
- Wetland degradation
- Soil compaction
- Change in runoff intensities

It should be noted that site establishment had already commenced at the time of the field investigation and wetland habitat loss and hydrological connectivity deterioration was already prevalent.

Waterfilled cut-off trench within TB HS2

Cut-off trench running down slope within TB HS2

Figure 3-33: Current conditions within Tala Bethal

Impact on Ecology / Biodiversity

Any development activity in a natural system will have an impact on the surrounding environment, usually in a negative way. The purpose of this phase of the study was to identify and assess the significance of the potential impacts caused by the current mining operations.

A number of potential impacts relating to the loss of indigenous vegetation, floral habitat and ecological structure, loss of floral diversity and ecological integrity, proliferation of alien invasive species, loss of plant species of conservation concern, loss of faunal habitat, direct faunal impacts and disturbance to fauna are predicted to occur as a result of the mine operation.

Loss of Species of Conservation Concern

A detailed ecological impact assessment will be conducted to determine which endangered and red listed faunal or floral species will be affected by the proposed amendment to the Mandlaglo MR. The below important taxa have been identified in the study area. These will be negatively affected by site clearance and all related mining activities, both directly and indirectly.

Graminoids: *Aristida aequiglumis* (d), *A. congesta* (d), *A. junciformis* subsp. *galpinii* (d), *Brachiaria serrata* (d), *Cynodon dactylon* (d), *Digitaria monodactyla* (d), *D. tricholaenoides* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *E. racemosa* (d), *E. sclerantha* (d), *Heteropogon contortus* (d), *Loudetia simplex* (d), *Microchloa caffra*

(d), *Monocymbium ceresiiforme* (d), *Setaria sphacelata* (d), *Sporobolus africanus* (d), *S. pectinatus* (d), *Themeda triandra* (d), *Trachypogon spicatus* (d), *Tristachya leucothrix* (d), *T. rehmannii* (d), *Alloteropsis semialata* subsp. *eckloniana, Andropogon appendiculatus, A. schirensis, Bewsia biflora, Ctenium concinnum, Diheteropogon amplectens, Eragrostis capensis, E. gummiflua, E. patentissima, Harpochloa falx, Panicum natalense, Rendlia altera, Schizachyrium sanguineum, Setaria nigrirostris, Urelytrum agropyroides.*

Herbs: *Berkheya setifera* (d), *Haplocarpha scaposa* (d), *Justicia anagalloides* (d), *Pelargonium luridum* (d), *Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, E. transvaalensis* subsp. *setilobus, Helichrysum aureonitens, H. caespititium, H. callicomum, H. oreophilum, H. rugulosum, Ipomoea crassipes, Pentanisia prunelloides* subsp. *latifolia, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata.*

Geophytic Herbs*: Gladiolus crassifolius, Haemanthus humilis* subsp. *hirsutus, Hypoxis rigidula* var. *pilosissima, Ledebouria ovatifolia.*

Succulent Herb: *Aloe ecklonis.*

Low Shrubs*: Anthospermum rigidum* subsp. *pumilum, Stoebe plumosa.*

All endemic species and species of concern have specific habitat requirements and the impacts of the mine operation might have effects on these species.

Loss of indigenous vegetation, floral and faunal habitat and ecological structure of water resources and soil

The mine operation may impact on foraging, breeding and roosting ecology of faunal species. Loss of vegetation generally affects nutrient cycles, removes the organic litter layer and results in habitat fragmentation and destruction of wildlife corridors. Cumulative impacts might include a decrease in floral habitat and ecological structure will lead to the proliferation of alien invasive species.

Alien Invasive Species

Alien invasive plant species will quickly encroach into disturbed areas. Alien plant species generally out-compete indigenous plant species for water, light, space and nutrients as they are adaptable to changing conditions and are able to easily invade a wide range of ecological niches (Bromilow, 2010). Alien invader plant species pose an ecological threat as they alter habitat structure, lower biodiversity (both number and "quality" of species), change nutrient cycling and productivity, and modify food webs (Zedler, 2004). This negatively affects the ability of the disturbed area to maintain indigenous floral biodiversity.

HYDROGEOLOGY IMPACT

Impacts on Groundwater

No significant impacts are expected during the construction phase in terms of groundwater quantity. The removal of vegetation in preparation of the mining area and haul road construction may cause an increase in surface runoff and therefore a small decrease in aquifer recharge. Additionally, the box-cut may cause a decrease in the water level due to dewatering if the base of the box-cut is lower than the groundwater level at that position.

The groundwater quality of the area is not expected to be impacted during the construction phase. In extreme cases, possible impacts may emanate from fuel spillages from construction vehicles.

During the operational phase, impacts on the groundwater quantity would mainly result from dewatering of the surrounding aquifer during the opencast mining. The groundwater level near the pit is expected to decrease as the void is dewatered to allow the safe continuation of mining.

During the operational phase and for the period after mining when the groundwater level has not yet recovered, the mine void will act as a groundwater sink area. Groundwater gradients and therefore groundwater flow will be towards the pit area.

For this reason, groundwater contamination as a result of the mining pit itself will not be able to flow down gradient from the pit area during the operational phase. Poor quality water may accumulate in the pit as a result of the dewatering.

Impacts on Surface Water

The study site can be characterised as having slightly to moderately undulating plains, including some low hills and pan depressions. There are a number of water resources in the vicinity of the project area, these include NFEPA Wetlands and the Bankspruit.

Potential surface contamination sources include the PCD, ROM stockpiles and other infrastructure. During the decommissioning phase this infrastructure will be removed and will include all carbonaceous or contaminated material. This will decrease the surface sources for further groundwater contamination.

The opencast pit area will be rehabilitated which will have a positive impact on the groundwater regime in some areas since the poor-quality seepage to the groundwater will decrease. Rehabilitation should occur in such a manner as to divert as much as possible water away from the opencast areas.

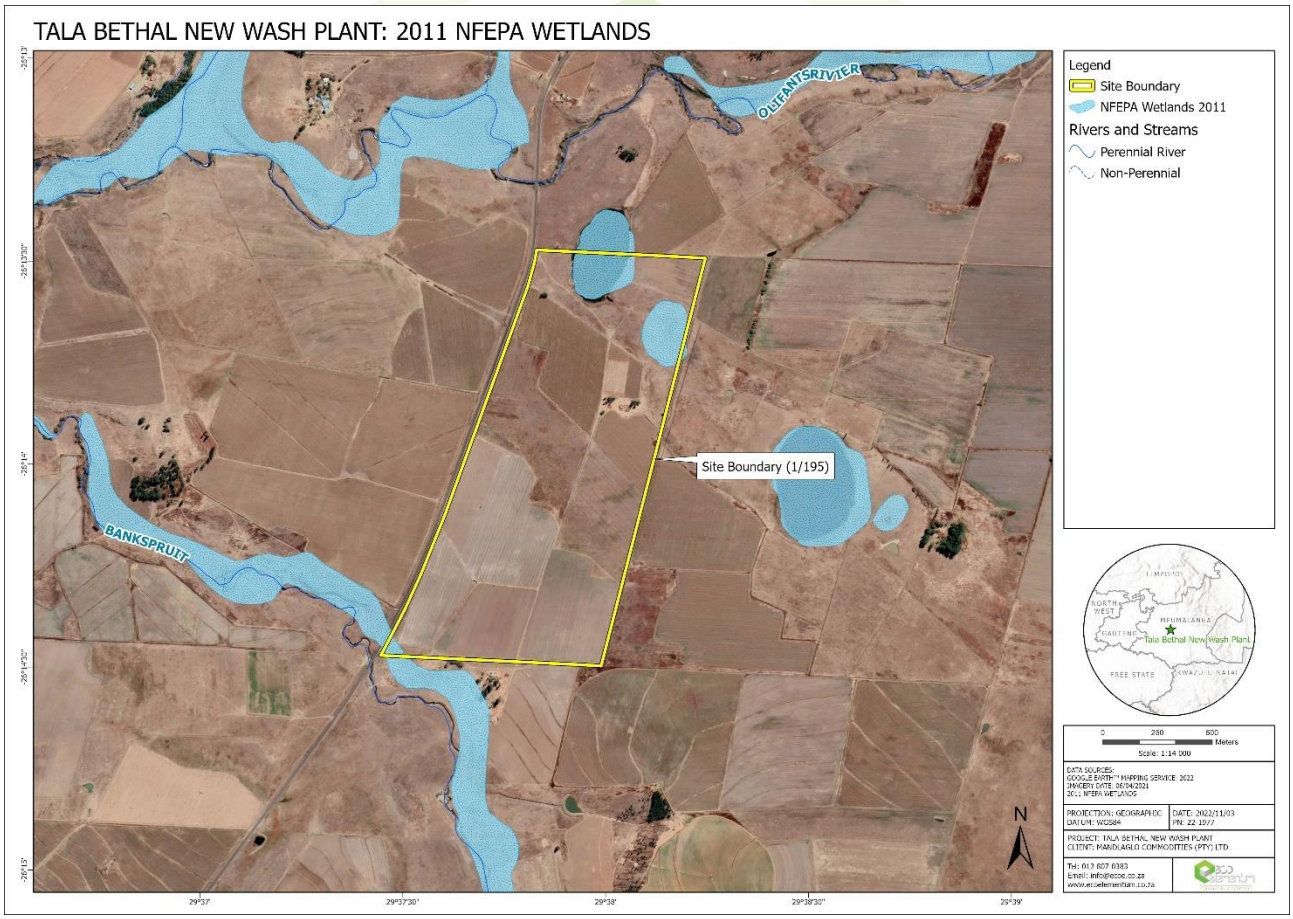


Figure 3-34: NFEPA Wetlands in the region of the Portion 1 of Farm Kafferstad 195 IS.

Once dewatering ceases at the end of the operational phase, the groundwater level will start to recover to a state of equilibrium. Decant from the lowest elevation on the pit boundary may occur once the groundwater levels have recovered.

There is a possibility of acid generating during the post-closure phase of the project. Therefore, the groundwater quality in the pit region will decrease as a result of the acidification. It is highly recommended that all carbonaceous material be placed on the pit floor and covered with overburden material. This will result in coverage of the carbonaceous material with water first, which will eliminate oxygen from the system to decrease the process of acid generation. A groundwater pollution plume

will start to migrate down gradient once the groundwater level has reached a point of equilibrium. Acid base analysis in the area will need to be conducted to calculate the probability of Acid Mine Drainage (AMD) occurring.

Acid mine drainage and the dewatering of aquifers as a result of mining activities may decrease the groundwater quality and have a net loss on the water supply to the groundwater users and the springs in the area.

HERITAGE IMPACT ASSESSMENT

According to historical aerial imagery and topographical maps, parts of the study area were cultivated as early as 1955. During later years, the majority of the area was cultivated, suggesting a general lower significance and potential impact to cultural resources.

One building was noted on historical aerial imagery within the demarcated development footprint (Site B01). The building, however, was demolished and the site is not associated with surface remains, but potentially sensitive subsurface cultural material might be located within the site boundary. Should such material be discovered, a qualified archaeologist must be contacted.

Sites located outside of the development footprint include: One demolished historical building (B02), an intact historical building (B03) and two cemeteries (F01 & F02).

Demolished historical building B02 is located approximately 100 m northeast of the nearest surface development, is not associated with material culture and is not at risk of being impacted by the proposed development. The intact historical building at Site B03 is located approximately 100 m southeast of the proposed opencast area, is protected by the National Heritage Resources Act, 1999 (Act No. 25 of 1999) and might be impacted by the proposed mining development. Should impact to the site be unavoidable, a destruction permit may be applied for from the Mpumalanga Provincial Heritage Resources Authority.

Cemetery F01, located on the northern boundary of the study area and approximately 266 m northeast of the proposed opencast area, will be impacted by a berm that is planned through the cemetery. The cemetery consists of approximately eight graves and although no dates were observed, the possibility exists that the graves exceed 60 years of age. The cemetery is therefore protected by 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, 1999 (Act No. 25 of 1999).

Cemetery F02 consists of approximately nine unfenced graves within an agricultural field on the southern border of the mining area. No dates were observed on the surface dressings, but the possibility exists that the graves exceed 60 years of age. The cemetery is therefore protected by 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, 1999 (Act No. 25 of 1999). The nearest surface development is proposed 700 m to the northeast and no impact to the cemetery is foreseen.

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)).

AIR QUALITY IMPACT

It is forecasted that the Construction Phase of the project will entail site clearing, removal of topsoil and vegetation, construction of infrastructure, and general transportation and hauling of material. These will have a moderately significant impact on ambient air quality of the sensitive receptors identified for the area, both before and after mitigation.

Two possible fugitive emission sources are anticipated in the proposed project area during the Operational Phase. These may impact on the air quality at the relevant environmental sensitive receivers:

1. Dust from material handling inside the pit area.
2. Haul roads; for transporting the ROM to the offsite Processing plant.

These sources will be used as inputs in the AERMOD model as unmitigated and mitigated in the Air Quality Impact Assessment which will be conducted.

The Decommissioning Phase will involve the demolition, removal and transportation of any infrastructure which was placed on the site area. This will also include the rehabilitation of the site to pre-mining conditions. During decommissioning, there will be a moderately significant impact on the receptors ambient air quality.

NOISE IMPACT

The potential environmental noise impact on average will be moderate and short term and after the implementation of noise mitigatory measures it will change to low. The impact will be low during the decommissioning phase. The impact will be moderate and short term during the operational phase pit activities will create a noise increase in the immediate vicinity of the mining activities.

IMPACT ASSESSMENT TABLE

Table 3-18: Impact Assessment

Activity	Aspect	Impact	Phase	+/-	SU[1]		+/-	SM[2]		Mitigation measures	Action Plan
Heritage											
Site establishment.	Clearance of the site	Destruction of culturally significant material.	Construction and development.	Negative	48	Med	Negative	38,4	Low-Med	Avoid heritage sites which were encountered.	Monitor subsurface material during development and construction phases and contact a qualified archaeologist should culturally significant material be observed. Apply for permits to demolish or move sites of cultural significance.
Subsurface activity.	Subsurface culturally significant material.	Destruction of subsurface culturally significant material.	Operational	Negative	4	Low	Negative	1,6	Low	Monitor material unearthed.	Monitor subsurface material during development and construction phases and contact a qualified archaeologist should culturally significant material be observed.
Palaeontological											
Subsurface activity.	Subsurface palaeontological significant material.	Destruction of palaeontological significant material.	Construction and Operational	Negative	4	Low	Negative	1,6	Low	Monitor unearthed material & adhere to the Fossil Chance Find Protocol when material of palaeontological significance is found.	Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to preserve fossils. A site visit and walk through needs to be conducted to confirmed whether there are any fossils on surface of the project footprint. Since there is a chance that fossils from the Vryheid Formation may occur below ground and be disturbed a Fossil Chance Find Protocol has been added to the EMPr.
Noise											
Construction and clearing activities.	Offloading of construction materials; Excavations and backfilling where required; Concrete mixing and batching; Use and maintenance of roads; Machinery noise from construction	Increased Noise levels	Construction	Negative	10	Low	Negative	6	Low	Construct a Noise Barrier between the main noise source noise sensitive receivers Equipment Maintenance 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 • 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. • Switching off equipment when not in use. • 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. • Avoid the use of engine compression brakes when approaching the site entrance or driving through or in the vicinity of the adjacent town. • All access roads will be signposted and speed limited to minimise transport noise. • Equipment with lower sound power levels would be used in preference to

[1] Significance unmitigated
[2] Significance mitigated

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
	related activities.										noisier equipment. • 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), Removal of material (mining process) and stockpiling, Machinery and excavation noise, Trucks clearing their load bins before loading, Vehicle travelling to and from site on a daily basis.	Increased Noise levels.	Operation	Negative	48	Med	Negative	28,8	Low-Med	Construct a Noise Barrier between the main noise source noise sensitive receivers. Equipment Maintenance 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 • 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. • Switching off equipment when not in use. • 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 the vicinity of the adjacent town. • All access roads will be signposted and speed limited to minimise transport noise. • 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.
Decommissioning activities	Demolition & Removal of all infrastructure (incl. transportation off site), Reshaping of the area that was mined, Rehabilitation - spreading of soil, re-vegetation & profiling/contouring with heavy machinery, Aftercare and maintenance of rehabilitated areas.	Increased Noise levels.	Closure and Decommissioning.	Negative	20	Low-Med	Negative	12	Low	Equipment Maintenance 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. • Switching off equipment when not in use. • Avoid the use of engine compression brakes when approaching the site entrance or driving through or in the vicinity of the adjacent town. • All access roads will be signposted and speed limited to minimise transport noise. • Equipment with lower sound power levels would be used in preference to noisier equipment.
Wetland											
Site establishment and mining	Site clearance	Loss of wetland habitat	Construction and operation	Negative	64	Med-High	Negative	38.4	Low-Med	Remain out of wetlands, and where possible the wetland buffer	Fence off wetlands areas and where possible, buffer zones. Restrict heavy vehicle and machinery movement to outside of wetland areas.

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
Site clearance	Vegetation clearance and habitat removal	Loss of species of conservation concern	Construction and operation	Negative	60	Med-High	Negative	36	Low-Med	Remain out of wetlands, and where possible the wetland buffer	Fence off wetlands areas and where possible, buffer zones. Restrict vehicle movement to outside of wetland areas. Perform a protected, and red data species search and rescue for relocation outside of impacted areas.
Site establishment and mining	Diversion trenches and storm water management systems on site, as well as removal of geological strata	Change in hydrological connectivity of the HGM units	Construction and operation	Negative	64	Med-High	Negative	51.2	Med	Remain out of wetlands, and where possible the wetland buffer. Ensure clean water from the catchment reach the downstream system	Fence off wetlands areas and where possible, buffer zones. Avoid mining activities within wetlands and the buffer zone where possible. Maintain a 100m buffer between Pan1 and proposed mining activities.. Implement simulated natural clean water diversion systems to divert clean water around the impacted area to the downstream wetlands.
Site establishment and mining	Site clearance and erosion	Sedimentation of the HGM units	Construction and operation	Negative	60	Med-High	Negative	24	Low-Med	Avoid sediment runoff into the wetland from the site	Implement sediment traps on the downstream area of the site. Maintain Stormwater Management systems
Site establishment and mining	Sedimentation, change in hydrological connectivity	Wetland degradation	Construction and operation	Negative	72	Med-High	Negative	43.2	Med	Remain out of wetlands, and where possible the wetland buffer. Ensure clean water from the catchment reach the downstream system Avoid sediment runoff into the wetland from the site	Fence off wetlands areas and where possible, buffer zones. Avoid activities within wetlands and the buffer zone where possible. Maintain a 100m buffer between Pan1 and proposed mining activities. Implement simulated natural clean water diversion systems to divert clean water around the impacted area to the downstream wetlands. Implement sediment traps on the downstream area of the site.
Mining operations	Heavy vehicle movement	Soil compaction	Construction and operation	Negative	36	Low-Med	Negative	14.4	Low	Remain out of wetlands, and where possible the wetland buffer.	Restrict heavy vehicle and machinery movement to outside of wetland areas.
Heavy vehicle movement	soil compaction	Change in runoff intensities	Construction and operation	Negative	64	Med-High	Negative	38.4	Low-Med	Remain out of wetlands, and where possible the wetland buffer. Avoid sediment compaction	Restrict heavy vehicle and machinery movement to outside of wetland areas. Rip compacted areas Revegetate bare soil
Ecological Impacts											
Construction and operational activities.	Work Revetments New access routes Site clearing for opencast area Placement of cleared topsoil into allocated stockpiles Use of heavy machinery	Flow alterations due to erosion and sedimentation.	Construction and Operation.	Negative	48	Med	Negative	9,6	Low	• Rehabilitation of the disturbed areas; • Limiting instream sedimentation; • Minimising pollutants entering the watercourse. Erosion control measures must be employed where required.	• Design and implementation of a suitable stormwater system; • Implement a programme for the clearing/eradication of alien species including long term control of such species; • Water quality monitoring must take place every month during operational phases; and • A topsoil stripping and stockpiling guideline must be completed to ensure rehabilitation success. • Attenuation measures must include, but are not limited to - the use of sand bags, erosion control blankets, and silt fences. • Long term attenuation measures, such as attenuation/infiltration trenches, swales must be established to control stormwater from hardened surfaces • Vegetation clearing must be undertaken as and when necessary in phases.

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
	Increased traffic Bank erosion.										• Install sediment barriers (silt catchers and Reno mattresses) along any drainage areas to prevent the migration of silt. • Exposed soils must be rehabilitated as soon as practically possible to limit the risk of erosion. • All roads need to be maintained and any erosion ditches forming along the road filled and compacted. • Demarcate wetland areas to avoid unauthorised access. • No washing of any equipment in close proximity to a watercourse is permitted. • No releases of any substances that could be toxic to fauna or faunal habitats within the channels or any watercourses is permitted. • 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 • 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 • Re-instate indigenous vegetation (grasses and indigenous trees) in disturbed areas.
Construction and operational activities.	Increased traffic leading to potential accidental spills of hydrocarbon materials Hazardous materials entering the watercourses Acid Mine Drainage Increased road runoff during rainfall events.	Pollution of watercourses.	Construction, Operation	Negative	56	Med	Negative	22,4	Low-Med		
Construction and operational activities.	Increased runoff from hardened surfaces Further spread of plants and seedlings Increased traffic.	Spread of alien vegetation.	Operational, Closure and Decommissioning.	Negative	56	Med	Negative	11,2	Low		
Construction and operational activities.	Construction and operational activities	Loss of Species of Conservation Concern	Operational, Closure and Decommissioning.	Negative	16	Low	Negative	6	Low	• Search and rescue for reptiles and other vulnerable species, before areas are cleared; • Environmental induction for all staff and contractors on-site. • Any disturbed areas should be rehabilitated in line with the rehabilitation guidelines, this includes the clearing of alien vegetation, following the guidelines of a suitable alien invasive plant management plan. • The site must be regularly monitored for re-growth of alien invasive species, and any new seedlings etc. eradicated using methods appropriate for the particular species, whether mechanical, chemical or biological. • Protect as much indigenous vegetation as possible. • An alien invasive management programme must be incorporated into an Environmental Management Programme.	• Implement an Alien Invasive Management Plan
Construction and operational activities.	Construction and operational activities	Loss of indigenous vegetation, floral and faunal habitat and ecological structure of water resources and soil	Operational, Closure and Decommissioning.	Negative	16	Low	Negative	6	Low		

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
										• Ongoing alien plant control must be undertaken in the disturbed areas as these areas will quickly be colonised by invasive alien species, especially in the riparian zone, which is particularly sensitive to AIP infestation. • Herbicides must be carefully applied, in order to prevent any chemicals from entering the river. Spraying of herbicides within or near to the wetland areas is strictly forbidden. • Re-instate indigenous vegetation (grasses and indigenous trees) in disturbed areas directly after mining ceases so as to stabilise against erosion and sedimentation.	
Groundwater											
Surface clearing and preparation.	Removal of vegetation.	Increase in surface run-off and therefore decrease in aquifer recharge.	Construction.	Negative	7	Low	Negative	1,4	Low	Re-vegetate.	Implement the rehabilitation plan.
Box cut opening.	Dewatering.	Decrease in water level should the pit floor be lower than the water level.	Construction	Negative	68	Med-High	Negative	68	Med-High	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.
Topsoil and overburden stockpiling.	Leaching from stockpiles.	Acid generation in the case of carbonaceous material placement.	Operation	Negative	24	Low-Med	Negative	9,6	Low	Should a contamination plume be detected, groundwater abstraction to contain plume.	Quarterly monitoring of monitoring boreholes.
ROM stockpiling.	Leaching from stockpiles.	Acid generation as a result of carbonaceous material.	Operation	Negative	24	Low-Med	Negative	9,6	Low	Should a contamination plume be detected, groundwater abstraction to contain plume.	Quarterly monitoring of monitoring boreholes.
Pollution Control Dams	Seepage should lining fail or dam overflow.	Contaminated water in the dams can seep to the aquifer.	Operation	Negative	24	Low-Med	Negative	9,6	Low	Should a contamination plume be detected, groundwater abstraction to contain plume.	Quarterly monitoring of monitoring boreholes.

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
Hydrocarbon spills.	Plume migration.	Spills from mining vehicles can infiltrate to the aquifer and cause a down gradient plume migration.	Operation	Negative	14	Low	Negative	2,8	Low	Clean any hydrocarbon spills in the appropriate manner.	Report any hydrocarbon spillage.
Pit dewatering	Dewatering.	The water infiltrating the pit will be removed for safe mining, causing a decrease in the water level.	Operation	Negative	85	High	Negative	85	High	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.
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.	Negative	12	Low	Negative	2,4	Low	Remove the top soil and overburden dumps during rehabilitation. Placement of carbonaceous material at bottom of pit.	Implement Rehabilitation Plan- placement of topsoil and overburden in pit.
Backfilling	Reshaping of area.	Adequate backfilling and rehabilitation will decrease aquifer recharge. The period to decant will therefore be prolonged.	Decommissioning	Negative	27	Low-Med	Negative	10,8	Low	Carbonaceous material at deeper base of pit. Rehabilitation to direct surface runoff away from pit and recharge to pit minimized. Flow paths including fracture zones sealed.	Refer to Rehabilitation Plan.
Revegetation.	Reshaping of area and revegetating the area.	Increase surface runoff over the rehabilitated opencast, therefore	Rehabilitation	Negative	5	Low	Negative	1	Low	Remove the ROM stockpile and PCD's. This will eliminate the ROM stockpile and PCD's as potential sources.	Rehabilitation Plan.

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
		decreasing aquifer recharge.									
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.	80	High	Negative	80	High	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.
Surface Water & Watercourse											
Construction activities	Infrastructure Work revetments New access road Site clearance for infrastructure and opencast area Topsoil stockpile placement Use of heavy machinery	Flow alteration due to erosion and sedimentation	Construction Phase.	Negative.	48	Med	Negative	48	Med	Do not allow surface water or stormwater to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place. Exposed soils must be rehabilitated as soon as practically possible to limit the risk of erosion. Erosion control measures must be employed where required.	All storm water runoff from the site must be supplemented by an appropriate road drainage system that must include open, grass-lined channels/swales rather than simply relying on underground piped systems or concrete V-drains. SUDS will encourage infiltration across the site, provide for the filtration and removal of pollutants and provide for some degree of flow attenuation by reducing the energy and velocity of storm water flows through increased roughness when compared with pipes and concrete V-drains. A topsoil stripping and stockpiling guideline must be completed to ensure rehabilitation success.
Operational activities	Increased traffic Use of heavy machinery Bank erosion	Flow alteration due to erosion and sedimentation	Operational phase	Negative	80	High	Negative	68	Med-high		

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
Construction activities	Use of heavy machinery using oils and fuels during site clearing Accidental spillages of chemicals, cements, oils, etc.	Pollution of watercourse	Construction Phase.	Negative	70	Med-High	Negative	42	Med	Design and implementation of a suitable stormwater system Rehabilitation of the disturbed areas. Limiting instream sedimentation. Minimising pollutants entering the watercourse;	Construct and implement SWMP Wetland monitoring and biomonitoring must take place bi-annually.
Operational activities	Increased traffic leading to potential accidental spills of hydrocarbon materials Increased road runoff during rainfall events	Pollution of watercourse	Operational phase	Negative	80	High	Negative	68	Med-high	Implement a programme for the clearing/eradication of alien species including long term control of such species; Water quality monitoring must take place every month during operational phases; and	
Construction activities	Hazardous materials entering the watercourse Use of heavy machinery Topsoil stockpile Bank trampling leading to erosion	Spread of alien vegetation	Construction Phase.	Negative	55	Med	Negative	44	Med	Ongoing alien plant control must be undertaken, particularly in the disturbed areas as these areas will quickly be colonised by invasive alien species, especially in the riparian zone, which is particularly sensitive to AIP infestation. Herbicides must be carefully applied, in order to prevent any chemicals from entering the river. Spraying of herbicides within or near to the wetland areas is strictly forbidden. Re-instate indigenous vegetation (grasses and indigenous trees) in disturbed areas.	Implement an alien invasive management plan throughout the phases of the development.
Operational activities	Increased runoff from hardened surfaces Increased traffic	Spread of alien vegetation	Operational phase	Negative	70	Med-High	Negative	42	Med		
Construction activities.	Vegetation clearance and site establishment.	Sedimentation and pollution of the wetland.	Construction Phase.	Negative	33	Low-Med	Negative	13,2	Low	Separate clean and Dirty Water System.	Construct and implement SWMP.
Open pit Mining.	Pit dewatering and drawdown.	Reduction in Baseflow.	Operational Phase	Negative	68	Med-High	Negative	68	Med-High	No mitigation available.	N/A
Pit dewatering.	Reduction to baseflow in the stream.	Reduced Poor Quality Water input.	Operational Phase.	Positive	39	Low-Med	Positive	39	Low-Med	No mitigation required.	N/A

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
Operational Activities.	Hydrocarbon spills Dirty Water release Sediment runoff.	Water quality deterioration.	Operational Phase.	Negative	60	Med-High	Positive	36	Low-Med	Separate clean and Dirty Water System.	Construct and implement SWMP.
Closure of the mine.	Groundwater rebound.	Decant of poor quality water.	Closure and Decommissioning.	Negative	32	Low-Med	Positive	12,8	Low	Treat decant water before release to the environment.	Establish a Passive treatment system in the form of a constructed wetland or similar.
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.	Negative	40	Med	Negative	32	Low-Med	Area of disturbance to be kept to a minimum and no unnecessary clearing of vegetation to occur Reduce exposure areas Avoid Dust Creation.	Demarcate areas of movement, and avoid areas where movement is not permitted. Topsoil should be re-vegetated. During the loading of topsoil onto trucks or stockpiles, the dropping heights should be minimised. Water or binding agents such as (petroleum emulsions, polymers and adhesives) can be used for dust suppression on earth roads. When using bulldozers and graders, minimise travel speed and distance and volume of traffic on the roads. All stockpiles to be damped down, especially during dry weather or re-vegetated (hydro seeding is a good option for slope revegetation).
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	Construction and Operational Phase.	Negative	40	Med	Negative	32	Low-Med	Area of disturbance to be kept to a minimum and no unnecessary clearing of vegetation to occur. Reduce exposure areas. Avoid Dust Creation.	Demarcate areas of movement, and avoid areas where movement is not permitted. Dust emitted during bulldozing activity can be reduced by increasing soil dampness by watering the material being removed. Time the blasting with wind to ensure the dust will not be blown to the sensitive receptors. Material need to be removed to dedicated stockpiles to be used during rehabilitation. Apply dust suppressant to roads. Cover Haul trucks with Tarpaulin.

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
		size less than 2.5 microns) giving rise to health impacts.									
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.	Negative	40	Med	Negative	32	Low-Med	Avoid Dust Creation Enforce a low speed limit.	Apply dust suppressant to roads. Cover Haul trucks with Tarpaulin Fit roads with Speed bumps.
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.	Decommissioning Phase.	Negative	44	Med	Negative	35,2	Low-Med	The area of disturbance must be kept to a minimum Avoid Dust Creation.	Demolition should not be performed during windy periods (August, September and October). Demarcate areas of movement. Speed restrictions should be imposed and enforced. Exhaust pipes of vehicles should be directed so that they do not raise dust. Hard surfaced haul roads or standing areas should be washed down and swept to remove accumulated dust. Dust suppression of roads being used during rehabilitation should be enforced.

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
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 rise to health impacts.	Decommissioning Phase.	Negative	56	Med	Negative	44,8	Med	Minimise exposed surface duration The area of disturbance must be kept to a minimum. Avoid Dust Creation.	Revegetation of exposed areas Demarcate areas of movement Spreading of soil must be performed on less windy days. Keep soil moist using sprays or water tanks, using wind breaks. Speed restrictions should be imposed and enforced Exhaust pipes of vehicles should be directed so that they do not raise dust.
Social Economic											
Mine establishment.	Mining operations.	Employment and income opportunity.	Construction and Operation Phase	Positive	55	Med	Negative	55	Med	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 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. Up-skill the local labour force. Develop a database of goods and services that could potentially be outsourced to the local community. Establish a supplier development programme as part of the Local Economic Development component. 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.
Mining operations.	Employee training.	Upskilling of Labour force.	Construction and Operation Phase.	Positive	30	Low-Med	Negative	30	Low-Med	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: Determine whether the current allocation as per the mines MWP is in line with the targets of the Mining Charter of 2018. Monitor and manage the social contribution of multinational suppliers (in-house as well as suppliers to contractor and direct service providers).
Mining operations.	Coal production and sales.	Increased Public revenue.	Construction and Operation Phase.	Positive	36	Low-Med	Negative	36	Low-Med		
Mining operations.	Social Development Plan.	Increase in Local Economic Development Funds.	Construction and Operation Phase.	Positive	36	Low-Med	Negative	36	Low-Med		

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
Mining operations.	Employment creation.	Project Induced In-Migration.	Construction and Operation Phase.	Negative	32	Low-Med	Negative	25,6	Low-Med	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. Ensure that foreign (outside) workers reside in suitable facilities and do not establish informal houses. 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. The general health of workers should be monitored on an on-going basis Establish a forum, with representatives of the mine and local stakeholders for discussing potential issues of community conflict. The area should be fenced off and security measures should ensure that no squatters are allowed on the mining right area. The relevant actions related to this objective should form of the a contractor management plan.
Mining operations	Mine area access restrictions	Change in access and movement to resident and livestock	Construction and Operational Phase	Negative	85	High	Negative	51	Med	Improve road surfacing. Measures suggested minimising the impact of flyrock on surrounding roads and structure; Measures suggested in the Health Impact Assessment to minimize traffic related accidents; Traffic calming measures to prevent speeding Road maintenance; 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
Increased road traffic	Road network and traveling	Degradation of road	Construction and Operational Phase	Negative	85	High	Negative	51	Med	Improve road surfacing. Measures suggested minimising the impact of flyrock on surrounding roads and structure; Measures suggested in the Health Impact Assessment to minimize traffic related accidents; Traffic calming measures to prevent speeding Road maintenance; Provide safe road crossing points and fencing of the main road and the mine site	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);
Mining operations.	Increased traffic Mining related hazards Increased dust Water quality	Safety and Health Risks.	Construction and Operation Phase.	Negative	44	Med	Negative	26,4	Low-Med	Minimise Safety and Health Risks.	Permanent security personnel should be on site. 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. Speed limits on the local roads surrounding the mining sites should be enforced

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
	deterioration Historical subsidence Blasting.										The mining area should be equipped with surveillance around its perimeter. 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. Ensure that a proper emergency plan that fits with the Municipal Disaster Management Plan is in place. Implement a HIV/AIDS awareness programme with specific focus on communities in and nearby the mining areas, as well as on the mine employees. Fire-fighting equipment should be on site and should be in a good working condition. All mining vehicles should be in a good condition and adhere to the road worthy standards. 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. The mine to provide workers without transport with mine transport to and from work, with a safe off-loading site inside the mine premises. Adhere to air pollution management plan to minimize health hazards related to coal dust particles and noxious gases. Adhere to groundwater and surface water management measures to prevent any negative impacts on health due to ground or surface water pollution Suitable safety measures should be implemented to avoid subsidence.
Mining operations	Open pit establishment	Change in sense of place	Construction and Operation Phase	Negative	36	Low-Med	Negative	36	Low-Med	Minimise Negative Impacts of Nuisance Factors (Noise and Dust). Minimise Negative Impacts from Blasting Activities.	The mitigation measures of the Noise and Air Quality Impact Assessments are relevant. Dust suppression measures should be applied if and when necessary. Limit the number of haul roads to limit dust creation. 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. 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. Personnel should be equipped with the necessary noise protection equipment I&AP forum needs to be established to 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.

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
											• 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.	Decommissioning and Closure.	Negative	75	Med-High	Negative	45	Med	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 AMD should be mitigated as per the ground water management plan. Rehabilitate mining area as soon as possible to prevent to prevent high losses in agricultural potential. 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.
Mining operations.	Mine Closure.	Decrease/termination of community investment funds and support to local communities.	Decommissioning and Closure.	Negative	70	Med-High	Negative	42	Med		
Mine Closure.	Water quality deterioration Historical subsidence.	Safety and Health Risks.	Decommissioning and Closure.	Negative	48	Med	Negative	28,8	Low-Med		
Closure											
Closure	The plant and mine area have a potential to pollute the natural ground water below the mining area causing a long-term water risk	Ground water and decant	Closure	Negative	60	Med-High	Negative	24	Low-Med	Annually improving the SWMP (Stormwater Management Plan) and following the prescribed EMP.	Annual improvement
Closure	At the end of LoM workers and community members will lose employment and associated benefits which will have a negative impact on families and their communities	Unemployment	Closure	Negative	52	Med	Negative	10.4	Low	Early and continuous engagement before the mine closes.	Annual engagement
Closure	At the end of LoM suppliers will lose business which will have a negative impact on local	Business loss	Closure	Negative	24	Low-Med	Negative	4.8	Low	Set up a community forum to address livelihoods during the closure phase.	Annual engagement

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
	business and on a regional scale										
Closure	Heavy rainfall events can cause the erosion of the trenches and berms allowing for polluted water to the enter the environment and cause siltation of watercourses.	Pollution	Closure	Negative	42	Med	Negative	8.4	Low	Plan for high rainfall events.	Monthly measurement. Ensure that trenches and berms are vegetated / lined according to the EMP and engineering design recommendations.
Closure	Extreme drought conditions prohibiting the growth of vegetation and resulting in poor rehabilitation.	Inability to get vegetation growth	Closure	Negative	39	Low-Med	Negative	7.8	Low	Plan for extreme drought events.	Monthly measurement
Closure	Migration of mine workers after the mine has closed will negatively affect community structures.	Community structures	Closure	Negative	16	Low	Negative	3.2	Low	Early and continuous engagement before mine closes	Monthly measurement
Closure	Re-design of the areas around the plant areas and dumps to represent the topography of pre-mining conditions could have a financial impact.	Final land use	Closure	Negative	8	Low	Negative	1.6	Low	Require a mine operations post closure design as part of the final rehabilitation plan	Post closure design
Closure	Not able to return quality of soil back to	Improper rehabilitation	Closure	Negative	10	Low	Negative	2	Low	Importing and treating topsoil to sustain the vegetation requirement of the final land-use	Post closure design

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
	its natural soil quality impacting on the final land-use of the area										
Closure	Decommissioning poorly done causing safety risks in the mining area	Safety risk	Closure	Negative	12	Low	Negative	2.4	Low	Annual review of the decommissioning, closure and rehabilitation plan. Conducting annual rehabilitation	Annual review
Closure	Closure strategy not effective for final land use, extending the closure period and having a financial risk.	Final land use	Closure	Negative	12	Low	Negative	2.4	Low	Annual review of the decommissioning, closure and rehabilitation plan Conducting annual rehabilitation	Annual review
Closure	Poor rehabilitation strategies extending the rehabilitation time frames and causing financial risks	Rehabilitation	Closure	Negative	12	Low	Negative	2.4	Low	Annual review of the decommissioning, closure and rehabilitation plan. Conducting annual rehabilitation	Annual review
Closure	Monitoring and measurement not conducted, causing an inability to react when		Closure	Negative	14	Low	Negative	2.8	Low	Annual review of the monitoring and measurement plan. Conducting annual rehabilitation	Annual review

Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
	degradation of the environment reduces										
Closure	Erosion from areas around dump areas requires to be managed and could cause a financial risk		Closure	Negative	12	Low	Negative	2.4	Low	Erosion Management Plan	Erosion Management Plan
Closure	The spread of weeds and alien vegetation could have an influence on land-use capability and natural vegetation.	Alien vegetation could have an influence on land-use capability and natural vegetation.	Closure	Negative	14	Low	Negative	2.8	Low	Continuous monitoring of vegetation growth	Monthly measurement
Closure	Disturbed and denuded areas inhibiting vegetation growth need to be repaired		Closure	Negative	10	Low	Negative	2	Low	Improve vegetation growth to improve land capability	Monthly measurement
Closure	Poor environmental rehabilitation prohibit fauna to return to the area	Environmental	Closure	Negative	12	Low	Negative	2.4	Low	Continuous monitoring of vegetation growth	Monthly measurement

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Activity	Aspect	Impact	Phase		SU[1]			SM[2]		Mitigation measures	Action Plan
Closure	Remaining dumps causes wind erosion and dust pollution to the surrounding farm land	Air pollution	Closure	Negative	12	Low	Negative	2.4	Low	Annual review of the monitoring and measurement plan for dust. Continuous dust suppression	Annual review

3.8.6 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 3-19: 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.	**0.2**
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.	**0.4**
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.	**0.8**
LOW	The impact will be mitigated to the point where it is of limited importance.	**1.0**

Table 3-20: 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 3-21: 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 3-22: 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.

3.8.7 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 3.8.5 and Table 3-18.

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

Refer to Section 3.8.5 and Table 3-18.

3.8.9 Motivation where no alternative sites were considered.

Portion 1 of the Farm Kafferstad 195 IS falls within Mandlaglo's approved MR boundary and is located within the Witbank Coalfields, well known as the most important coal producing coalfields in South Africa. The site for the new opencast section is preferred due to the shallow coal reserve and the heavily or moderately modified nature of the site. No alternative mining site locations were considered during the study as the project location is bound to the current location due to the underlying geology and the approved MR area. The stormwater management infrastructure of the proposed site will be based on the most effective way to handle clean and dirty water separation. This will also be determined by the positioning of the Wash Plant.

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 mining sector contributes several positive socio-economic benefits which will stimulate local economy and the increase the quality of life for the surrounding communities. The option of not approving the proposed activities will result in the loss of employment opportunity and skills development which would have possible if the project progresses.

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

The resource location was determined through drilling exercises in order to locate the areas that will be most economical to mine, and the extent of the resource that will be mined. The opencast section's location was chosen due to the shallow nature of the coal resource. The proposed layout of the surface infrastructure was determined using an integrated approach

which considered the area's topology and contours, space availability, floodplain and watercourse buffers, existing infrastructure, servitudes and drainage flow directions.

The stormwater management infrastructure of the proposed site will be based on the most effective way to handle clean and dirty water separation. This infrastructure will be located around the site near the Wash Plant area, the coal platforms and PCD. The environmental sensitivities of the area were considered as far as possible when considering the site layout for any possible infrastructure.

3.9 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 3.8.6 of this report.

3.10 Assessment of each identified potentially significant impact and risk

Refer to Section 3.8.5 and Table 3-18.

3.11 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 BA Report	Reference to Applicable Section of Report
Archaeological Impact Assessment.	The area demarcated for the mining of coal (Portion 1 of Farm Kafferstad 195 IS) is located on previously cultivated land that is currently exclusively associated with mining activities. Also, no sites of heritage significance were observed during the site inspection, on historical aerial images or on toparchical maps. The 500 m river buffer, a zone generally associated with a higher heritage site probability, does not intersect the demarcated study area. The study area is therefore not considered to be sensitive from a heritage perspective. The following recommendations are made in terms with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) in order to avoid the destruction of heritage remains associated with the areas demarcated for the proposed mining development:: • Historical Site B01 intersects the proposed development footprint and used to be associated with a building exceeding 60 years of age. However, the building was demolished and the area disturbed. Since infrastructure existed at the site, the possibility of uncovering cultural material within the demarcated boundary is higher compared to other areas. Should such remains be discovered, it is recommended that the associated activity be suspended and that a qualified archaeologist be contacted. This site is therefore considered to be potentially sensitive. • Historical Site B02 is located approximately 100 m from the nearest development footprint and used to be associated with a building exceeding 60 years of age. However, the building was demolished, and only a foundation mound remains. Since the site does not intersect the proposed development footprint, no impact is foreseen. The site was sufficiently recorded and no further action is required. • Historical Site B03 is located approximately 100 m from the nearest development footprint, but might be impacted by the proposed development. Since the building exceeds 60 years of age, it is protected under the NHRA (Act No. 25 of 1999). It is therefore recommended that the site be monitored on a quarterly basis by the Environmental Control Officer, as well as before and after blasting. Should any damage be observed as a result of the proposed development, a qualified archaeologist must be contacted. Should damage to the building be unavoidable, a destruction permit may be applied for from the Mpumalanga Provincial Heritage Resources Authority. • Site F01, a cemetery consisting of approximately eight graves, is located within an area demarcated for the location of a berm, while the nearest opencast activities will be roughly 266 m to the southwest. Although no dates were observed on the surface features, the possibility exists that the graves 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 NHRA (Act No. 25 of 1999) apply. Due to the proposed location of the berm, the cemetery will be impacted by the proposed development. Since the cemetery appears not to be in use anymore and in order to prevent accidental damage to the graves, a fenced-off conservation buffer of 20 m is recommended and that no mining/construction activities take place within 100 m of the cemetery. Access to the cemetery should also not be refused. Alternatively, the graves may be relocated by a qualified graves relocation unit to a premises earmarked	X	This table, Section 3.8.4 Appendix D

List of Studies Undertaken	Recommendations of Specialist Reports	Recommendations that Have Been Included in the BA Report	Reference to Applicable Section of Report
	by the local municipality, but will set in motion a substantial process as new legislation will be triggered. These processes, however, must be performed in accordance with the involvement of community leaders and the relatives of the deceased buried in the concerned cemetery. • Site F02, a cemetery consisting of approximately nine graves, is located on the southern border of the project area and roughly 700 m southwest of the nearest proposed development. Although no dates were observed on the surface features, the possibility exists that the graves 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 NHRA (Act No. 25 of 1999) apply. Due to the type and dilapidated state of the surface features and proximity to the proposed development, it is unlikely that the site will be impacted. Access to the cemetery should also not be refused. • 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. • Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site not be impacted and that a qualified archaeologist be contacted as soon as possible. • 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)). • 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.		

List of Studies Undertaken	Recommendations of Specialist Reports	Recommendations that Have Been Included in the BA Report	Reference to Applicable Section of Report
Wetland Assessment.	The following management measures are proposed • Fence off wetlands areas and where possible, buffer zones. • Restrict heavy vehicle and machinery movement to outside of wetland areas. Specifically the pan buffer. • Perform a protected, and red data species search and rescue for relocation outside of impacted areas. • Avoid trenching and mining within wetlands and the buffer zone where possible. • Implement simulated natural clean water diversion systems to divert clean water around the impacted area to the downstream wetlands. • Implement sediment traps on the downstream area of the site. • Maintain Stormwater Management systems. • Rip compacted areas. • Revegetate bare soil. • Monitoring should be undertaken twice a year during spring, and late summer. • A buffer zone should be determined by a hydropedologist to ensure maintained hydrological connectivity, with a management plan where the buffers cannot be implemented, to compensate for the losses. • The Pans and Hillsope Seepage wetlands should therefore be maintained or improved to a Category B status Should the TB HS2 be destroyed or deteriorated further due to the proposed mining activities, the Pan and Hillslope Seep system (TB Pan 1, Pan 2, and HS1) should be protected through a conservation initiative and the PES increased to Category B and maintained as such. A wetland specialist should furthermore be appointed to calculate the required offset for the wetlands lost due to mining.	**X**	This table, Section 3.8.4 Appendix D

3.12 ENVIRONMENTAL IMPACT STATEMENT

3.12.1 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 3-23: 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							
Open pit Mining	Pit dewatering and drawdown	Reduction in Baseflow.	Operation	Negative	Med - High	Negative	Med - High
Operational activities	Operational activities	Flow alteration due to erosion and sedimentation	Operation	Negative	High	Negative	Med - high
Operational activities	Operational activities	Pollution of watercourse	Operation	Negative	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

3.12.2 Final Site Map

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

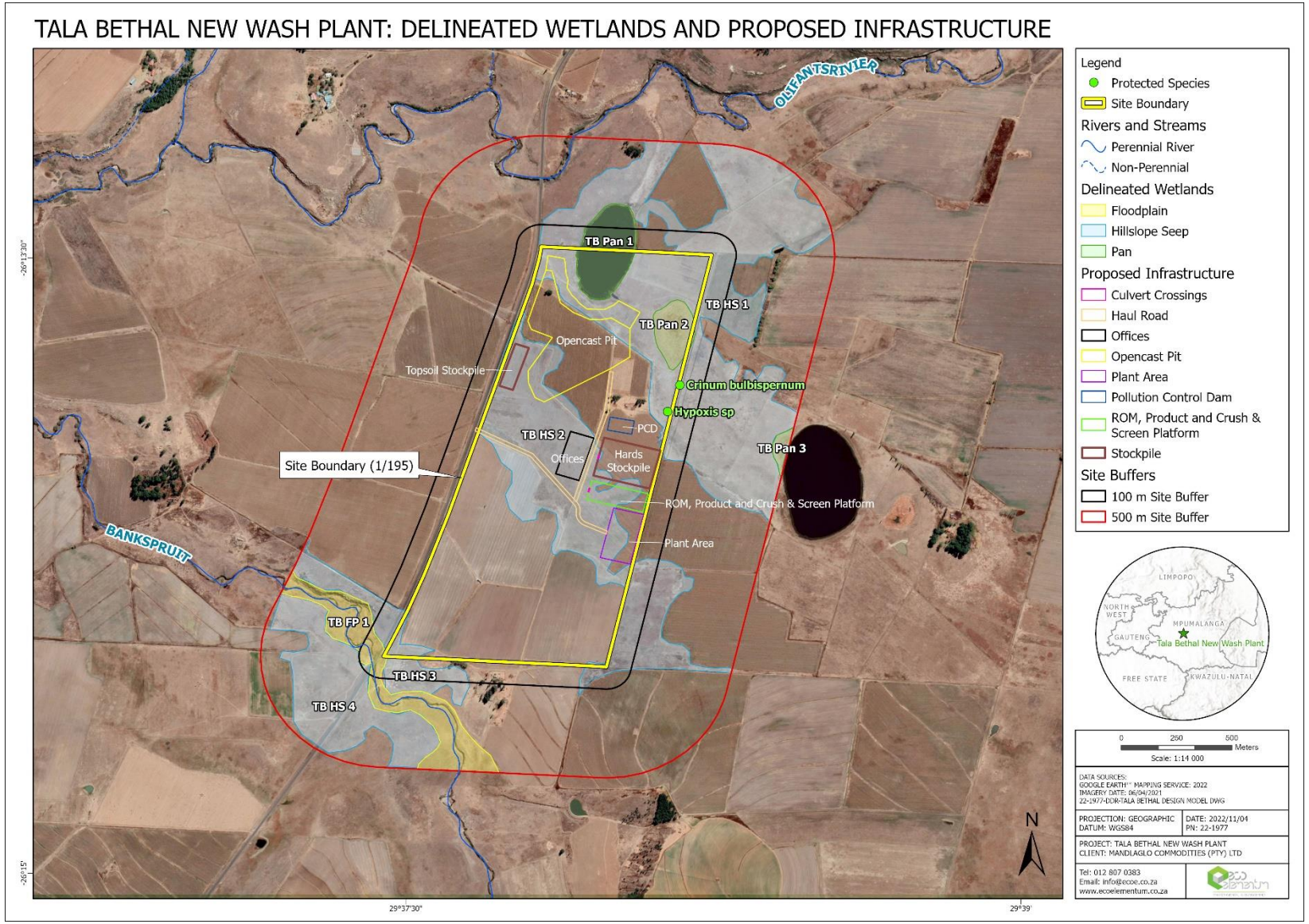

Figure 3-35: Proposed mining layout with sensitivities and buffers

3.12.3 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. • 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. • No additional jobs will be created.

3.13 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.

3.14 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.
- 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.
- 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.
- Access from the R38 must be controlled with clear signage that trucks are entering and exiting the site.
- Not work or activities should be undertaken in the two pans that exist on site.

3.15 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE.

The following gaps in knowledge have been identified by the specialists during their reporting on Portion 1 of Farm Kafferstad 195 IS.

Archaeological

The site visit (October 2022) confirmed that the majority of the study area consists of cultivated land and a few sections of open veldt. Except for a few wet and marshy areas near the perennial and non-perennial pans that hampered free movement, no other constraints were encountered and the general visibility was considered to be good.

Wetlands

The following constraints may have affected the Wetland Assessment:

- Site establishment had already commenced at the time of the field investigation and wetland habitat loss and hydrological connectivity deterioration was already prevalent.

- Connection of the pan to the groundwater table was not determined.
- TB Pan1 could not be accessed directly due to community protest.
- TB HS2 could only be accessed partially due to the site being fenced off with an electric fence and surrounded by cut-off trenches.
- Detailed vegetation and faunal assessments were not undertaken.
- Detailed soil forms were not identified, and only the presence of mottling was determined.

Ecological

Site establishment had already commenced at the time of the field investigation and thus the baseline ecological environment was unable to be established. The generic characteristics of the region were used to interpolate the baseline environment.

Other Studies

Other specialist studies were still underway at the time of submission of this DBAR, these including the Geohydrological and Air Quality. The inputs and findings from these outstanding reports will be added to the FBAR.

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

3.16.1 Reasons why the activity should be authorized or not.

The EAP believes that the authorisation for the activity on the Portion 1 of the Farm Kafferstad 195 IS should be granted. The site area overlaps with a transformed landscape (i.e previous cultivation activities) with major watercourse and features avoided as far as possible. The risks of the proposed Wash Plant development and opencast section are minimal and can be mitigated by following the mitigation measures stipulated in the EMP. This will reduce impacts significantly to acceptable levels.

3.16.2 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 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.
- 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.
- Access from the R38 must be controlled with clear signage that trucks are entering and exiting the site.
- Not work or activities should be undertaken in the two pans that exist on site.

3.17 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. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED.

Mandlaglo's Tala Bethal Coal Mine has a MR (Ref: MP 30/5/1/2/2/10191 MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA). The combined Life of Mine (LoM) for the Tala Bethal Coal Mine is estimated more than 10 years.

3.18 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.

3.19 FINANCIAL PROVISION

CALCULATION OF THE MINE CLOSURE QUANTUM								
Mine: MANDLAGLO COMMODITIES (PTY) LTD TALA BETHAL COAL MINE					Province: Mpumlanga			Version 0.0: Annual Mine Closure Quantum Update for FY2022
Evaluators: Eco Elementum (Pty) Ltd					Date: November 2022			
General Information	Risk Class	High (A)	MANDLAGLO COMMODITIES (PTY) LTD: TALA BETHAL COAL MINE					
	Environmental Sensitivity	Medium						
	WF 1: Nature of Terrain Weighting Factor	Flat 1.00						
	WF 2: Proximity to Urban Area Weighting Factor	Urban 1.00						
Component No	Main Activities Itemized Descriptions	[B] CPI Adjusted Master Rate	[A] Quantity	Units	[C] Multipliction Factor	[D] Weighting Factor 1: Nature of Terrain	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 16.33	18550.00	m3	1.00	1.00	R 302 950.99	Plant structures
2(A)	Demolition of steel buildings and structures	R 227.49	0.00	m2	1.00	1.00	R 0.00	Mobile container type structures
2(B)	Demolition of reinforced concrete buildings and structures	R 335.25	350.00	m2	1.00	1.00	R 117 338.40	Wieghbridge and foundation structures
3	Rehabilitation of access roads	R 40.71	7800.00	m2	1.00	1.00	R 317 532.09	1300m x 6m
4(A)	Demolition and rehabilitation of electrified railway lines	R 395.12	0.00	m	1.00	1.00	R 0.00	n/a
4(B)	Demolition and rehabilitation of non-electrified railway lines	R 215.52	0.00	m	1.00	1.00	R 0.00	n/a
5	Demolition of housing and facilities	R 454.99	250.00	m2	1.00	1.00	R 113 746.41	Buildings, weighbridge and temporary buildings
6	Opencast rehabilitation including final voids and ramps	R 231 563.75	11.40	ha	0.52	1.00	R 1 372 709.89	Total opencast and voids
7	Sealing of shafts, adits and inclines	R 122.13	0.00	m3	1.00	1.00	R 0.00	n/a
8(A)	Rehabilitation of overburden and spoils	R 159 005.51	4.00	ha	1.00	1.00	R 636 022.04	Total overburden and spoils
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	R 198 038.49	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 575 197.64	0.60	ha	0.80	1.00	R 276 094.87	Carbenacous areas
9	Rehabilitation of subsided areas	R 133 143.17	0.00	ha	1.00	1.00	R 0.00	n/a
10	General surface rehabilitation, including grassing of denuded areas	R 47 081.00	8.00	ha	1.00	1.00	R 376 648.00	General surface disturbance areas
11	River diversions	R 125 959.18	0.00	ha	1.00	1.00	R 0.00	n/a
12	Fencing	R 143.68	1250.00	m	1.00	1.00	R 179 599.60	Removal of all fencing
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required)	R 47 893.23	4.60	ha	0.67	1.00	R 147 606.92	Refer item 8A & 8C
14	2 to 3 years of maintenance and after care	R 16 762.63	23.40	ha	1.00	1.00	R 392 245.52	Entire disturbed footprint
15	Specialist study	R 65 000.00	65000.00	report	1.00	1.00	R 65 000.00	Final closure study: GNR1147 Format
						Subtotal (1 to 15 above)	R 4 297 494.74	
	Subtotal 1				Weighting Factor 2	1	R 4 297 494.74	
1	Preliminary and General				12% of Subtotal 1 if less than R100mil		R 515 699.37	
					6% of Sub Total 1 if more than R100mil			
2	Contingency				10% of Sub Total 1		R 429 749.47	
					Subtotal 2 (Subtotal 1 plus sum of management and contingency)		R 945 448.84	
					Subtotal 3		R 5 242 943.58	
					GRAND TOTAL (Subtotal 3 plus 15% VAT)		R 6 029 385.12	

3.19.1 Explain how the aforesaid amount was derived.

The DMRE Master Rates were used in order to calculate the financial provision which would be suitable for the project. 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.

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

The applicant has confirmed that the amount calculated will be provided for.

3.20 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

3.20.1 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:

3.20.1.1 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 +

3.20.1.2 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).

The demarcated development footprint area is characterised by a combination of previously/currently cultivated land, open veldt utilised as pasture, and sections already disturbed by mining development. According to historical aerial imagery and

topographical maps, parts of the study area were cultivated as early as 1955. During later years, the majority of the area was cultivated, suggesting a general lower significance and potential impact to cultural resources.

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)).

3.21 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 3.12.3.

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:	Marungwane Ramashapa
Tel No.:	012 807 0383
e-mail address:	Maru@ecoe.co.za

4.2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

Mandlaglo Commodities (Pty) Ltd (hereinafter Mandlaglo) holds a Mining Right (MR) (Ref: MP 30/5/1/2/2/10191 MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA) and a Water Use Licence (06/B11A/ABCGIJ/9696) in terms of the National Water Act, Act No. 36 of 1998 (NWA). Mandlaglo is currently operating Tala Bethal Coal Mine, an underground mining operation located near Hendrina, in the Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province of South Africa.

The proposed project entails the amendment of the Mining Right (MR) to include a new opencast section and the addition of a Wash Plant to the current surface infrastructure for on-site coal beneficiation, this will require amendments to their currently approved authorisations. The amendment will apply to Portion 1 of Farm Kafferstad 195 IS.

Mandlaglo has appointed Eco Elementum (hereinafter EcoE) as independent environmental assessment practitioners (EAPs) to undertake the required amendment processes for the environmental authorisations, as they apply to Portion 1 of Farm Kafferstad 195 IS. A Basic Assessment (BA) process is required in terms of NEMA Regulations, as amended for the application of the Section 102 MR amendment.

The current Tala Bethal Coal Mine's Operational Phase consists of the following:

- Coal mining using underground mining methods;
- The stockpiling of ROM and transporting to an off-site beneficiation plant;
- The disposal of mine affected water into the Pollution Control Dams (PCDs);
- The transporting of coal products; and
- The utilization of mine infrastructure.

The proposed amendment will include:

- Addition of a Wash Plant Infrastructure; and
- Addition of a new opencast section.

The Decommissioning Phase will be begin once all economically exploitable coal reserves have been extracted. The combined Life of Mine (LoM) for the Tala Bethal Coal Mine is estimated more than 10 years. The decommissioning phase will consist of:

- The removal of all mine infrastructure;
- The filling of all remaining voids and final shaping of the rehabilitated opencast pit;

- The removal of the carbonaceous layer from the product stockpiling area and haul roads;
- The ripping of all infrastructure areas; and
- The seeding of ripped and rehabilitated surfaces.

The mine closure phase will be dedicated to the implementation of a closure plan and the maintenance of rehabilitated areas.

Site Preparation

The new opencast section for the proposed amendment will be situated on Portion 1 of the Farm Kafferstad 195 IS. Site preparation mainly deals with the stripping and stockpiling of topsoil prior to the mining activities commencing. This process is undertaken to safeguard the quality and quantity of available valuable topsoil resources in the area as part of soil management practices. The main objectives of soil management are to:

- 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 should be located outside proposed mine disturbance areas;
- Stockpiles should be constructed using dozers rather than scrapers in order to minimise the structural degradation of the soil;
- Stockpiles should be constructed to have a “rough” surface condition to reduce erosion hazard, improve drainage and promote revegetation; and
- Stockpiles should be revegetated with the appropriate fertilisers and seeds to minimise weed infestation, maintain soil organic matter levels, soil structure, 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 soon as feasible after these structures are completed or as areas are no longer required. Soil surveys will be conducted to determine the depth of topsoil over the open cut area, beneath proposed mine waste infrastructure emplacements and Wash Plant infrastructure areas. It should be noted that it is important to ensure that only topsoil be recovered during site preparation. No underlying material should be inadvertently collected as it is unsuitable for reuse in rehabilitation.

A generalised best practice protocol for soil handling is presented below and includes measures which optimise the retention of soil characteristics (in terms of nutrients and micro-organisms) favourable to plant growth. This protocol will be, as far as possible, implemented for the stockpiles at the Tala Bethal Section 102 Project area.

- Topsoil stockpiles will have a maximum height of 3 m to limit the potential for anaerobic conditions to develop within the soil pile;
- Topsoil stockpiles will have an embankment grade of approximately 1V:4H in order to limit the potential for erosion of the outer pile face;

- Topsoil stockpiles will be seeded and fertilised to promote vegetation growth; 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 at Portion 1 of Farm Kafferstad 195 IS. 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, while 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).

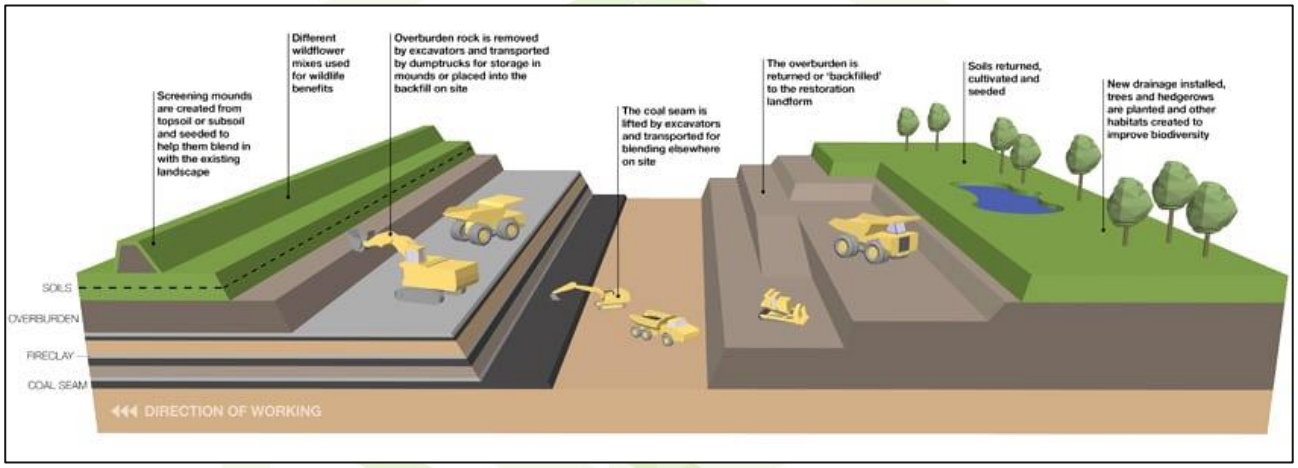

Figure 4-1: Typical Opencast Concurrent Roll Over Rehabilitation Mining Technique

ROM Coal

The Run of Mine (RoM) will be stockpiled on a lined platform near the Plant Area. The addition of a Wash Plant is proposed for the project for on-site beneficiation of coal, this will include crushing, screening and washing of the ROM.

The coal beneficiation or enrichment process is achieved by taking advantage of the density difference which is the physical properties of the coal mined mineral. Raw coal material, which is fed into heavy medium, sinks while the shale (refuses) float and these products are taken separately and the beneficiation or enrichment process takes place.

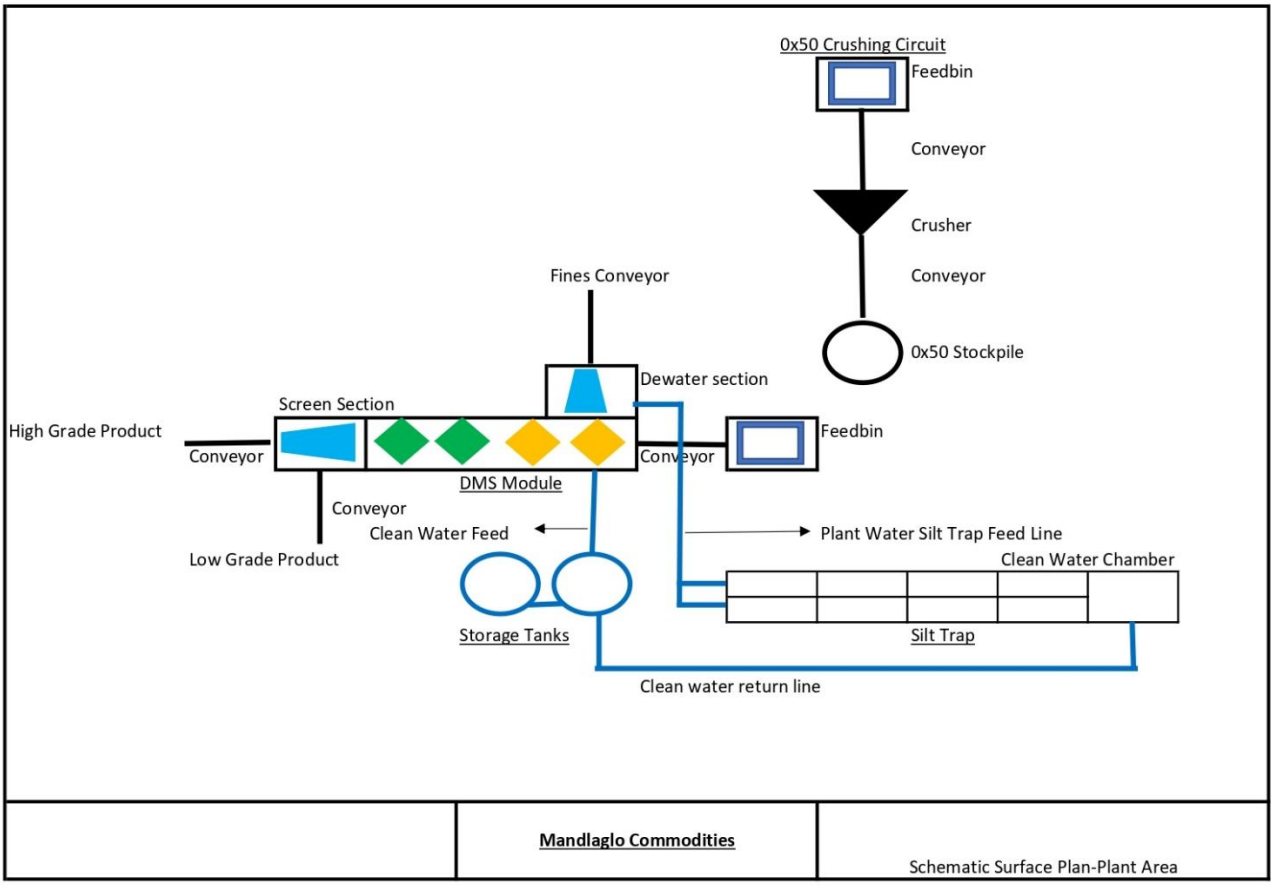

Figure 4-2: Schematic of Coal Beneficiation Process

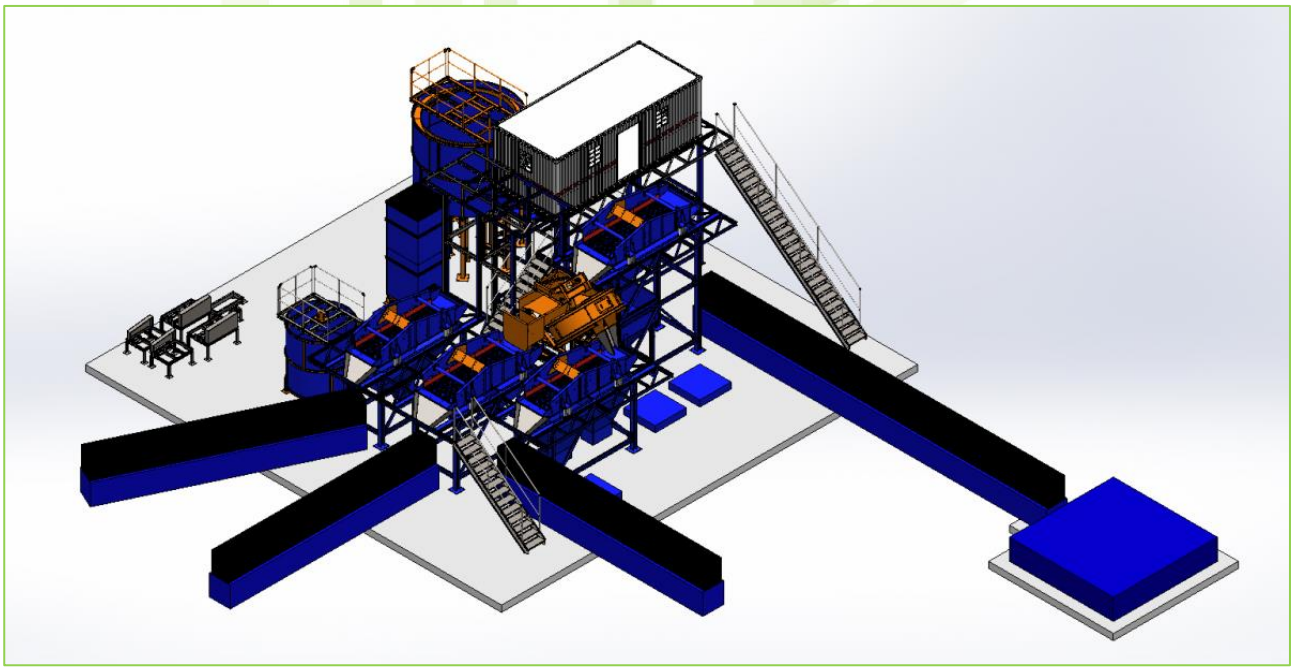

Figure 4-3: Typical Coal Wash Plant

Access and Haul Roads Construction

Portion 1 of the Farm Kafferstad 195 IS may be accessed via the R38 towards and from Hendrina, Mpumalanga. The site will require the construction of haul roads. The haul road will be used to access the mine offices, ablution facilities, workshop

complex, plant area, PCD and mining area. Coal transportation trucks will also use this road to enter and exit the mine premises, including travelling to the weighbridge. In the construction of the haul roads, where possible, access roads should follow slope contours and vegetation should be left in place at the sides of the road to protect the soils.

Temporary Site Offices and Security Offices

To minimise construction requirements relating to the development of the mine and security offices, Mandlaglo will make use of temporary site and security offices. The Figure 4-4 provides an example of the container-type office trailers which will be used onsite. The use of office trailers is advantageous as they are available for purchase off-the-shelf and don't need to be constructed ensuring a smaller footprint is disturbed. Keeping the disturbance area to a minimal extent and ensuring ease of mine closure and rehabilitation after LoM make the temporary offices ideal, especially considering the short duration of the proposed activities and requirement of these offices.

The mine offices for the project will be situated on the eastern section of Portion 1 of the Farm Kafferstad 195 IS, while the security office will be at the entrance of the mining area next to the main entrance road R38.

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

Temporary Sanitation and Changehouse Facilities

The sanitation and changehouse facilities on-site will also be container-type trailer structures which can be easily established and easily removed after the decommissioning of the site. A septic tank system will be implemented to manage the water used within the change house and ablution facilities (Figure 4-5). 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. Sewage will be removed utilising a 'honey-sucker' truck, or similar, transported and disposed of at an appropriate, licenced facility off-site.

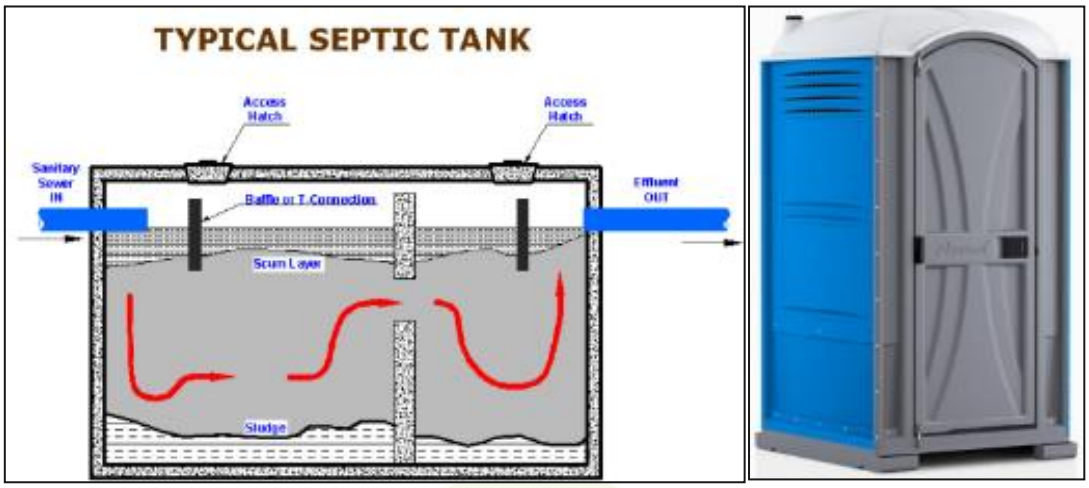

Figure 4-5: Typical septic tank cross section and chemical toilet illustration

Mobile Fuel Storage

Fuel, in the form of diesel, will be stored onsite using a mobile fuel storage tank (Figure 4-6). The fuel storage tank will be equipped with a drip tray designed to hold 110% the capacity of the tanks. The fuel bowser will be stored off site. The figures below illustrate a generic mobile fuel storage tank.

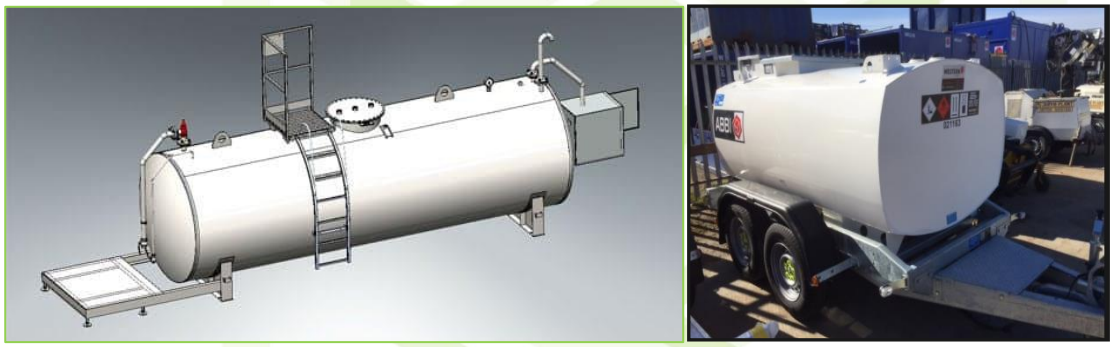

Figure 4-6: Typical mobile fuel storage trailer with bunded tray

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

The development of a Pollution Control Dam (PCD) responsible for the storage of process and dirty water is proposed for the mining area. The dirty water runoff from the product platform, stockpile areas and haul road areas are conveyed to the proposed PCD by means of concrete dirty water channels. Provisions such as a diversion berm are made to ensure a clear split between the clean water runoff and the dirty water runoff on-site. The total amount of clean water that could potentially enter the PCD will thus be limited and will discharge into the environment. A concrete silt trap will be required for the PCD for maintenance. In the case where water for dust suppression is limited during the dry season, alternative methods of dust suppression such as applying chemicals ('Dust-a-side) on the roads may be considered.

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 (Figure 4-7) is an illustration of the typical PCD that will be constructed on Portion 1, Farm Kafferstad 195 IS.

Figure 4-7: Lined PCD illustration

Clean and Dirty Water Separation

Effective surface water management and monitoring is essential for long term sustainability and protection of the receiving water environment. There is a legal obligation on the water user to establish a monitoring programme on site which needs to be registered on the National Monitoring System administered by D:RQS.

A detailed surface water management plan was 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.

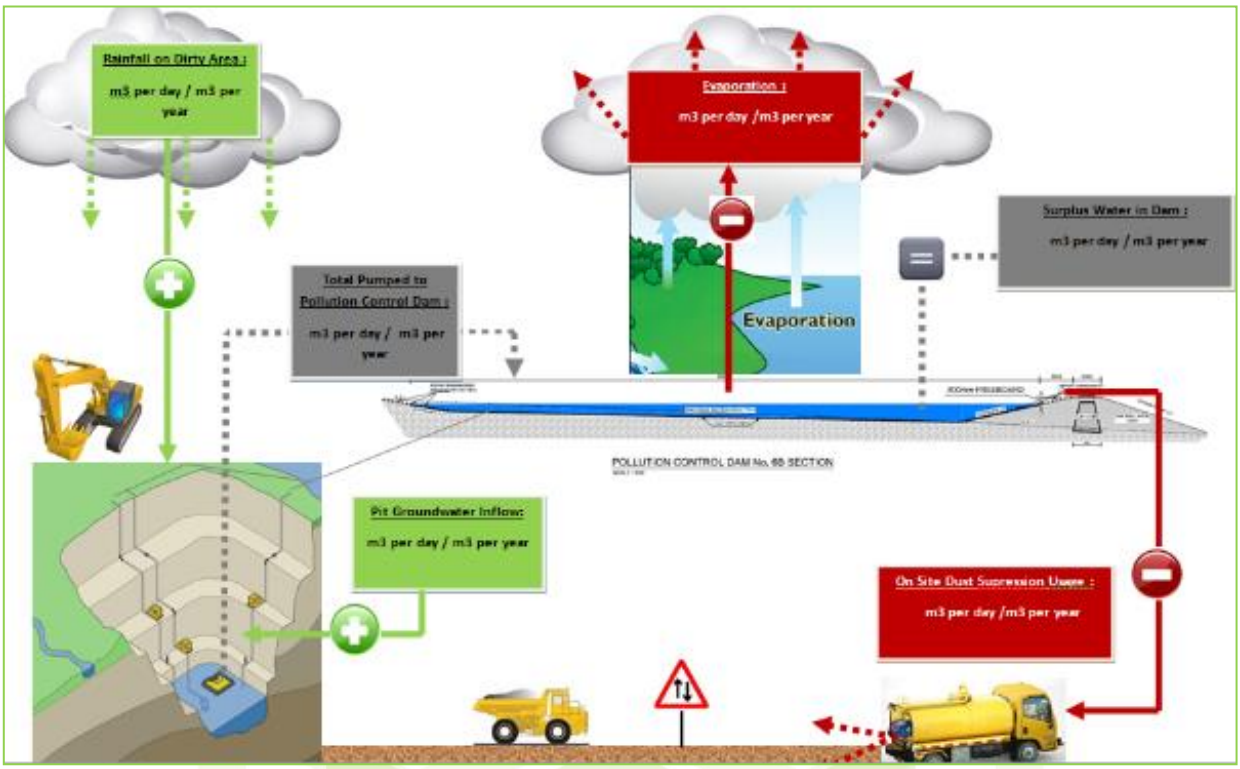

Figure 4-8: Typical water balance considerations during the design of a clean and dirty water separation system

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 necessary for the WUL Amendment Application.

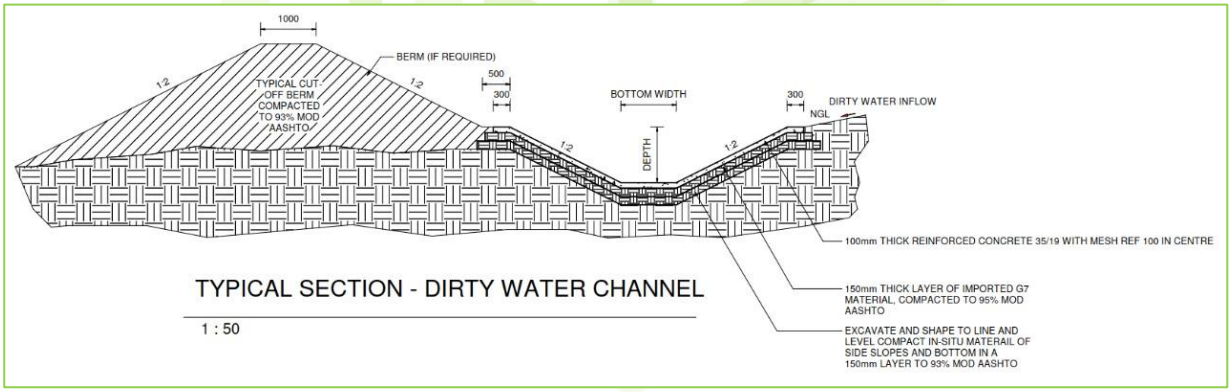

Figure 4-9: Typical Channel / Berm Cross Section For Polluted Water Diversion

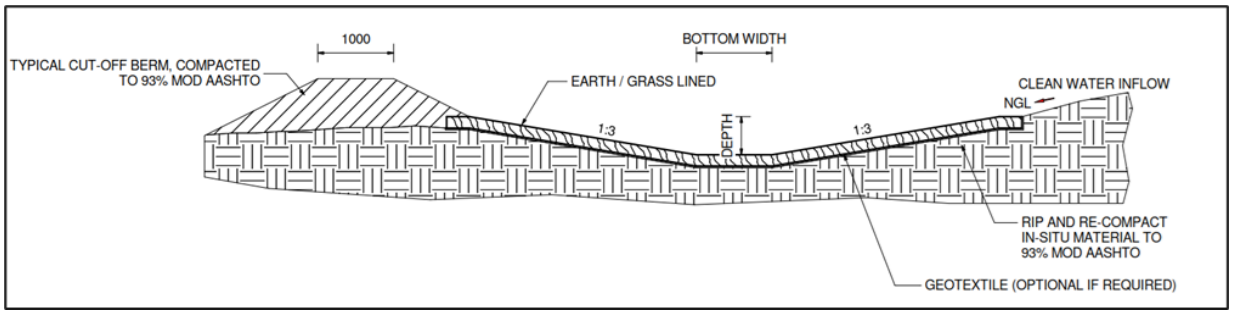

Figure 4-10: Typical channel/berm cross section for clean water diversion

Fencing

The entire Portion 1 on Kafferstad 195 IS will be fenced to promote safety and deter trespassing on the property during the construction and operational phases. Fences will be clearly demarcated, with the appropriate signage 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 4-11: Typical mine fence signage

Staff and Visitors Parking

Mandlaglo will construct a parking area near the Plant Area. Designated parking areas will be constructed by compaction of the subsoil after removal, storage and preservation of the valuable layer of topsoil. Reverse parking will be mandatory at all parking bays. Storm water management control around these areas will be implemented while the necessary signage will be erected to ensure optimal safety. 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 LoM. 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 where 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.

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**) 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)

Refer to Appendix C for the site sensitivity map.

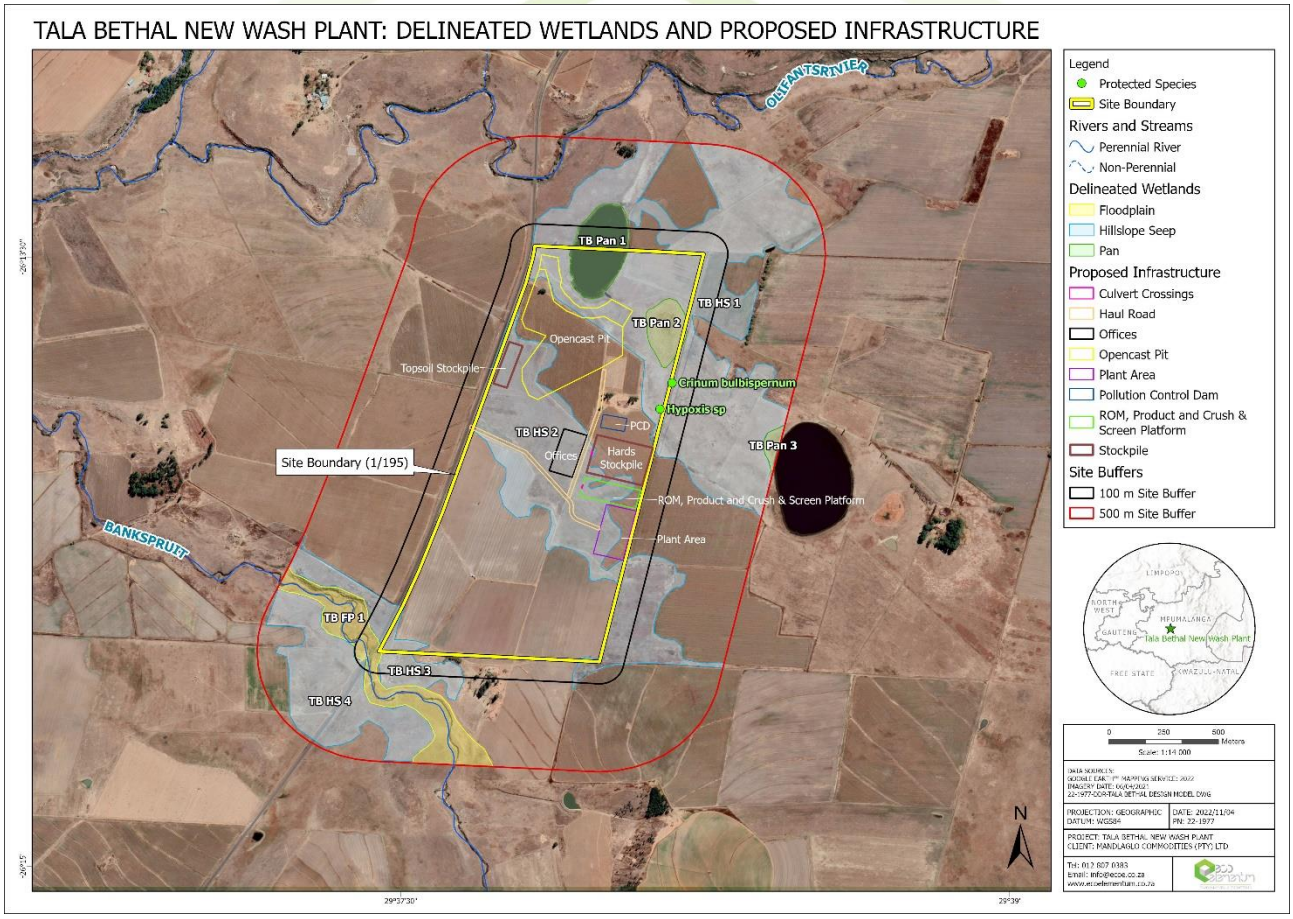

Figure 4-12: Proposed Site Infrastructure in relation to site sensitivites

4.4 Description of Impact Management Objectives including Management Statements

4.4.1 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.

4.4.2 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 abstracted from a borehole for domestic use, this is estimated at 5 litres per person/day.

4.4.3 Has a water use licence has been applied for?

Mandlaglo is in possession of a WUL (06/B11A/ABCGIJ/9696) in terms of the National Water Act, Act No. 36 of 1998 (NWA). They intend on developing a Washplant on Portion 1 of Farm Kafferstad 195 IS, this requires an amendment to their currently approved authorisations.

4.4.4 Impacts to be mitigated in their respective phases.

The table below provides the impacts and the associated mitigation strategies and phases.

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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 and development	Apply the Fossil Chance Find Protocol described as part of the action plan.	Fossil Chance Find Protocol The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence. 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. 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. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material where feasible.	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
					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. 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. 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; Excavations and backfilling where required; Concrete mixing and batching; Use and maintenance of roads; Machinery noise from construction related activities.	Increased Noise levels	Construction	Construct a Noise Barrier between the main noise source noise sensitive receivers Equipment Maintenance 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 • 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. • Switching off equipment when not in use. • 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 the vicinity of the adjacent town. • All access roads will be signposted and speed limited to minimise transport	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
					noise. • 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.					
Operational Activities	Use and maintenance of haul roads (incl. transportation of material to site and offsite), Removal of material (mining process) and stockpiling, Machinery and excavation noise, Trucks clearing their load bins before loading, 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 Equipment Maintenance 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 • 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. • Switching off equipment when not in use. • 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 the vicinity of the adjacent town. • All access roads will be signposted and speed limited to minimise transport noise. • 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.	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), Reshaping of the area that was mined, Rehabilitation - spreading of soil, re-vegetation &	Increased Noise levels	Closure and Decommissioning	Equipment Maintenance 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. • Switching off equipment when not in use. Avoid the use of engine compression brakes when approaching the site entrance or driving through or in the vicinity of the adjacent town.	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
	profiling/contouring with heavy machinery, Aftercare and maintenance of rehabilitated areas.				• All access roads will be signposted and speed limited to minimise transport noise. • Equipment with lower sound power levels would be used in preference to noisier equipment.					
Wetland Impacts										
Site establishment and mining	Site clearance	Loss of wetland habitat	Construction and operation	Remain out of wetlands, and where possible the wetland buffer	Fence off wetlands areas and where possible, buffer zones.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
					Restrict heavy vehicle and machinery movement to outside of wetland areas.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
Site clearance	Vegetation clearance and habitat removal	Loss of species of conservation concern	Construction and operation	Remain out of wetlands, and where possible the wetland buffer.	Fence off wetlands areas and where possible, buffer zones	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
					Restrict vehicle movement to outside of wetland areas.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and	Implement SWMP as per GN704 Follow the approved Closure and	Control through management and monitoring Remedy	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
						invasive species control and management	invasive species eradication	Rehabilitation Plan	through rehabilitation	
					Perform a protected, and red data species search and rescue for relocation outside of impacted areas.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
Site establishment and mining	Diversion trenches and storm water management systems on site, as well as removal of geological strata	Change in hydrological connectivity of the HGM units	Construction and operation	Remain out of wetlands, and where possible the wetland buffer. Ensure clean water from the catchment reach the downstream system	Fence off wetlands areas and where possible, buffer zones.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
					Avoid mining activities within wetlands and the buffer zone where possible. Maintain a 100m buffer between Pan1 and proposed mining activities.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
					Implement simulated natural clean water diversion systems to divert clean water around the impacted area to the downstream wetlands.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	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
Site establishment and mining	Site clearance and erosion	Sedimentation of the HGM units	Construction and operation	Avoid sediment runoff into the wetland from the site	Implement sediment traps on the downstream area of the site. Maintain Stormwater Management systems	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
Site establishment and mining	Sedimentation, change in hydrological connectivity	Wetland degradation	Construction and operation	Remain out of wetlands, and where possible the wetland buffer. Ensure clean water from the catchment reach the downstream system Avoid sediment runoff into the wetland from the site	Fence off wetlands areas and where possible, buffer zones. Avoid activities within wetlands and the buffer zone where possible. Maintain a 100m buffer between Pan1 and proposed mining activities. Implement simulated natural clean water diversion systems to divert clean water around the impacted area to the downstream wetlands. Implement sediment traps on the downstream area of the site.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
Mining operations	Heavy vehicle movement	Soil compaction	Construction and operation	Remain out of wetlands, and where possible the wetland buffer.	Restrict heavy vehicle and machinery movement to outside of wetland areas.	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
Heavy vehicle movement	Soil compaction	Change in runoff intensities	Construction and operation	Remain out of wetlands, and where possible the wetland buffer. Avoid sediment compaction	Restrict heavy vehicle and machinery movement to outside of wetland areas. Rip compacted areas Revegetate bare soil	Avoid canalisation, and sedimentation Prevent pollution to the watercourse Alien and invasive species control and management	Dispersed flow to and in the wetland areas Prevent pollution to the water Alien and invasive species eradication	Implement SWMP as per GN704 Follow the approved Closure and Rehabilitation Plan	Control through management and monitoring Remedy through rehabilitation	Throughout LoM
Ecological Impacts										

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
Construction and operational activities	Stream Diversion Work Revetments New access routes Site clearing for opencast area Placement of cleared topsoil into allocated stockpiles Use of heavy machinery Increased traffic Bank erosion.	Flow alterations due to erosion and sedimentation.	Construction and Operation	• Rehabilitation of the disturbed areas; • Limiting instream sedimentation; • Minimising pollutants entering the watercourse Erosion control measures must be employed where required.	• Design and implementation of a suitable stormwater system; • Implement a programme for the clearing/eradication of alien species including long term control of such species; • Water quality monitoring must take place every month during operational phases; and • Wetland monitoring and biomonitoring must take place bi-annually. • A topsoil stripping and stockpiling guideline must be completed to ensure rehabilitation success. • Attenuation measures must include, but are not limited to - the use of sand bags, erosion control blankets, and silt fences. • Long term attenuation measures, such as attenuation/infiltration trenches, swales must be established to control stormwater from hardened surfaces • Vegetation clearing must be undertaken as and when necessary in phases. • Install sediment barriers (silt catchers and Reno mattresses) along any drainage areas to prevent the migration of silt. • Exposed soils must be rehabilitated as soon as practically possible to limit the risk of erosion. • All roads need to be maintained and any erosion ditches forming along the road filled and compacted. • Demarcate wetland areas to avoid unauthorised access. • No washing of any equipment in close proximity to a watercourse is permitted. • No releases of any substances that could be toxic to fauna or faunal habitats within the channels or any watercourses is permitted. • Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and	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 Hazardous materials entering the watercourses Acid Mine Drainage 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 Further spread of plants and seedlings 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
					disposed of using proper solid/hazardous waste facilities • 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 • 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 carbonaceous material.	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.
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.

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
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.	Decommissioning	Carbonaceous material at deeper base of pit. Rehabilitation to direct surface runoff away from pit and recharge to pit minimized. Flow paths including fracture zones sealed.	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.
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

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
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	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 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. 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										

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
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 Reduce exposure areas Avoid Dust Creation.	Demarcate areas of movement, and avoid areas where movement is not permitted. Topsoil should be re-vegetated. During the loading of topsoil onto trucks or stockpiles, the dropping heights should be minimised. Water or binding agents such as (petroleum emulsions, polymers and adhesives) can be used for dust suppression on earth roads. When using bulldozers and graders, minimise travel speed and distance and volume of traffic on the roads. 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) 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 Reduce exposure areas Avoid Dust Creation.	Demarcate areas of movement, and avoid areas where movement is not permitted. Dust emitted during bulldozing activity can be reduced by increasing soil dampness by watering the material being removed Time the blasting with wind to ensure the dust will not be blown to the sensitive receptors Material need to be removed to dedicated stockpiles to be used during rehabilitation Apply dust suppressant to roads. 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) SANS 1929:2011.	Control through management and monitoring.	Ongoing dust suppression throughout LoM. Concurrent rehabilitation of bare areas.
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	Construction and Operational Phase.	Avoid Dust Creation Enforce a low Speed limit.	Apply dust suppressant to roads. Cover Haul trucks with Tarpaulin 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.	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
		less than 2.5 microns) giving rise to health impacts.						36794 - No. R 827) SANS 1929:2011.		
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.	Decommissioning Phase.	The area of disturbance must be kept to a minimum Avoid Dust Creation.	Demolition should not be performed during windy periods (August, September and October). Demarcate areas of movement Speed restrictions should be imposed and enforced. Exhaust pipes of vehicles should be directed so that they do not raise dust. Hard surfaced haul roads or standing areas should be washed down and swept to remove accumulated dust. 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) SANS 1929:2011.	Control through management and monitoring.	Ongoing dust suppression throughout LoM. 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 rise to health impacts.	Decommissioning Phase.	Minimise exposed surface duration The area of disturbance must be kept to a minimum Avoid Dust Creation.	Revegetation of exposed areas Demarcate areas of movement Spreading of soil must be performed on less windy days. Keep soil moist using sprays or water tanks, using wind breaks. Speed restrictions should be imposed and enforced. 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) SANS 1929:2011.	Control through management and monitoring.	Ongoing dust suppression throughout LoM. Concurrent rehabilitation of bare areas
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 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.	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.

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
					Up-skill the local labour force. Develop a database of goods and services that could potentially be outsourced to the local community Establish a supplier development programme as part of the Local Economic Development. 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.					
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: Determine whether the current allocation as per the mines MWP is in line with the targets of the Mining Charter of 2018 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 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 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 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. Ensure that foreign (outside) workers reside in suitable facilities and do not establish informal houses. 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. The general health of workers should be monitored on an on-going basis Establish a forum, with representatives of the mine and local stakeholders for discussing potential issues of community	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 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
					conflict. The area should be fenced off and security measures should ensure that no squatters are allowed on the mining right area. The relevant actions related to this objective should form of the a contractor management plan.					
Increased road traffic	Road network and traveling	Degradation of road	Construction and Operational phase	Improve road surfacing Measures suggested minimising the impact of flyrock on surrounding roads and structure; Measures suggested in the Health Impact Assessment to minimize traffic related accidents; Traffic calming measures to prevent speeding Road maintenance; 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 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 Create effective access for required movement by residents and livestock.	Traffic management measures As per SLP	Remedy through SLP	Throughout LoM
Mining operations.	Increased traffic Mining related hazards Increased dust Water quality deterioration Historical subsidence Blasting.	Safety and Health Risks.	Construction and Operation Phase.	Minimise Safety and Health Risks.	Permanent security personnel should be on site. 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. Speed limits on the local roads surrounding the mining sites should be enforced. The mining area should be equipped with surveillance around its perimeter. A Health and Safety Plan should be	Limit any safety and health risks during operations.	Limit any safety and health risks during operations.	As per 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
					implemented and it must be ensured that all managers are qualified in First Aid and other relevant safety courses. Ensure that a proper emergency plan that fits with the Municipal Disaster Management Plan is in place. Implement a HIV/AIDS awareness programme with specific focus on communities in and nearby the mining areas, as well as on the mine employees. Fire-fighting equipment should be on site and should be in a good working condition. All mining vehicles should be in a good condition and adhere to the road worthy standards. 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. The mine to provide workers without transport with mine transport to and from work, with a safe off-loading site inside the mine premises. Adhere to air pollution management plan to minimize health hazards related to coal dust particles and noxious gases . Adhere to groundwater and surface water management measures to prevent any negative impacts on health due to ground or surface water pollution. 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) Minimise Negative Impacts from Blasting Activities.	The mitigation measures of the Noise and Air Quality Impact Assessments are relevant. Dust suppression measures should be applied if and when necessary Limit the number of haul roads to limit dust creation. Operational mining activities with potential noise impacts should be mitigated and should not be undertaken during night time. Noise generating	Limit nuisance factors relate to noise and dust Limit potential negative impacts on noise and infrastructure damage related to blasting activities.	Limit nuisance factors relate to noise and dust Limit potential negative impacts on noise and infrastructure damage related to blasting activities.	As per 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
					activities should thus be kept to normal working hours (e.g. 7 am until 5 pm) where possible. 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. Personnel should be equipped with the necessary noise protection equipment I&AP forum needs to be established to 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.	Decommissioning and Closure.	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	Minimise the negative economic impacts related to mine closure.	Minimise the negative economic impacts related to mine closure.	As per SLP	Remedy through Social and Labour Plan.	Prior to Mine closure.
Mining operations.	Mine Closure.	Decrease/termination of community investment funds	Decommissioning and Closure.				Minimise the negative economic	As per SLP	Remedy through	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
		and support to local communities.			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 losses in agricultural potential 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.		impacts related to mine closure.		Social and Labour Plan.	
Mine Closure.	Water quality deterioration Historical subsidence.	Safety and Health Risks.	Decommissioning and Closure.				Minimise the negative economic impacts related to mine closure.	As per SLP	Remedy through Social and Labour Plan.	Prior to Mine closure.
Mine Closure	The mine area has a potential to pollute the natural groundwater below the mining area causing a long term water risk.	Groundwater and decant	Closure	Annually improving the SWMP (Stormwater Management Plan) and following the prescribed EMP. Early and continuous engagement before the mine closes. Set up a community forum to address livelihoods during the closure phase. Plan for high rainfall events. Plan for extreme drought events. Early and continuous engagement before mine closes Annual engagement	Annual improvement Annual engagement Monthly measurement. Ensure that trenches and berms are vegetated / lined according to the EMP and engineering design recommendations. Monthly measurement Set up a community forum	Minimise the negative economic impacts related to mine closure.	Minimise the negative economic impacts related to mine closure.	As per SLP	Remedy through Social and Labour Plan	Throughout LoM
Mine Closure	At the end of LoM (life of Mine) workers and community members will lose employment and associated benefits which will have a negative impact on families and their communities	Unemployment	Closure			Minimise the negative economic impacts related to mine closure.	Minimise the negative economic impacts related to mine closure.	As per SLP	Remedy through Social and Labour Plan	Throughout LoM
Mine Closure	At the end of LoM suppliers will lose business which will have a negative impact on local business and on a regional scale	Business loss	Closure			Minimise the negative economic impacts related to mine closure.	Minimise the negative economic impacts related to mine closure.	As per 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
Mine Closure	Heavy rainfall events can cause the erosion of the trenches and berms allowing for polluted water to the enter the environment and cause siltation of watercourses.	Pollution	Closure			Minimise the negative economic impacts related to mine closure.	Minimise the negative economic impacts related to mine closure.	As per SLP	Remedy through Social and Labour Plan	Throughout LoM
Mine Closure	Extreme drought conditions prohibiting the growth of vegetation and resulting in poor rehabilitation.	Inability to get vegetation growth	Closure			Minimise the negative economic impacts related to mine closure.	Minimise the negative economic impacts related to mine closure.	As per SLP	Remedy through Social and Labour Plan	Throughout LoM
Mine Closure	Migration of mine workers after the mine has closed will negatively affect community structures.	Community structures	Closure			Minimise the negative economic impacts related to mine closure.	Minimise the negative economic impacts related to mine closure.	As per SLP	Remedy through Social and Labour Plan	Throughout LoM

4.4.5 Financial Provision

4.4.5.1 Determination of the amount of Financial Provision.

4.4.5.1.1 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.

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

The BAR and EMP were provided to I&APs for review and comment for 30 days, from 11th November to 12th December 2022. A public information meeting (open day) with I&APs will be held at Hendrina Public Library, 22 November 2022. The environmental objectives of closure and the project were communicated to I&AP's during the public consultation process.

4.4.5.1.3 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 this report as land becomes available for rehabilitation.
Surface Infrastructure related to mining operations (including plant)	Removal, decommissioning and demolition of infrastructure.	
Final void	Backfilling and sealing.	
Contaminated land remediation	Hydrocarbons – Removal of fuel storage and refuelling bays Chemical – contaminated equipment removal.	
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.

4.4.5.1.4 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).

4.4.5.1.5 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 - OPENCAST								
Mine: Fraxocare (Pty) Ltd - Mining Permit MP 30/5/1/1/3/13329 MP				Province: Mpumlanga			Version 1.0: Annual Mine Closure Quantum Update for 2022	
Evaluators: Eco Elementum (Pty) Ltd				Date: July 2022				
General Information	Risk Class	High (A)	PROPOSED OPENCAST MINING PERMIT AREA					
	Environmental Sensitivity	Medium						
	WF 1: Nature of Terrain Weighting Factor	Flat 1.00						
	WF 2: Proximity to Urban Area Weighting Factor	Peri-Urban 1.05						

Component No	Main Activities Itemized Descriptions	[B] CPI Adjusted Master Rate	[A] Quantity	Units	[C] Multiplication Factor	[D] Weighting Factor 1: Nature of Terrain	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 16,33	0,00	m3	1,00	1,00	R 0,00	Mobile Crushing and Screening Plant
2(A)	Demolition of steel buildings and structures	R 227,49	0,00	m2	1,00	1,00	R 0,00	Mobile container type structres only
2(B)	Demolition of reinforced concrete buildings and structures	R 335,25	44,00	m2	1,00	1,00	R 14 751,11	The proposed operation will make use of the neighboring mine's mobile offices, weighbridge and silt trap, but will share in the closure cost as well.
3	Rehabilitation of access roads	R 40,71	262,47	m2	1,00	1,00	R 10 684,95	Gravel roads L:87.49m x W:6m = 524.94m2 (Share access road with neighboring mine) = 524.94m2 / 2 = 262,47m2
4(A)	Demolition and rehabilitation of electrified railway lines	R 395,12	0,00	m	1,00	1,00	R 0,00	n/a
4(B)	Demolition and rehabilitation of non-electrified railway lines	R 215,52	0,00	m	1,00	1,00	R 0,00	n/a
5	Demolition of housing and facilities	R 454,99	0,00	m2	1,00	1,00	R 0,00	Mobile offices mainly, minimal permanent structures on site
6	Opencast rehabilitation including final voids and ramps	R 231 563,75	4,96	ha	0,52	1,00	R 597 249,22	
7	Sealing of shafts, adits and inclines	R 122,13	0,00	m3	1,00	1,00	R 0,00	n/a
8(A)	Rehabilitation of overburden and spoils	R 159 005,51	0,700	ha	1,00	1,00	R 111 303,86	All overburden and spoils to be shaped, grassed and seeded
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	R 198 038,49	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 575 197,64	0,150	ha	0,80	1,00	R 69 023,72	Carbenaceous material footprints to be rehabilitated for e.g. stockpiling areas. RoM area shared with the adjacent mine. RoM situated in the pit area only
9	Rehabilitation of subsided areas	R 133 143,17	0,00	ha	1,00	1,00	R 0,00	n/a
10	General surface rehabilitation, including grassing of denuded areas	R 42 133,00	4,96	ha	1,00	1,00	R 208 979,68	Entire disturbed footprint
11	River diversions	R 125 959,18	0,00	ha	1,00	1,00	R 0,00	n/a
12	Fencing	R 143,68	100,00	m	1,00	1,00	R 14 367,97	Main farm fences to remain - mining complex fencing to be removed
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required)	R 47 893,23	0,85	ha	0,67	1,00	R 27 275,19	All carbenaecous areas to be accounted for: Item 8A + 8C
14	2 to 3 years of maintenance and after care	R 16 762,63	4,96	ha	1,00	1,00	R 83 142,64	Entire disturbed footprint
15	Specialist study	R 45 000,00	1,00	report	1,00	1,00	R 45 000,00	GNR 1147 Specialist Study
						Subtotal (1 to 15 above)	R 1 181 778,34	
	Subtotal 1				Weighting Factor 2	1,05	R 1 240 867,26	
1	Preliminary and General				12% of Subtotal 1 if less than R100mil 6% of Sub Total 1 if more than R100mil		R 148 904,07	
2	Contingency				10% of Sub Total 1		R 124 086,73	
					Subtotal 2 (Subtotal 1 plus sum of management and contingency)		R 272 990,80	
					Subtotal 3		R 1 513 858,05	
					GRAND TOTAL (Subtotal 3 plus 15% VAT)		R 1 740 936,76	

4.4.5.1.6 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 MPRD 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 –

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

4.4.5.1.8 Monitoring and reporting frequency (Table 4-2).

4.4.5.1.9 Responsible persons (Table 4-2).

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

4.4.5.1.11 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.	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 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 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 Compare the annual findings with those of the Baseline Studies.	Ecologist	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.
Construction, Operation and Decommissioning Activities	Alien Invasive Control Program (AICP)	Implement an Alien Invasive Control Programme. During the Biodiversity Assessment a qualified ecologist must be contracted to ensure that the implementation of the AICP are adequately addressed.	Ecologist	Bi-Annually
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. 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.

4.4.5.1.12 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 DMR.

4.4.5.1.13 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.

4.4.5.1.14 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 EAP

Eco Elementum

Name of Company:

11/11//2022

Date

-END-

APPENDIX A: EAP CV

APPENDIX B: PUBLIC PARTICIPATION REPORT

APPENDIX C: LAYOUT MAPS

APPENDIX D: SPECIALIST STUDIES

APPENDIX E: ADDITIONAL DOCUMENTATION