ENVIRONMENTAL & ENGINEERING

REPORT

ALGATORQUE (PTY) LTD

DRAFT BASIC ASSESSMENT REPORT - MINING PERMIT APPLICATION

REPORT REF: 19-974-AUTH- (ALGATORQUE MP)

DMR REF: MP 30/5/1/3/2/ 12425MP

(A PORTION OF PORTION 46 OF THE FARM ELANDSFONTEIN 309 JS, EMALAHLENI, MPUMALANGA PROVINCE)

VERSION CC

Document and Quality Control:

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AA – draft	29/08/2020	Kelebone Sekonyela		First draft for review / comments
BB – draft	01/09/2020	Vernon Siemelink		Technical Review
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Approved for Distribution:				
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Quality Control By:

Nature of Signoff:	Responsible Person:	Role / Responsibility	Qualification
Author	Kelebone Sekonyela	Environmental Assessment Practitioner	MSc Environmental Management
Technical Reviewer	Vernon Siemelink	Environmental Assessment Practitioner	M(EnvMan) UP – Senior Environmental Consultant
Quality Reviewer	Leoni le Roux	Project Administration	Professional Secretary and Personal Assistant

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;

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 provided in this report are based solely on the information provided to Eco Elementum (Pty) Ltd by the Client and other external sources (including previous site investigation data and external scientific studies). The opinions expressed herein apply to the site conditions and features which existed at the time of commencement of the investigations and production of this report.

The author has 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.

Whilst Eco Elementum (Pty) Ltd exercises due care and diligence in rendering the services and preparing this report, the accuracy of the content herein contained is reliant on the accuracy, correctness and completeness of information and/or data supplied to it by the Client. In this regard, Eco Elementum (Pty) Ltd accepts no liability for any loss and/or damages arising out of the inaccuracy of this report in instances where the information and/or data provided to it by the Client is found to be inaccurate, incorrect and/or incomplete.

DECLARATION OF INDEPENDENCE

I, Vernon Siemelink, declare that;

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing:
  - any decision to be taken with respect to the application by the competent authority; and
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

04/10/2020

Signature **Date**

Mr. Vernon Siemelink
BSSc Honn GeoScience (UP)
M (EnvMan) Environmental Management
ISO 14001:2004 Lead Auditor

EXECUTIVE SUMMARY

The obtaining of a mining permit from the Department of Mineral Resources is governed by the Mineral Petroleum Resources Development Act (MPRDA, no 28 of 2002). The MPRDA requires compliance with related legislation, specifically the National Environmental Management Act of 1998. This Basic Assessment Report includes, amongst others, the following information as required in terms of the MPRDA:

- A description of the environment likely to be affected by the proposed mining 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 and Rehabilitation measures of areas disturbed during mining activities.

REGISTERED LANDOWNER

The registered owners of the farms were listed as follows:

Table 1: Directly Affected Landowners

	Landowner	Farm Portion
1.	**Evraz Highveld Steel & Vanadium Ltd.**	In respect of portion of portion 46 of the farm Elandsfontein 309 JS in the magisterial district of Emalahleni, Mpumalanga Province of South Africa.

An agreement between Algatorque and the landowner was signed and permission granted on the farm portion.

PROJECT DESCRIPTION

Table 2: Project Description

Item	Detail
Type of mineral	Bituminous coal found in the coal seams of the Witbank Coal Field.
Mining method	Opencast Mining following a roll-over concurrent rehabilitation methodology.
Depth of the mineral below surface	Coal from a single coal seam horizon is mined with an estimated thickness of 2.5 m – 3.0 m at a depth varying from 6.5 m to 28 m deep.
Geological formation	Witbank Coal Field.
Mining Area Size	4.65 ha
Coal Reserve	It is anticipated that a maximum 50 000 tons per month of Coal will be moved / screened. No coal washing will take place on the site, only in pit mobile crushing and screening.
Mining Right Properties	A portion of portion 46 of the farm Elandsfontein 309 JS.
Property Applicable to current application	A portion of portion 46 of the farm Elandsfontein 309 JS - T0JS00000000030900046.
Existing Authorisations	N/A Tasotron Pty Ltd Mining Permit and Deedun Trading Pty Ltd prospecting right. Water Use license for Section 21 water uses in process.

Life of mine	Algatorque will have approximately thirty-six (36) months of life as determined from the proposed production rate.

LOCATION

The study area is located about 12 km west-southwest of Emalahleni and 2.5 km south of the N4 highway. The study area is characterised by disturbed Evraz Highveld Steel and Vanadium activities, forms part of the Highveld Steel property. Surrounding land use is aligned to the above, with various other industrial operations and some agricultural activities located adjacent to or in the vicinity of the proposed mining permit area. Apart from the local roads, the main infrastructural land use in the vicinity is represented by Witbank town and power station.

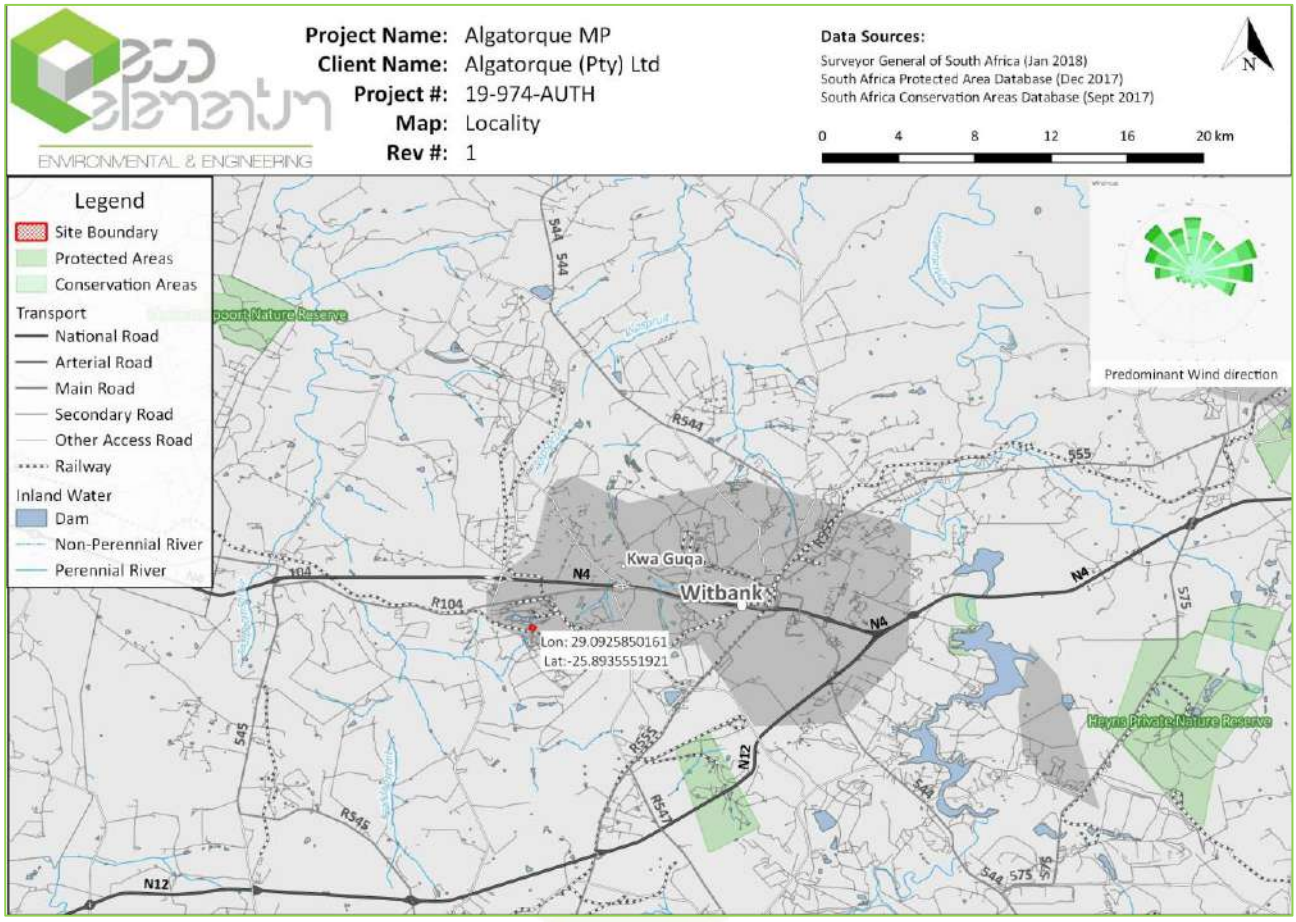


Figure 1: Locality Map

Table 3: Property Location and Coordinates

Property	Portion	Map Reference (1:50 000)
Elandsfontein 309 JS	46	4629CC

The study area is characterised by agricultural fields and disturbed industrial and coal mining and logistical activities. The general surroundings are characterised by agricultural land and both land parcels have residences.

1 Proposed public participation plan for the BAR.

2 Legal background

General Provisions:

1. The provision or obtaining of services indicated in the **Table 1** below, in addition to the specific requirements indicated in the Table, is subject to all the applicable health and safety and other restrictions, directions and requirements determined in terms of section 27(2) of the Disaster Management Act.
2. Where any hard copies of documents are submitted, such documents must be sanitized.
3. If there is any uncertainty about whether an activity is allowed or not, the relevant official of the applicable authority should be approached for guidance and/or confirmation.
4. At all times it must be ensured that reasonable opportunity is provided for public participation and that all administrative actions are reasonable. While the COVID-19 pandemic is a unique circumstance, the specific circumstances in each case must be considered in order to determine what will be reasonable. If in the circumstances of a particular case alternative reasonable methods to give notice to potential interested and affected parties (I&APs) are available, then the relevant competent authority can be approached for an agreement in this regard as provided for in Regulation 41(2)(e) of the EIA Regulations, as per the table below (Table 4).

Table 4: The provision or obtaining of services

ACTIVITY	REQUIREMENTS
Public participation	Proponents/ applicants, EAPs, specialists and professionals, where relevant, must: - ensure that all reasonable measures are taken to identify potential I&APs for purposes of conducting public participation on the application; and - ensure that, as far as is reasonably possible, taking into account the specific aspects of the application- (a) information containing all relevant facts in respect of the application or proposed application is made available to potential I&APs; and (b) participation by potential or registered I&APs has been facilitated in such a manner that all potential or registered I&APs are provided with a reasonable opportunity to comment on the application or proposed application In ensuring the above, applicants and EAPs, in addition to the methods contained in Chapter 6 of the EIA Regulations, or as part of reasonable alternative methods proposed in terms of regulation 41(2)(e) of the EIA Regulations, may make use of the following non-exhaustive list of methods : emails, websites, Zero Data Portals, Cloud Based Services, or similar platforms, direct telephone calls, virtual meetings, newspaper notices, radio advertisements, community representatives, distribution of notices at places that are accessible to potential I&APs.
Submit reports and documents to competent authority for decision-making on applications requiring adherence to Chapter	Proponents/ applicants or EAPs must, when submitting documents to the competent authority for decision making purposes, submit a declaration indicating that: - all reasonable measures have been taken to identify potential I&APs for purposes of conducting public participation on the application; - as far as is reasonably possible and taking into account the specific aspects of the application, (a) information containing all relevant facts in respect of the application or proposed application has been made available to potential I&APs; and

6 of the EIA Regulations	(b) participation by potential or registered I&APs has been facilitated in such a manner that all potential or registered I&APs have been provided with a reasonable opportunity to comment on the application or proposed application; and the public participation plan, as agreed with the competent authority, has been adhered to and indicate any deviations from such agreed plan where relevant; - reports and documents submitted for decision-making purposes must contain the public participation plan as required in Annexure 2.

Table 5: Public Participation Status and Proposed Actions

Possible means of I&AP notification	Proposed communication and action
Draft BAR with Appendices will be made available through:	
Electronic copy available on the Company Website	BAR will be placed on the company website.
Electronic copy sent directly via WeTransfer	BAR will be sent electronically via WeTransfer upon request
Electronic copies sent to CLO's for discussion with communities	If established, CLO's will be provided with an Electronic copy to discuss with communities
I&AP's to be notified of the availability of the Draft BAR Report via	
Newspaper advertisements	Availability of the Draft Basic Assessment Report will be advertised in the local Newspaper.
Direct contact through CLO's	CLO's will be notified.
SMS Notification	SMS notification will be sent in English to I&Aps.
Email notification	Email notification will be sent to all registered parties
Comments on Draft BAR Report can be made through:	
Telephone call	I&AP's can call the office, or request a call via return SMS to discuss the project and raise comments and concerns.
Responding to the notification SMS	Comments and concerns can be raised by responding to the notification SMS
Responding to the notification Email	Comments and concerns can be raised by responding to the notification Email
Focus group and one on one meetings will be scheduled via Zoom, or a similar platform	Online group meetings will be scheduled upon request, and recorded for reporting purposes

1.1 proposed new timeframe

As per Government Notice No. 650 of 05 June 2020 the period between 27 March 2020 and 05 June 2020 should be excluded from the EIA timeframe and the reckoning of days. Section 4.3 of the Government Notice No. 650 further extends the timeframe with another 21 days (i.e. 26 June 2020)

Eco Elementum requests that the proponent is allowed to initiate the Public Participation Process, for a period of 30 days from **04 September 2020 to 04 October 2020. The submission of** the **Final Basic Assessment Report** will subsequently be submitted to the Department on **13 October 2020** for Final Decision making.

Table 6: Public Participation Process Followed

Date	Public Participation Process
26/02/2020	Application lodged on the SAMRAD.
04/09/2020 – 04/10/2020	30 day Public Participation started for the Basic Assessment Process.
04/09/2020	Announcement phase - notification e-mails was sent, telephone calls to the I&AP.
04/09/2020	Draft Basic Assessment Report will be made available: b. Eco Elementum Website; c. Electronic copy sent directly via WeTransfer to (landowner upon request); d. Electronic copies sent to CLO's for discussion with communities.
04/09/2020	e. Site notices will be placed at various access points along the secondary road which transverses the site; f. At the entrance of the proposed sites; g. Outside DWS municipal office; h. Witbank Main Library and i. On the main access road towards the site.
04/09/2020	English adverts were also placed in 1 local newspaper. The advert included a brief project description, location of the project, date of public meeting, methods to register as an IAP and review period of the BA report.
04/09/2020	Submission of the Public Participation Plan.
13/10/2020	Submission of the Basic Assessment Report.

Please refer to the Public Participation Report in Annexure B of the report for the full report and annexures.

The following table contains the detail of consultations held with directly affected landowners and I&AP's to date. Landowner consultation is key to the public participation process and will continue during the BAR phase of the project.

Table 7: Consultation and Public Participation

(To be updated after public participation)

Person/Company	Interest	Consulted	Main Issue	Comment
Evraz Highveld Steel & Vanadium Ltd. **Ms. Andrea de Souza** **Legal Representative**	Land owner – Portion of portion 46 of the Farm Elandsfontein 309 JS.			

Please refer to the Annexure B: Public Participation Report and annexures for the full Report and Public Participation process that was followed.

MINING PROCESS

As a summary the following activities and technologies will be carried out and are associated with the proposed Algatorque - Elandsfontein project:

- Site preparation with topsoil removal;
- Box cut opencast mining with a roll over rehabilitation sequence;
- Hauling, access road, haul road, and road diversion of the road;
- Clean and dirty water separation system;
- Trenching;
- Fencing;
- Drilling and blasting;
- Topsoil, subsoil, overburden, discard and ROM stockpiles;
- Waste management; and
- Mine closure and rehabilitation.

ALTERNATIVES AND PROJECT MOTIVATION

The option of not approving the activities will result in a significant loss to valuable information regarding the coal reserve status on this property.

No Alternative mining site locations were considered during the study. The project location was however bound to the current location due to the underlying geology and acceptance of the application for the specific Mining Permit. The Mining Permit is dependent on the area chosen being susceptible to possible coal deposits and therefore no alternative site could be considered.

IDENTIFIED ENVIRONMENTAL IMPACTS

The following significant environmental impacts have been identified (refer to Annexure 7 for the detailed impact assessment tables).

IMPACT	COMMENT	MITIGATION
De-watering of the surrounding aquifer. Water entering the mining area will have to be pumped out to enable mining activities. This may cause a lowering in the groundwater table in- and adjacent to the mine.	If it is proven that dewatering of the mines is impacting on baseflow, various options should be investigated such as if clean discharge is available to be pumped back into the surrounding streams/rivers/wetlands. A surface water specialist should be consulted in this regard.	Monitor static groundwater levels on a quarterly basis in all boreholes within a zone of one kilometer surrounding the mines to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time. The numerical model should be updated during operation of the mines by using the measured inflows, water levels and drilling and pump test information to re-calibrate and refine the impact prediction Groundwater quality must be monitored on a quarterly basis.
Following closure of the mine, the groundwater level will rise to an equilibrium that will differ from the pre-mining level due to the disturbance of the bedrock. Decant may occur after the rebound of groundwater levels. Once the normal groundwater flow conditions have been re-instated, polluted water	The final backfilled opencast topography should be engineered such that runoff is directed away from the opencast areas. Implement as many closure measures during the operational phase, while conducting appropriate monitoring programs to demonstrate actual performance of the various	Treatment of the decant may be viable, however all passive methods should be investigated first during the operational phase of the mine. Major fractures encountered while mining must be sealed by grouting, both on inflow and outflow areas.

(caused by interactions of geological materials and groundwater) could potentially migrate away from the mining areas.	management actions during the life of mine.	All sulphate containing waste material should be stored at the base of the opencast and flooded as soon as possible to exclude oxygen. A pollution control dam could be used to intercept polluted seepage water. This should be considered if it is found that the streams / rivers / wetlands are indeed negatively affected by pollution. Regular sampling of the streams/rivers/wetlands is essential to decide on this option if needed. All mined areas should be flooded as soon as possible to minimise oxygen from reacting with the remaining pyrite. Mining should remove as much coal as possible from the opencasts and underground and separate acid forming and non-acid forming material. Deposit acid forming material at the base of the opencast. The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the opencast area.
Negatively affecting the surface water Resources.	Water resources identified within 500 m of the proposed site.	• 100-meter buffer has been established from any surface water resources - Storm water diversion measures and containment will be implemented. • Water will be recycled as far as possible using a closed loop sump system.
Negatively affecting the surface right holders.	Agreement to be put in place between the client and surface right holders.	Comply with the MPRDA & NEMA and obtain agreement with surface right holders. Implement and Comply with the EMP.
Dust and gaseous emissions (-).	Conduct dust suppression techniques to ensure that applicable standards for gravimetric dust fall out, PM10 and PM2.5 are not exceeded.	Water trucks to wet all roads and operational surfaces. Fallout monitoring should be continued for the life of mine to better assess the level of nuisance dust associated with both mining and process related operations. Sampling of fallout should be undertaken within the neighbouring areas as well as on-site. Indicative PM10 and PM2.5 dust monitoring must also be undertaken at the same sites as mentioned under the previous bullet but also in and around potential fugitive emission sources to determine mitigation measures and focus management efforts.
Conflicting land uses (indusial and mining).		• Mining activities will be planned to take place outside of industrial and commercial activities where possible. • where not possible compensation will be discussed and agreed with the affected party.

		• rehabilitation will consider further use of the land.
Loss of vegetation. Invasion by alien invasive species.	Clearing of vegetation within the mining Permit footprint and the topsoil stockpile and the proposed mini-pit ramps.	• Modify by vegetating soil stockpiles; • Control though alien invasive eradication programme; • Alien invasive vegetation to be identified and removed throughout the LoM; • Ensure site clearing is restricted to the footprint of the designated areas to limit the degradation and destruction of natural habitats; • Modify - Vegetate open and exposed areas to prevent soil erosion and the establishment of alien invasive vegetation; • Restrict access and avoid areas of identified faunal and floral species, that are adjacent to the mining activities; • Red data species of Floral and faunal within the mining activities must be rescued and relocated; • Restrict access and avoid sensitive landscapes, such as wetlands and ridges that are adjacent to the mining operations; • Topsoil that will be used for rehabilitation within one year must be stockpiled according to the Rehabilitation Plan. Compaction of stockpiled topsoil must be avoided to ensure the seed bank is viable; and • Alien invasive vegetation to be identified and removed throughout the LoM.

CONTENTS

Annexures

List of Figures

List of Tables

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
NC:	Non-conformance
NHRA:	National Heritage Resources Act, 46 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
SLP:	Social and Labour Plan
SOP:	Standard Operating Procedure
SSC:	Species of Special Concern
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 AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT: **Algatorque (Pty) Ltd**

TEL NO: 083 476 1247

FAX NO: 086 696 4891

POSTAL ADDRESS: No. 13 Twelfth Avenue, Menlo Park, 0081

PHYSICAL ADDRESS: No. 13 Twelfth Avenue, Menlo Park, 0081

FILE REFERENCE NUMBER SAMRAD: MP 30/5/1/3/2/ 12425MP

2. 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.

3. 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 ASSSSMENT AND BASIC ASSESSMENT REPORT

4. CONTACT PERSON AND CORRESPONDENCE ADDRESS

4.1 DETAILS OF:

i. Details of the EAP

Name of The Practitioner: Mr. Vernon Siemelink / Ms Kelebone Sekonyela

Tel No.: 012 807 0383

Fax No. : 086 714 5397

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

ii. Expertise of the EAP.

1) The qualifications of the EAP

(with evidence).

Name	Vernon
Surname	Siemelink
Company	Eco Elementum (Pty) Ltd
Position	Director – Senior Environmental Consultant
Location	361 Oberon Ave, Glenfield Office Park, Nikka Building, 1st Floor, Faerie Glen, Pretoria, 0081
Email	vernon@ecoe.co.za
Telephone Number	072 196 9928/ 012 348 5214
Education	**M(EnvMan) - Masters in Environmental Management** Master's Degree at University of Pretoria in Pretoria, South Africa (Gauteng) **BSSc. GeoScience - Honours in Geographical Science** Honours Degree at University of Pretoria in Pretoria, South Africa (Gauteng)
Professional skills	- Vernon Siemelink is a Director at Eco Elementum (Pty) Ltd Environmental and Project Management Professionals and has been involved in the field of environmental science and environmental management for the past 9 years. - Vernon is a SGS IRCA Certified EMS Lead Auditor and a SETA accredited assessor. He has also completed the CEM auditor conversion training for ISO 9001, ISO 14001 and OHSAS 18001 Integrated Management Systems. - Vernon Siemelink has been an environmental consultant and professional since 2008, specialising in the fields of: a. Environmental Impact Assessments and Authorisations. b. Water use license application. c. Waste use license application. d. Environmental Monitoring and Control. e. Mine Closure and Rehabilitation. f. Environmental Compliance and Audits. g. Environmental Management Systems; and Specialist Impact Studies. - During this time, he has provided quality, environmental, and health and safety consulting and auditing services in nearly every industry sector. - Furthermore, Vernon holds a Master's Degree in Environmental Management and an Honours Degree in Geosciences from the University of Pretoria.

Please refer to the CVs attached in Annexure A.

2) Summary of the EAP's past experience.

(In carrying out the Environmental Impact Assessment Procedure)

Table 8: Qualifications of EAP

Skills	- Environmental Impact Assessments. - Basic assessments, WULA reports. - Water use license application. - Prospecting and Mining Right Authorizations. - Environmental Management Plans. - Public Participation. - Environmental Authorizations. - ISO 14001:2004 Environmental Management System Auditor. - FSC Forest Management Auditing. - Geographic Information System Support (ArcGISv9.2). - SETA Accredited Assessor. - EMSware software Administrator. - Integrated Management System Auditor.
EAP Experience	Mr. Vernon Siemelink has been an Environmental Assessment Consultant for 9 years, during this time he has conducted S/EIA's, Basic Assessments, rehabilitation planning, developed EMPr (This includes conducting screening and scoping exercises, baseline studies, impact assessments, monitoring, and management planning and implementation) environmental legal assessments, ISO 14001:2004 management systems, due diligence, EMPr Performance Assessments and Integrated Water Use License Audits for clients in nearly every industry sector.

Name	**Kelebone**
Surname	Sekonyela
Company	Eco Elementum (Pty) Ltd
Position	Junior Environmental Practitioner (EAP)
Location	361 Oberon Ave, Glenfield Office Park, Nikka Building, 1st Floor, Fearie Glen, Pretoria, 0081.
Email	kele@ecoe.co.za
Telephone Number	072 83 78813 / 012 348 5214
Education	**MSc(EnvMan) - Masters in Environmental Management** Master's Degree at University of Johannesburg in Johannesburg, South Africa (Gauteng) **BA. Geography - Honours in Geographical Science** Honours Degree at University of Johannesburg in Johannesburg, South Africa (Gauteng)
Professional skills	- Kelebone Sekonyela is an EAP at Eco Elementum (Pty) Ltd and has been involved in the field of environmental science and environmental management for about 2 years. - Kelebone Sekonyela has been an environmental consultant since 2018, focusing in the fields of: a. Environmental Impact Assessments and Authorisations. b. Water use license application. c. Waste use license application. d. Environmental Monitoring and Control. e. Environmental Compliance and Audits. - During this time, she has provided quality, environmental, and auditing services in nearly every industry sector. - Furthermore, Kelebone holds a Master's Degree in Environmental Management from the University of Johannesburg.

4.2 Location Of The Overall Activity

Table 9: Location of the Activity

Farm Name:	A portion of portion 46 of the farm Elandsfontein 309 JS.
Application area (Ha)	4.65 ha.
Magisterial district:	Magisterial District of eMalahleni.
Distance and direction from nearest town	Situated approximately 15 km West of Witbank.
21 digit Surveyor General Code for each farm portion	T0JS00000000030900046.
Locality map	A locality map at a scale not smaller than 1:460000 in Figure 1 (below).
Description of the overall activity. **(Indicate Mining Right, Mining Permit, Mining permit, Bulk Sampling, Production Right, Exploration Right, Reconnaissance permit, Technical co-operation permit, Additional listed activity)**	Mining Permit application of 4.65ha of a portion of the portion 46 of the Farm Elandsfontein 309 JS.

4.3 Locality Map

(show nearest town, scale not smaller than 1:460000)

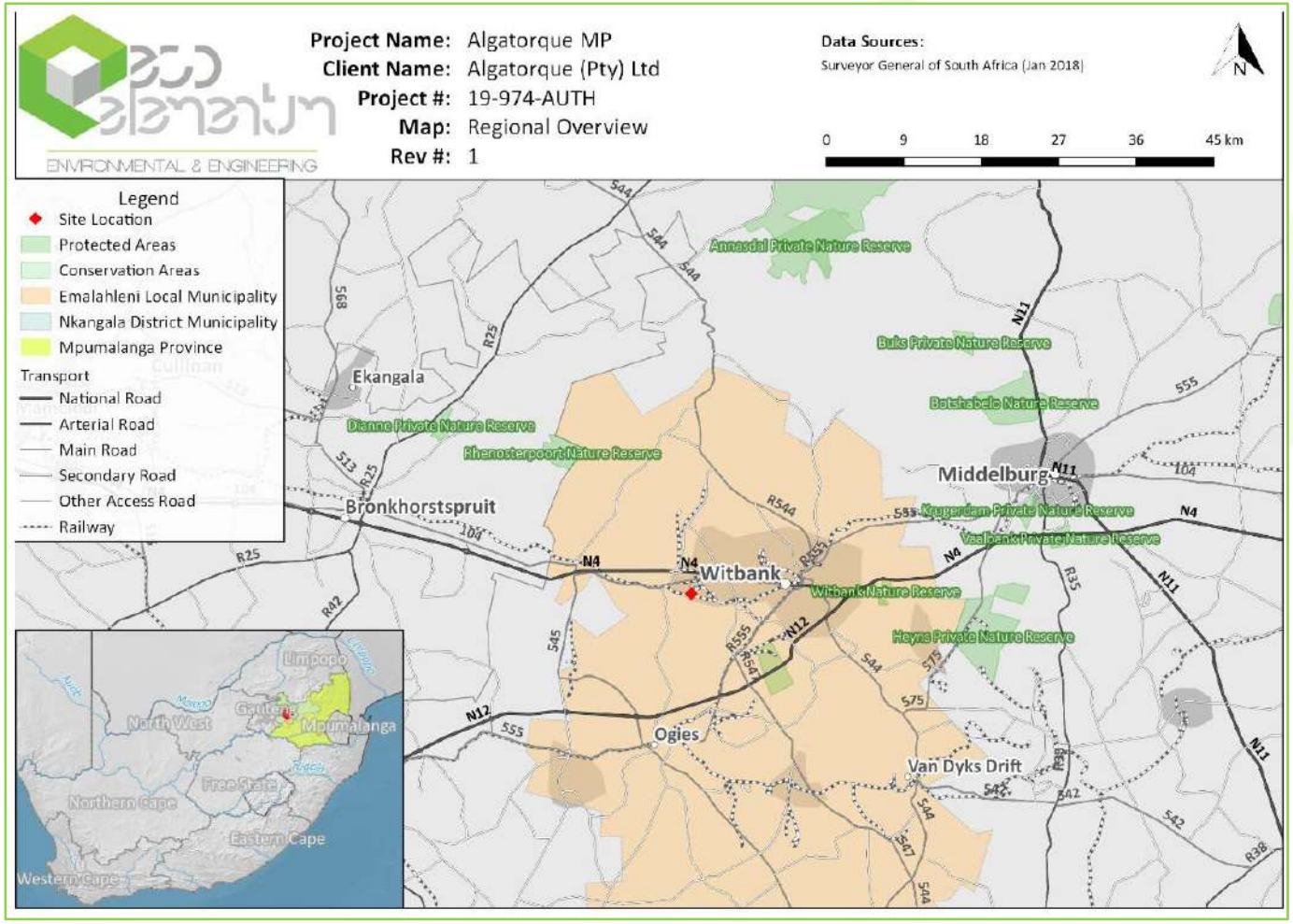


Figure 2: Regional Overview map

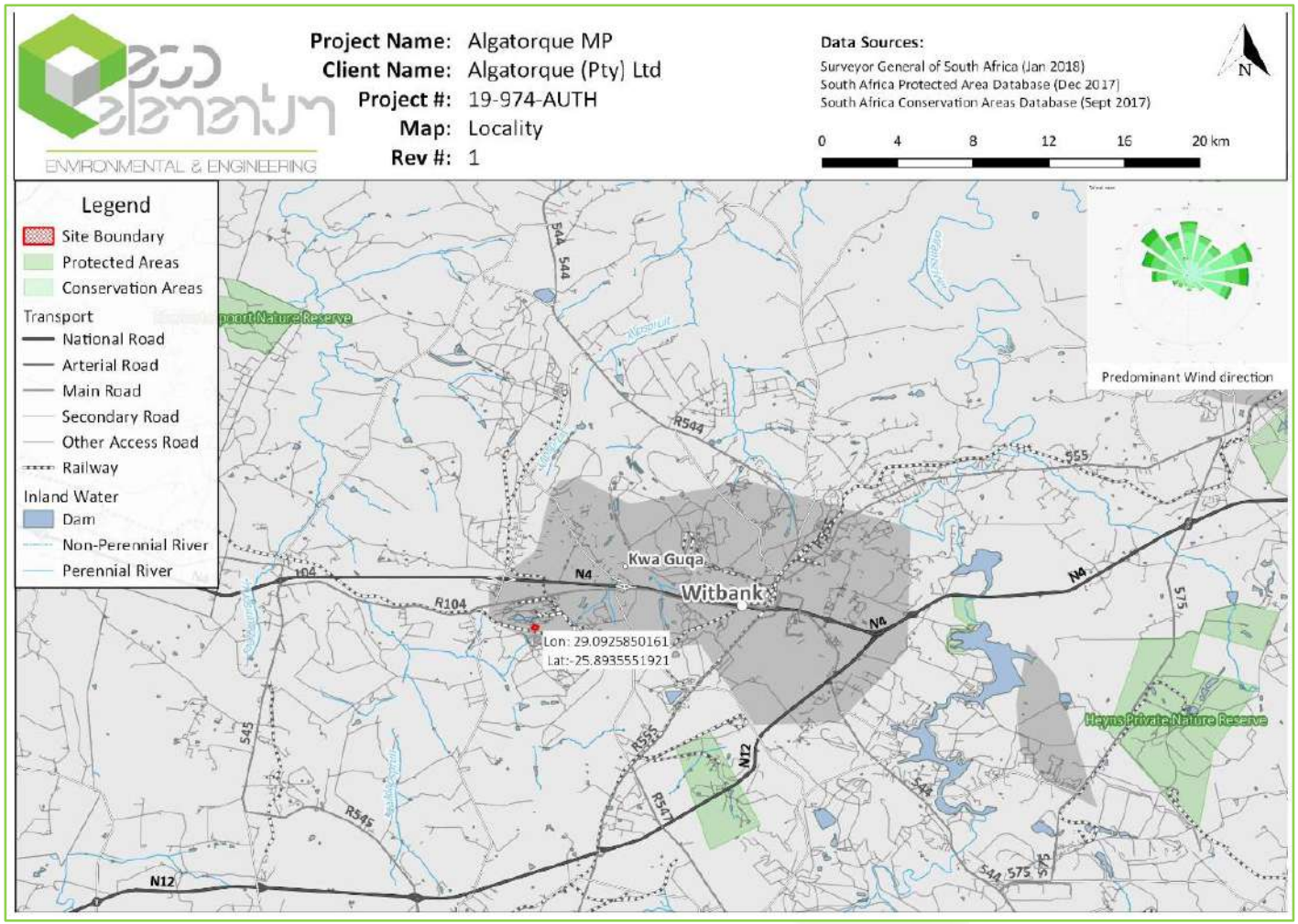


Figure 3: Locality Map

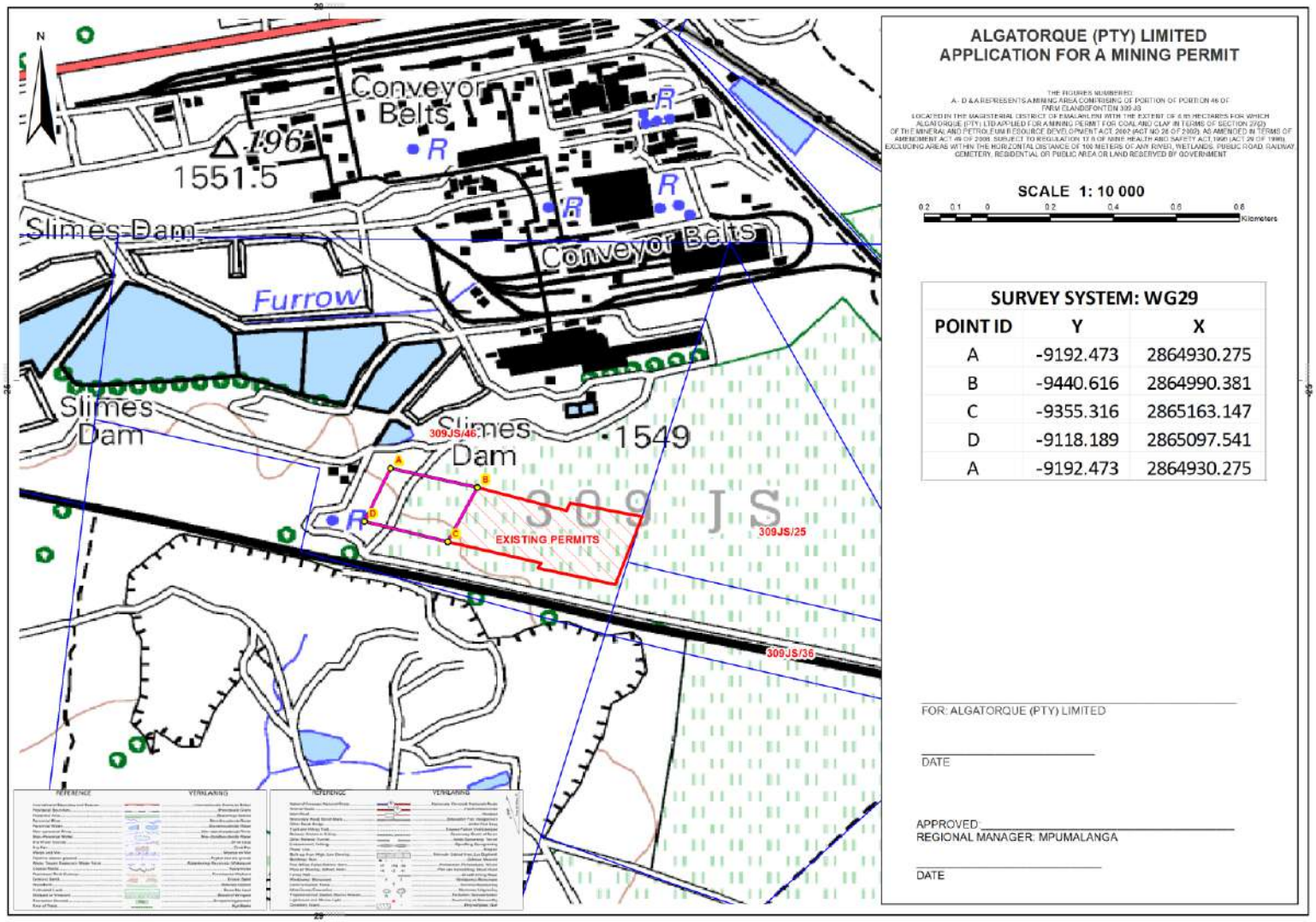


Figure 4: Regulation (2)2 Map

4.4 Description Of The Scope Of The Proposed Overall Activity.

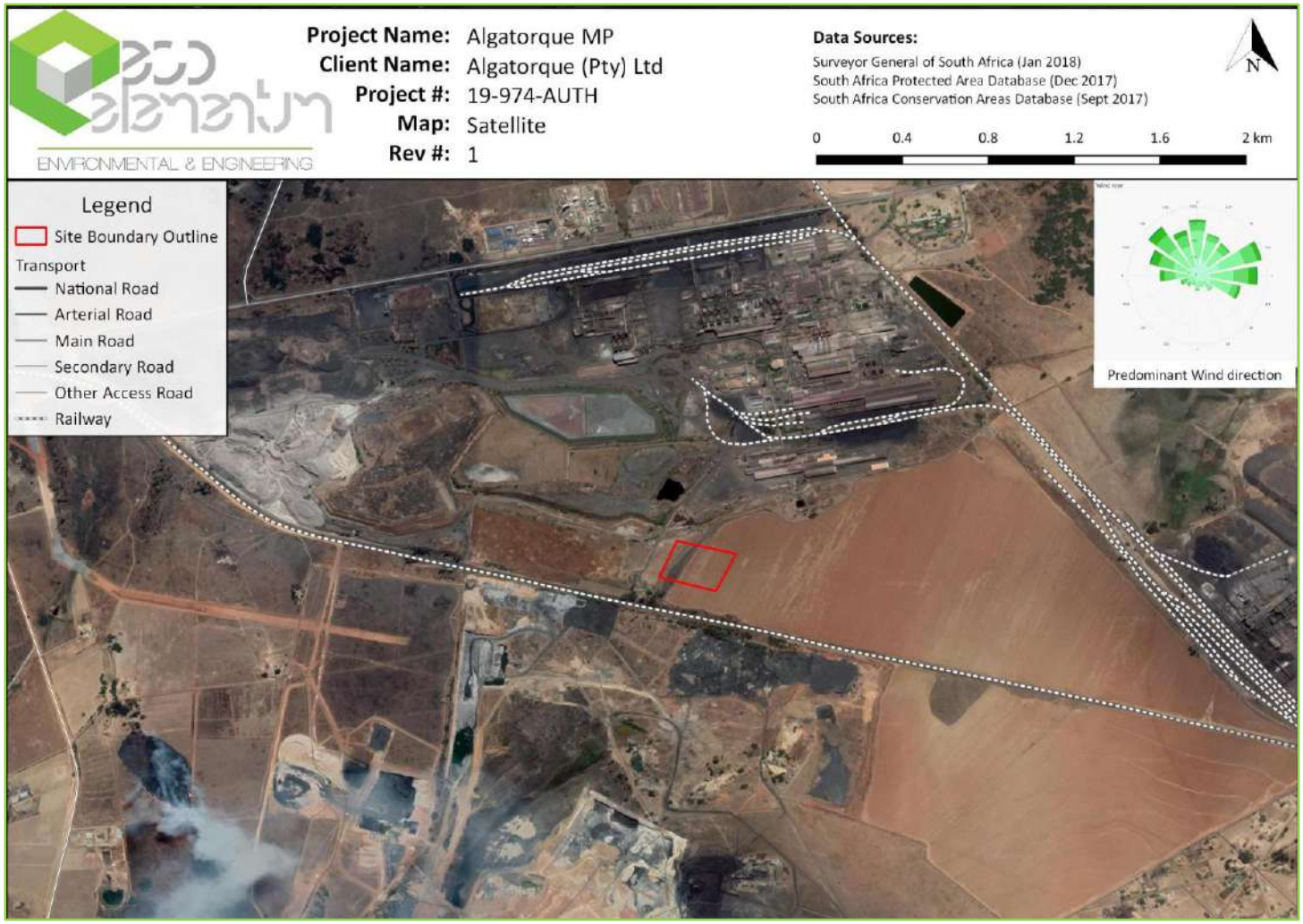


Figure 5: Elandsfontein proposed site – satellite image

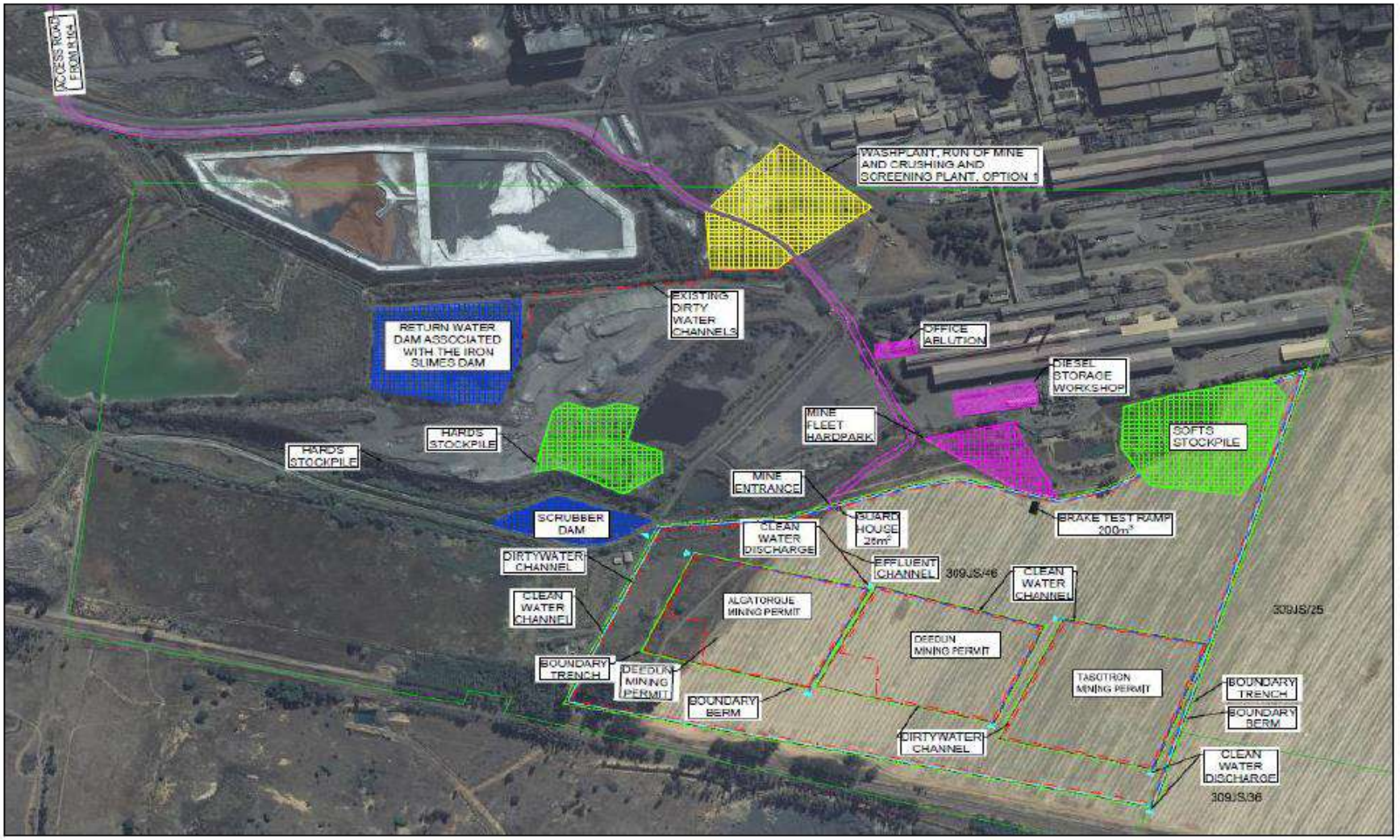


Figure 6: Conceptual site layout

As a summary, the following activities will be carried out and are associated with the proposed Algatorque - Elandsfontein mining permit project:

- Site preparation with topsoil removal;
- Box cut opencast mining with a roll over rehabilitation sequence;
- Hauling, access road, haul road, and road diversion of the road;
- Clean and dirty water separation system;
- Trenching;
- Fencing;
- Drilling and blasting;
- Topsoil, subsoil, overburden, discard and ROM stockpiles;
- Waste management; and
- Mine closure and rehabilitation.

(i) Listed and specified activities

Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) requires, upon request by the Minister that an Environmental Management Plan be submitted and that the applicant must notify and consult with Interested and Affected Parties (I&APs). Section 24 of the NEMA requires that activities, which may impact on the environment must obtain an environmental authorisation from a relevant authority before commencing with the activities. Such activities are listed under Regulations Listing Notice 1 Government Notice (GN) 983, Listing Notice 2 GN 984 and Listing Notice GN 985 (date d 4 December 2014) of NEMA. The proposed prospecting activity triggers:

Please refer to the following table for the details in terms of the listed activities.

Table 10: Listed and specific activities

NAME OF ACTIVITY (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc... etc... etc. E.g. for mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc... etc... etc.)	Aerial extent of the Activity Ha or m^2	LISTED ACTIVITY (Mark with an X where applicable or affected).	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)
The development 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.	50 m^2	X	GNR 983 – Listing Notice 1 Activity 14	n/a
Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development. **Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).**	4.65 ha	X	GNR 983 – Listing Notice 1 Activity 21	n/a
The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— **(i) the undertaking of a linear activity; or** **(ii) maintenance purposes undertaken in accordance with a maintenance management plan.**	4.65 ha	X	GNR 983 – Listing Notice 1 Activity 27	n/a
Roads (roads will be temporary gravel roads, not exceeding 3,5 m in width).	Approx. 20 000 m^2	-	-	-
Temporary Camp Site.	Approx. 100 m^2	-	-	-
Site Clearance	Less than 20 ha	X	GNR 983 – Listing Activity 27	-
Hydrocarbon Storage.	Less than 30 m^3	-	-	-

(ii) Description of the activities to be undertaken

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

SITE PREPARATION

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

- provide sufficient stable topsoil material for rehabilitation (in this case concurrently as mining continues);
- optimise the preservation and recovery of topsoil for rehabilitation;
- identify soil resources and stripping guidelines;
- identify surface areas requiring stripping (to minimise over clearing);
- manage topsoil reserves to not degrade the resource;
- identify stockpile locations and dimensions; and
- identify soil movements for rehabilitation use.

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

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

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

Based on the final void having a considerable surface area relative to the total area mined and topsoil being recovered from all areas to be mined, it is considered that a topsoil surplus over the life of mine will occur. However, the Project topsoil budget will be reviewed following completion of topsoil recovery from the deeper profiles within the Algatorque – Elandsfontein project.

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

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

BOX CUT OPENCAST MINING WITH A ROLL-OVER REHABILITATION SEQUENCE

The most economical method of coal extraction from coal seams depends on the depth and quality of the seams, and also the geology and environmental factors of the area being mined. The impact of coal mining processes is generally differentiated by whether they operate on the surface or underground. In this instance the mineral will be won by means of opencast surface mining methods as indicated in the figures above. Coal is mined only where technically feasible and economically justifiable. Evaluation of technical and economic feasibility of a potential mine requires consideration of many factors: regional geologic conditions, overburden characteristics, coal seam continuity, thickness, structure, quality, and depth; strength of materials above and below the seam for roof and floor conditions; topography (especially altitude and slope); climate; land ownership as it affects the availability of land for mining and access;

surface drainage patterns; ground water conditions; availability of labour and materials; coal purchaser requirements in terms of tonnage, quality, and destination; and capital investment requirements.

The Algatorque - Elandsfontein project operation proposes to use the rollover mining and rehabilitation method. Roll-over opencast mining is typical of small scale opencast mining operations in the Mpumalanga coal fields. The proposed mining entails only opencast methods for this stage of the project. The open-castable reserves will be mined in conventional truck and shovel mining methods using the lateral roll-over technique in a single direction. This would mean mining from the one side of the development footprint in a linear fashion towards the opposite side while backfilling and rehabilitating the area that has already been mined, thus creating the effect that the mining cuts are rolling over in a single direction. Sustainable development applied to mining works necessarily includes rehabilitation with the aim of either restoring the land to its original use, or eliminating or reducing adverse environmental impacts to a long-term acceptable condition. The process is driven primarily by legislation which ensures that the mine owner must comply with the intention of achieving those end conditions, which are defined in broad terms by guidelines.

An initial box cut as well as an access pit ramp into the box will be constructed first. A double box cut has been planned to enable mining in both a northerly and southerly direction, thereby increasing the face length and production rates. The ramp will have a maximum slope of 12˚. Topsoil from the initial box cut will be stripped, where after the subsoil and hard overburden will be drilled, blasted and removed. Topsoil, subsoil and hard overburden will each be stockpiled separately. After removal of the coal from the initial box cut, subsequent box cuts will be made and the initial void filled with the stockpiled hard overburden, subsoil and finally topsoil which will then be seeded and grasses to re-establish vegetation coverage to grazing capability.

The primary procedures that will be implemented during the mining process include;

- Removing and stockpiling of topsoil;
- Construction of the pollution control evaporation dam(s) also used for dust suppression;
- Trenching around the mining footprint to ensure storm water is diverted away from the open cast pit;
- Blasting, stripping and stockpiling of overburden;
- Excavation of the initial strip of the box-cut;
- Excavation of coal (ROM);
- Crushing, screening and stockpiling coal; and
- Backfill rehabilitation concurrently as mine progress forward.

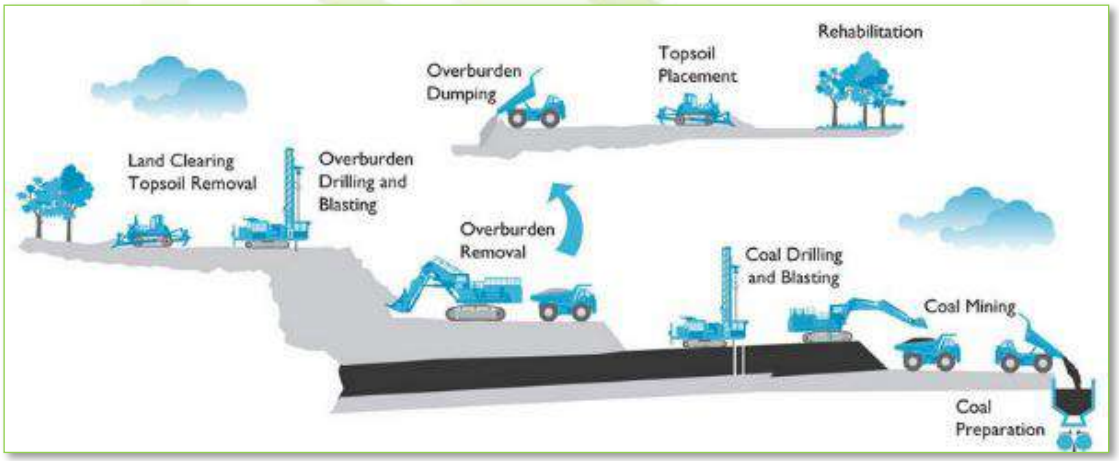


Figure 7: Typical coal surface mining opencast sequence indicating primary procedures

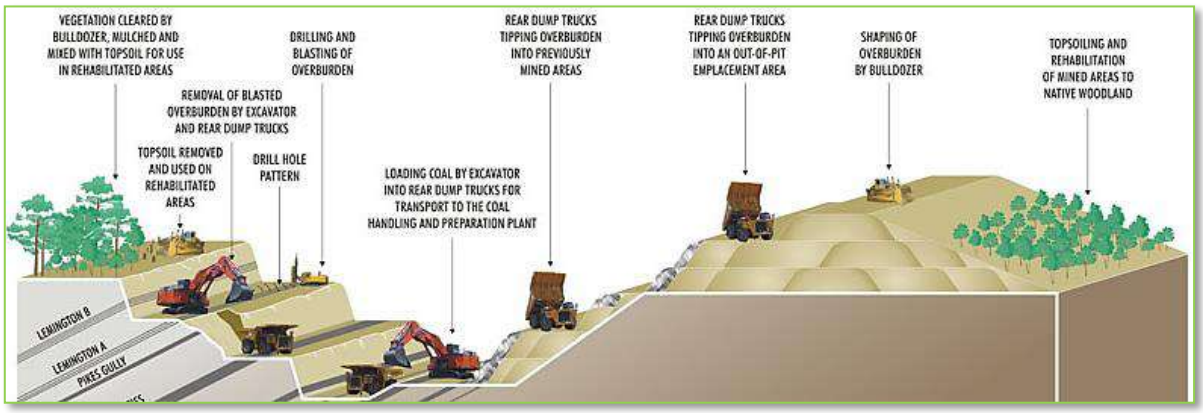


Figure 8: Typical coal surface mining opencast sequence indicating rollover backfill rehabilitation methodology

The figure below indicates the typical mining sequence and can be summarized as; initial removal of the overburden which will then be stockpiled behind the mining area to ensure it can be replaced back in the initial box cut. The physical mining of the coal seam follows which is then placed into trucks to be taken to the crushing and screening facility. From here discard coal will be extracted and replaced in the bottom of the opencast pit, while the product will be taken to the weighbridge via trucks and then removed off site. The overburden is replaced back into the pit as mining progress leaving a minimum area open at a single time. The topsoil which was stripped and stockpiled separately before mining commenced is then replaced and per the land capability specialist report prepared to the optimal composition to ensure the field can be restored to grazing land as was the pre-mining land use.

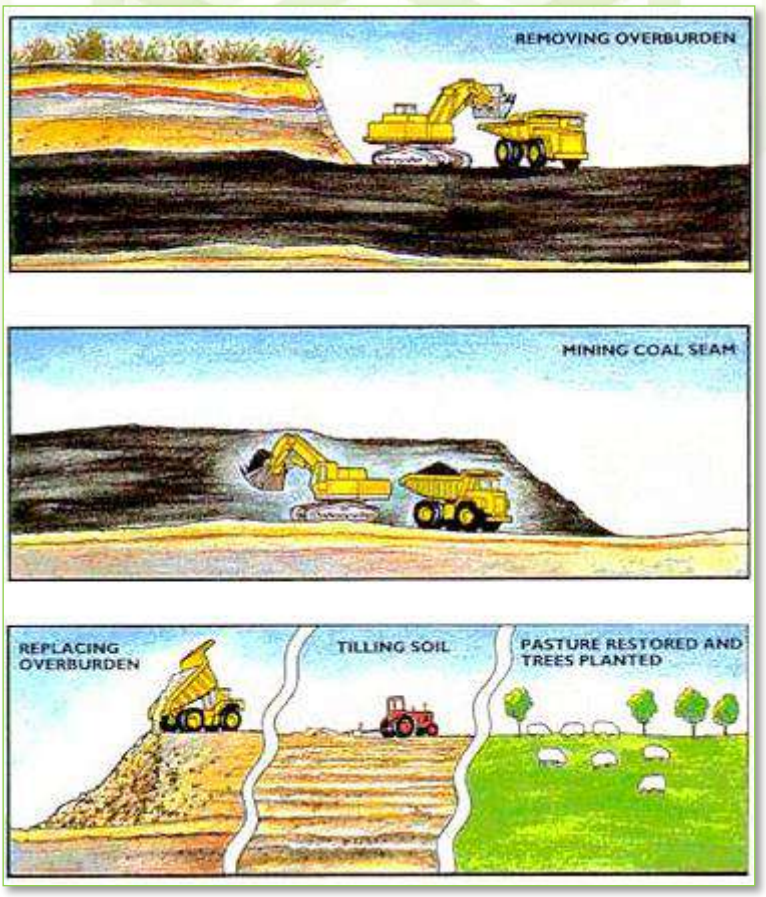


Figure 9: Opencast Coal Mining Sequence

The sequence in the following figure can serve as a further illustration of the anticipated project. Step (1) is where the topsoil will be stripped and stockpiled separately. After this drilling takes place to enable blasting of the overburden. During step (2) the overburden is then removed by conventional truck and shovel methodology and stockpiled separately within the mining footprint. Step (3) includes the removal of under burden which is typically associated with more hard material than fine material (typical of overburden) and is usually the sandstone layer on top of the coal seam. This material is also stockpiled separately. During step (4) physical extraction of coal or winning of the mineral takes place and step (5) indicates the conventional truck and shovel methodology of removing the material.

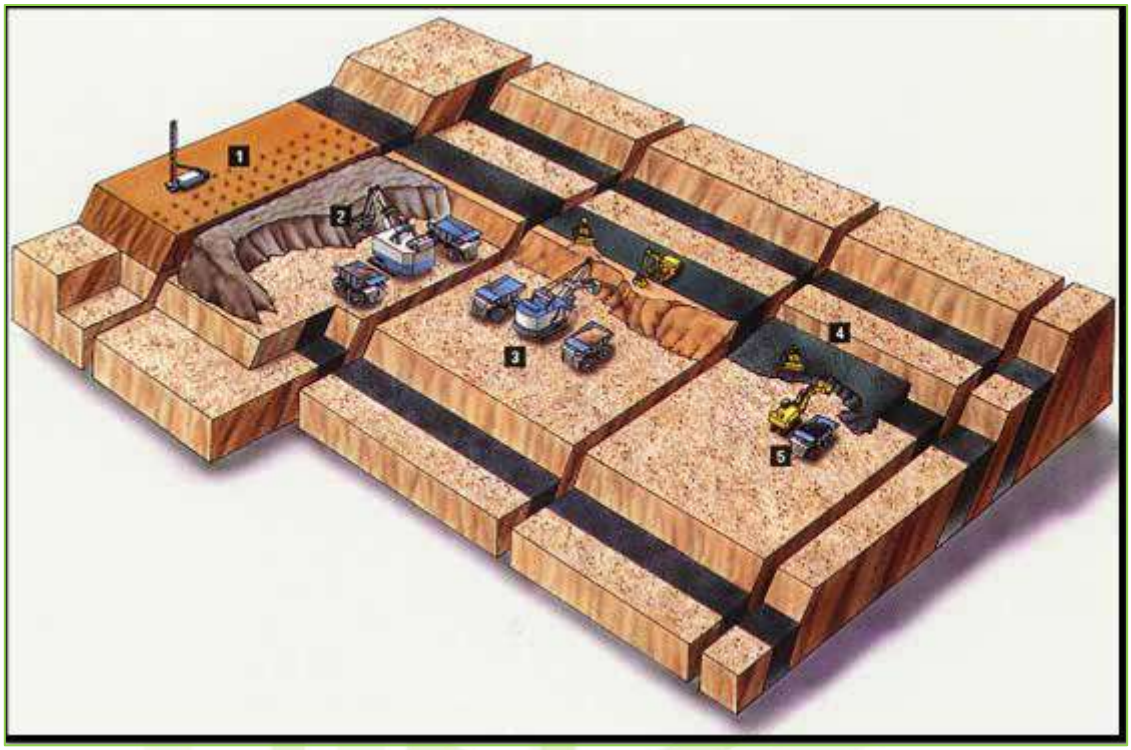


Figure 10: Opencast coal mining typical progressive steps (No 1- 5)

The following basic principles of rehabilitation form the basis of the roll-over mining methodology that entails concurrent rehabilitation as mining progress:

- Prepare a rehabilitation plan prior to the commencement of mining which includes detailed surveys of the pre-mining environment to ensure the landscape can be restored to the pre-mining environment as close as feasible;
- Agree on the long-term post-mining land use objective for the area with the relevant government departments, local government councils and private landowners. The land use must be compatible with the climate, soil, topography of the final landform and the degree of the management available after rehabilitation;
- Progressively rehabilitate the site, where possible, so that the rate of rehabilitation is similar to the rate of mining;
- Prevent the introduction of noxious weeds and alien vegetation (typical to areas of disturbance);
- Minimise the area cleared for mining and associated infrastructure to only what is ultimately required and no additional clearance of unnecessary areas;
- Reshape the land disturbed by mining operations so that it is stable, adequately drained and suitable for the desired long-term land use;
- Minimise the long-term visual impact by creating landforms which are compatible with the surrounding landscape;
- Reinstate natural drainage patterns disrupted by mining wherever possible;
- Minimise the potential for erosion by wind and water both during and following mining;
- Characterise the topsoil and retain it for use in rehabilitation. It is preferable to reuse the topsoil immediately rather than storing it in stockpiles. Only discard if it is physically or chemically undesirable, or if it contains high levels of weed seeds or plant pathogens;
- Consider spreading the cleared vegetation on disturbed areas;
- Deep rip compacted surfaces to encourage infiltration, allow plant root growth and key the topsoil to the subsoil, unless subsurface conditions dictate otherwise;
- Ensure that the surface one or two metres of soil is capable of supporting plant growth;

- If topsoil is unsuitable or absent, identify and test alternatives substrates, e.g. overburden that may a suitable substitute after addition of soil improving substances;
- Re-vegetate the area with plant species consistent with the post mining land use; and
- Monitor and manage rehabilitation areas until the vegetation is self-sustaining.

MOBILE CRUSHING AND SCREENING OF ROM COAL

The proposed project entails to make use of a mobile crushing and screening facility to ensure it can be easily moved and also reduce the footprint required for rehabilitation post life of mine. No washing of coal on site is proposed as the final product from the mobile crushing and screening facility will be taken away off site, and therefore significantly reduce the environmental impacts associated with washing of coal. The image below is a typical representation of a crushing and screening plant with associated activities. Coal from the ROM stockpile is loaded into trucks and then hauled to a feed din from where it is fed via a conveyor into the crushing and screening facility. Coal is then stockpiled according to the required top sizes from where it can be loaded transported to the weighbridge once again via truck hauling, weighed and taken off site. The process in itself is quite simple and straight forward as no washing of the coal will take place on site.

ACCESS AND HAUL ROADS CONSTRUCTION

The mine access road will lead off one of the dirt roads serving the purpose to only give farmers access to their properties. The dirt road will be upgraded to the applicable standards which includes a gravel road leading into the mine. The road will be used to access the mine offices, workshop complex, and mining area (including mobile crushing and screening facility with ROM stockpiles). Coal transportation trucks will also use this road to enter and exit the mine premises, including travelling to the weighbridge. The weighbridge will be a 22 m x 3 m, 70 ton weighbridge adjacent to the new access road. Several temporary haul roads will also be constructed to access the mine area as well as the ROM stockpiling area. These haul roads will be used by mine personnel to access the mine areas for their day to day duties and the dump trucks will use the road for haulage of coal to the ROM stockpiles. The roads will be constructed to have a width of 8 m while dust suppression using water carts with an added chemical dust suppressant (environmentally friendly) product will be employed.

In order to maintain a gravel road properly operators must clearly understand the need for three basic items:

- A crowned driving surface,
- a shoulder area that slopes directly away from the edge of the driving surface, and
- a ditch.

The shoulder area and the ditch of many gravel roads may be minimal. This is particularly true in regions with very narrow or confined right-of-ways. Regardless of the location, the basic shape of the cross section must be correct or a gravel road will not perform well, even under very low traffic. The figure below illustrates the components of a typical cross section of a gravel road that must be considered.

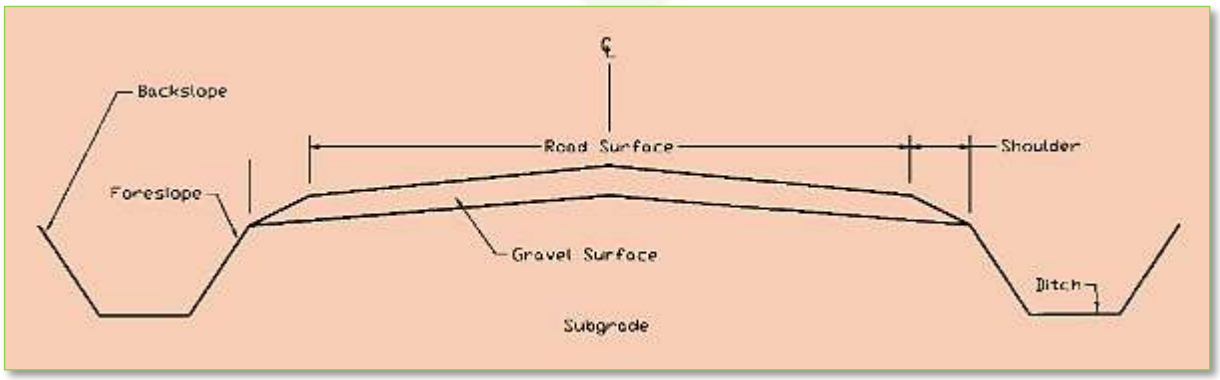


Figure 11: The components associated with a gravel road section

Gravel roads tend to rut more easily in wet weather. Traffic also tends to displace gravel from the surface to the shoulder area and even to the ditch during dry weather. Managers and equipment operators have the continual responsibility of keeping the roadway properly shaped. The shape of the road surface and the shoulder area is the equipment operator's responsibility and is classified as routine maintenance. Keeping the fore-slope and ditch established and shaped is often the maintenance operator's responsibility as well. The main aim of the design and associated maintenance is to keep water drained away from the roadway. Standing water at any place within the cross section (including the ditch) is one of the major reasons for distress and failure of a gravel road.

There is sometimes a need for specialized equipment to do major reshaping of the cross section, especially in very wet conditions. However, the operator of routine maintenance equipment must do everything possible to take care of the roadway. The recommended shape of each part of the cross section will be considered during road planning. When a gravel road is maintained properly, it will serve low volume traffic well. Unfortunately, most gravel roads will fail when exposed to heavy hauls even when shaped properly. This is due to weak subgrade strength and marginal gravel depths which are often problems with gravel roads. The low volume of normal traffic does not warrant reconstruction to a higher standard. However, improper maintenance can also lead to very quick deterioration of a gravel road, especially in wet weather. The maintenance equipment operators must always work at maintaining the proper crown and shape. During mining extra maintenance and wetting of the roads to ensure minimal dust generation will be required.

SEMI TEMPORARY SITE AND SECURITY OFFICES

The site offices for the project, including a small security hut at the entrance of the mining area next to the main entrance road will consist of container-type offices that is commercially available as off the shelve products, as illustrated in the image below. This ensures minimal construction requirements on site and also minimal footprint. Keeping the disturbance area minimal and ensuring ease of mine closure and rehabilitation after life of mine make the temporary offices ideal, especially considering the short duration of the proposed activities and requirement of these offices. The visual impact associated with the structures will also be considered and natural colour paint will be applied to the structures to blend in with the background features.

Storm water management around the facilities will also be considered and the necessary waste receptacles will be in place for general domestic waste separation and management. Waste skips will be used for waste collection and any domestic waste will be removed from the site to a licensed waste facility by a registered and approved contractor. No housing facilities will be required as personnel will not be allowed to reside on site for the duration of the project but instead live off site from the mine. The security will however be present 24hours a day on the mine for the duration of the project and even longer during the mine closure and rehabilitation period.

Figure 12: Typical semi temporary site offices and security office

SEMI TEMPORARY SANITATION AND CHANGE HOUSE

Similar to the structure indicated in the section above, will the semi temporary sanitation and change house also be container type facilities which can easily be brought to site and also removed after life of mine. For the change house and ablution facility a septic tank system will be implemented which is temporary of nature and can also be decommissioned easily. The septic tank system will ensure a 'honey-sucker' type sewage removal vehicle can remove and dispose of sewage at an appropriate facility off site. This ensures no major construction and approval is required for a full scale sewage treatment facility. Mobile chemical toilets will also be used where necessary and supplied by an approved contractor whom 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. The current expectation is that 50 employees will require 45 liter per person per day (litre pp/day) amounting to 2 460 litres per day.

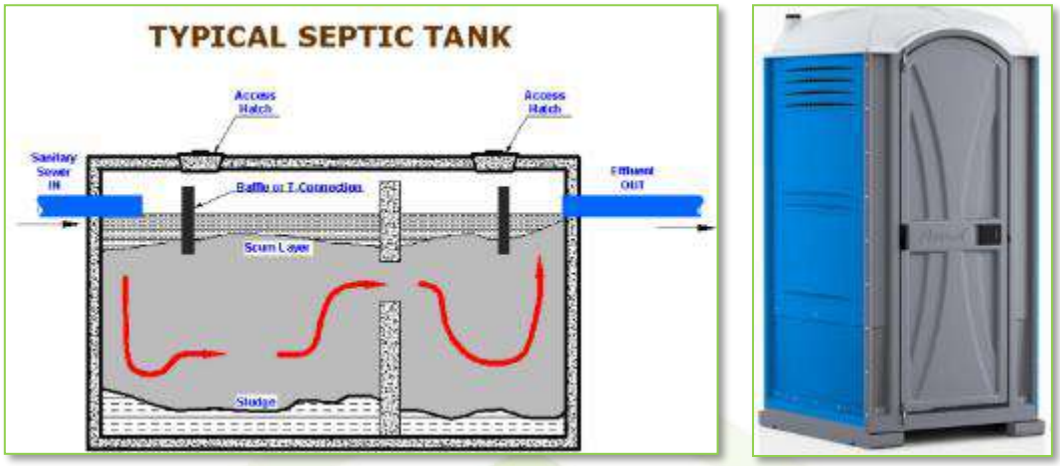


Figure 13: Typical septic tank cross section and chemical toilet illustration

MOBILE FUEL STORAGE

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

Figure 14: Typical mobile fuel storage trailer with bunded tray

POLLUTION CONTROL FACILITY/DAM (EVAPORATION AND DUST SUPPRESSION USAGES)

Water is typically the prime environmental medium (besides air) that is affected by mining activities. Mining adversely affects water quality and poses a significant risk to South Africa's water resources. Mining operations can further substantially alter the hydrological and topographical characteristics of the mining areas and subsequently affect the surface runoff, soil moisture, evapo-transpiration and groundwater behaviour. Failure to manage impacts on water resources (surface and groundwater) in an acceptable manner throughout the life-of-mine and post-closure, on both a local and regional scale, will result in the mining industry finding it increasingly difficult to obtain community and government support for existing and future projects. Consequently, sound management practices to prevent or minimise water pollution are fundamental for mining operations to be sustainable.

Pro-active management of environmental impacts is required from the outset of mining activities. Internationally, principles of sustainable environmental management have developed rapidly in the past few years. Locally the Department of Water Affairs (DWA) and the mining industry have made major strides together in developing principles and approaches for the effective management of water within the industry. This has largely been achieved through the establishment of joint structures where problems have been discussed and addressed through co-operation.

The National Water Act (Act 36 of 1998) requires that the dirty water originating from the mining operations be kept separate from the clean water systems outside and on top of the mining area. Therefore, in-pit water storage cannot be considered for this application and the additional requirements of the NWA will also need to be complied with. Data generated during the geohydrological investigation as part of the Water Use License Application phase will guide the civil engineering team to accurately size and design the pollution control facilities, in this case lined dams above ground, to be used as evaporation dams and also for water abstraction for dust suppression carts on the mine.

The main concern regarding coal mining is the correct treatment and disposal of water. Sufficient provision will be made in the form of trenches for surface water runoff diversion away from the mining area, to ensure clean and dirty water separation takes place. This way contamination of water can be minimised. Water that has been contaminated and in-pit ingress water will be pumped to above ground pollution control dams which will be lined to ensure no ground water infiltration can take place. The pollution control dam(s) will be constructed, fenced and notices erected to warn the public with regards to safety, at the proposed mining area for the storage of dirty water. The pollution control dam will be designed by a registered professional civil engineer and have capacity to handle all dirty water emanating from the dirty water areas on the mining area. An integrated Water Use License Application (IWULA) covering the mine related water uses will be submitted to the Department Water Affairs.

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

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

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

The design, operation and closure of PCDs are important aspects in the successful operation of a mine, given the inherent safety and environmental risks posed by structural failure, spillage or overtopping of these facilities. It is thus important that practitioners within this field have a good understanding of the management of water, surface and groundwater, when designing and/or operating PCDs. To this end, the Department: Water and Sanitation (DWS) have prepared an activity-related Best Practice Guideline to focus on mine water PCDs which will be adhered to during the design and construction of the pollution control dam(s).

Best practice for mine water PCDs is developed from a combination of the following requirements:

- Legislative requirements;
- Industry norms and generally accepted good practices;
- Technically and environmentally sound design practices;
- Life cycle planning for the PCD;
- Management of hazards and risks;
- Effective water resources management, both for the mine site and within the regional Catchment Management Plan, and
- Other factors, such as site specific conditions.

Effective design, operation, management and closure of PCDs are ensured through adherence to the above requirements. The image below is an illustration of the typical pollution control dam that will be constructed.

Figure 15: Lined pollution control dam (PCD) illustration

Best Practice water management for PCDs will be based on the following general principles:

- All PCDs will comply with the legal and regulatory conditions within South Africa.
- Worst-case conservative assumptions will be made in instances where the quality of water to be contained within the PCD cannot be established with certainty.
- PCDs are to be sited, sized and operated to maximise the opportunities for water reuse and reclamation and to minimise the impacts on the water resource.
- Designs will adhere to the generally accepted principles of sustainable development and Best Practice Environmental Option (BPEO), as defined in section 2 of NEMA, by integrating social, economic and environmental factors during the planning and implementation and closure phases.
- Technical studies and the design of PCDs will be undertaken by suitably qualified personnel (registered civil engineers).
- The full life cycle of the PCD will be considered in the design, operation and closure of PCDs.
- Designs will adopt a holistic approach, including:
  - Sustainability;
  - Full life cycle of the PCD;
  - Water quantity and quality, and
  - Surface water and groundwater.

The siting of pollution control dams is critical in order that it maximizes the containment of all polluted water. The pollution control dam design specifications are as set out below. It is a requirement that pollution control dams do not leach any of the polluted contents into the groundwater and is therefore required to be lined in order to limit seepage. It is proposed that a 1,5mm thick HDPE lining be used to line the dam basin. The lining will be covered by a 200 mm thick soil backfill.

CLEAN AND DIRTY WATER SEPARATION

The clean and dirty water separation on the mine has been discussed to an extent under relevant sections where applicable, although, a detailed surface water management plan will be drawn up as part of the Water Use License Application 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.

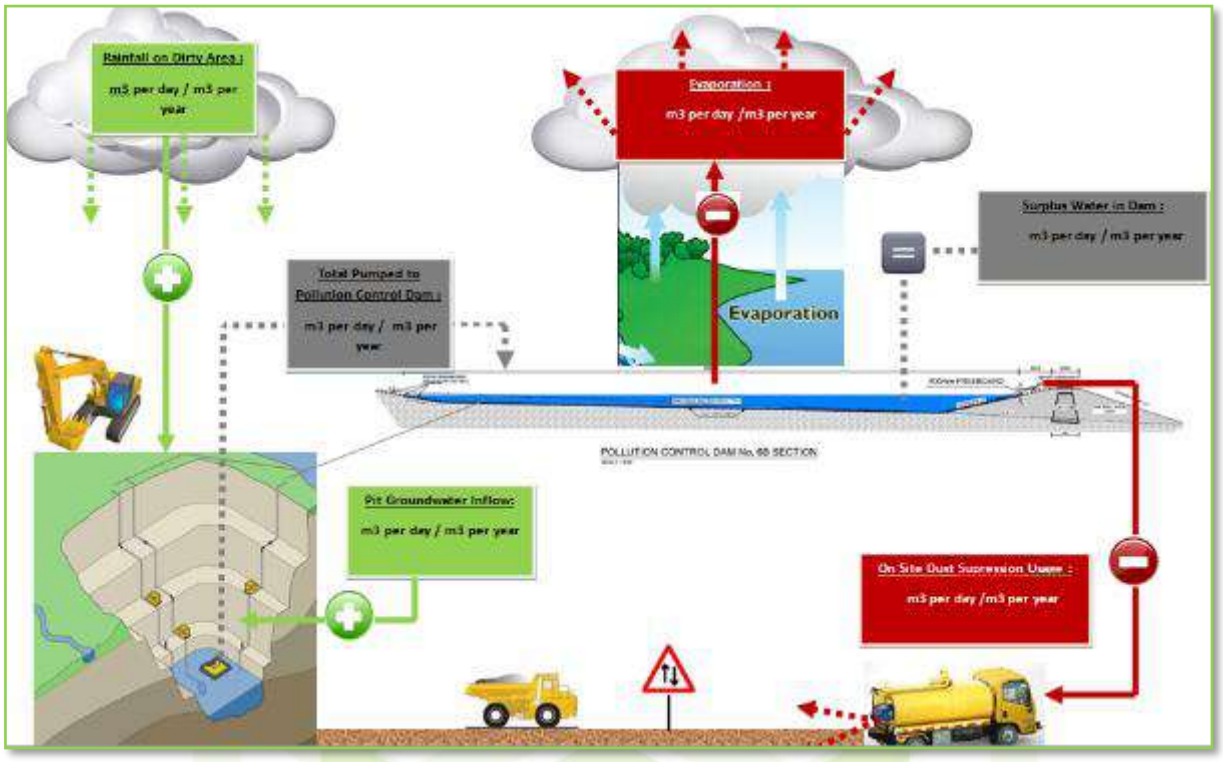


Figure 16: Typical water balance considerations during the design of a clean and dirty water separation system

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

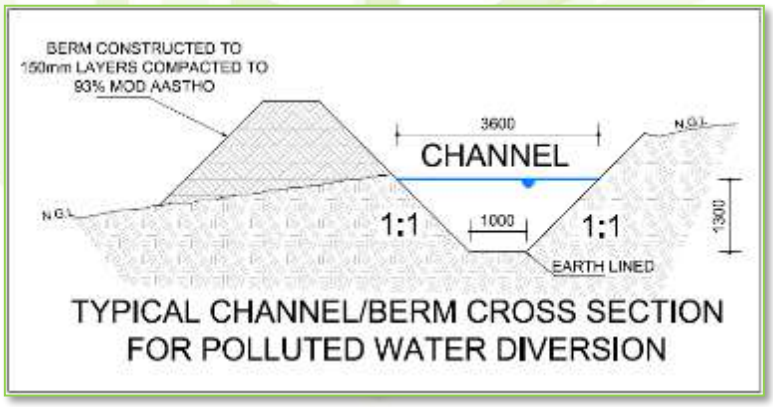


Figure 17: Typical channel/berm cross section for polluted water diversion

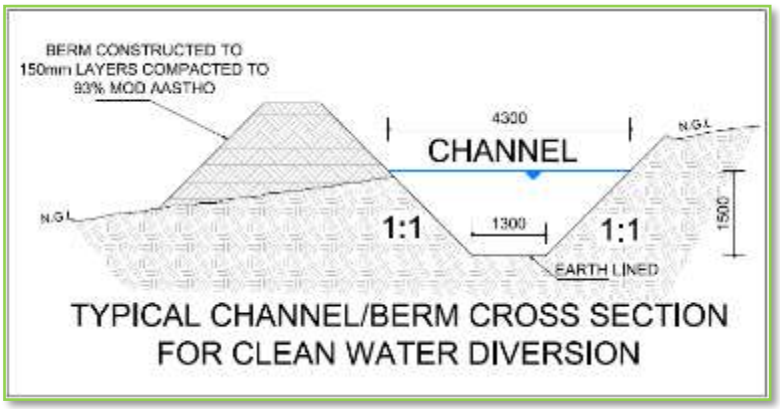


Figure 18: Typical channel/berm cross section for clean water diversion

FENCING

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

Figure 19: Typical mine fence signage

STAFF AND VISITORS PARKING

Designated parking areas will be constructed by compaction of the subsoil after removal, storage and preservation of the valuable layer of topsoil. Uncovered parking areas for mine fleet vehicles will be constructed in a separate area to the staff and visitors parking as a safety measure as the mine fleet vehicles are very large and pose a safety hazard. The staff and visitors parking will be separate from the latter and possibly covered. Storm water management control around these areas will be implemented while the necessary signage will be erected to ensure optimal safety while reverse parking will be implemented at all parking bays. The necessary waste receptacles as well as oil spill kits will be provided at these sites in case of accidental spillage or leakage of hydrocarbon fuel / oil / greases from the vehicles.

DRILLING AND BLASTING

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

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

The risks associated with blasting have been identified and include blast and potential fly-rock. There is a limited risk of air blast due to mining activities resulting in property damage. Blasting controls will include monitoring of blast design, powder factors and stemming levels to minimise the effects of air blast and ground vibrations. The mining area will be evacuated prior to blasting to a radius of >500 m while the adjacent property owners will also be informed accordingly prior to blasting events. Eskom has indicated that they also need to be informed well in advance of blasting events as several power lines transect the mining footprint that need to be protected.

A blast management plan will be implemented with the objectives of;

- Ensuring all relevant statutory requirements and company Policies and Standards are met;
- Managing and minimising the impact of blasting from mining operations on the environment and nearby residences;
- Maintaining an effective response mechanism to deal with issues and complaints; and
- Ensuring the results of blast monitoring comply with applicable criteria.

TOPSOIL, SUBSOIL, OVERBURDEN, DISCARD AND ROM STOCKPILES

Positions of the topsoil, subsoil and overburden stockpiles have been indicated on the mine plan. All topsoil, subsoil and overburden material will be removed during the mining operation and stockpiled separately for the purpose of backfill rehabilitation as discussed earlier. The stripping, handling and preservation of topsoil have also been discussed earlier in this report as a separate chapter due to the importance of topsoil for rehabilitation purposes. The topsoil stockpiles will not exceed a height of six meters which is high enough to reduce leaching impacts of stockpiled topsoil. The subsoil and overburden stockpiles will however exceed this height.

Topsoil will be kept separate from other stockpiles and shall not be used for construction purposes or for maintenance of the access roads. The topsoil shall be adequately protected from being blown away by wind or eroded by the force of water. The subsoil and overburden stockpile areas will cover an area of approximately 2 ha, of which the topsoil will be stripped and stockpiled separately. The hard overburden stockpiles will contain approximately 50m^3 (bulking factor of 1.1) of blasted overburden material.

Stockpiles may be used in some instances to provide visual and noise barriers between the mining operations and neighbouring land users. These stockpiles will be constructed from either overburden or from soil and will be in place for the life of mine and will be top-soiled and grassed immediately after their construction. Topsoil removal will take place by means of excavators and hauled with Articulate Dump Trucks (ADT's).

The ROM stockpiling area will be constructed to cover an area of approximately 1ha and will not contain more than 10 000 tons of ROM coal at one period. The stockpile will also not exceed a height of 12 m. The stockpile will be used to load coal from the mining area as well as to cater for any ceases in production resulting from breakdown or disruption of workings. Dirty water emanating from this area will be diverted to the pollution control dam area.

A weighbridge will be constructed adjacent to the ROM coal stockpile area on a concrete slab footprint. The exact design will be made available once the external service providers have submitted their designs and a decision have been made regarding the procurement of a weighbridge. Below, cross sections of three typical weighbridge designs have been provided for clarification purposes. The impacts associated with these three structures are very closely related and would not significantly change the impact rating or influence the final outcome of the EIA which ever design is implemented.

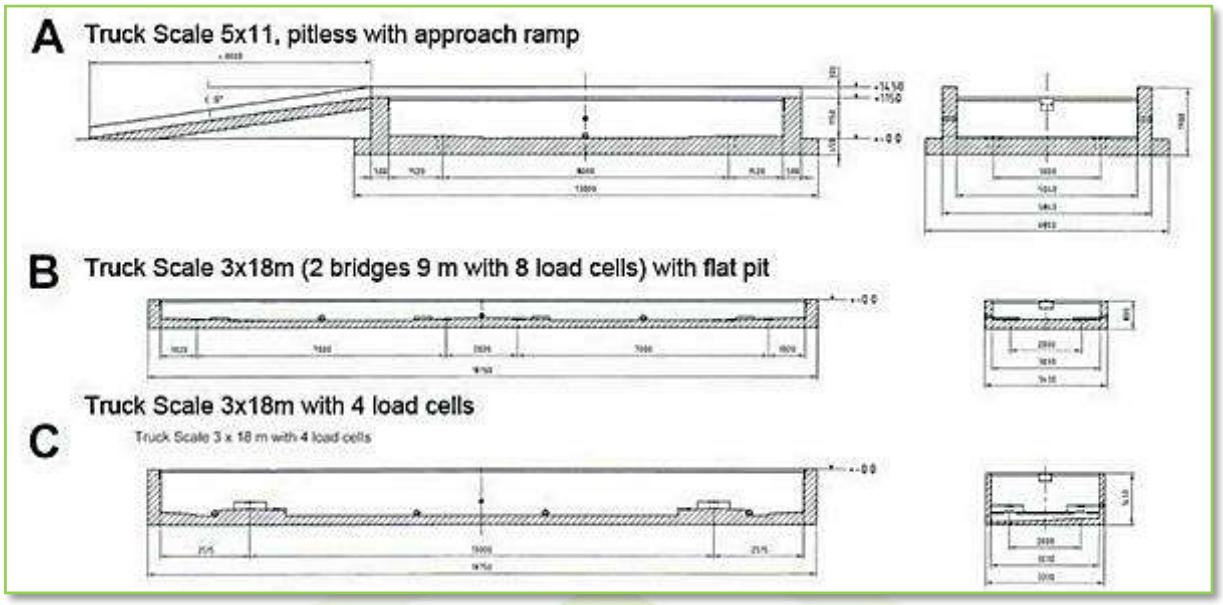


Figure 20: Three potential alternative weighbridge designs and cross sections

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. The overall aim of the project is to keep the carbon footprint of the entire project as small as possible. This will include the use of "green" products as far as possible as well as the reclamation of all building rubble during the construction phase.

Several waste streams are likely to originate from the activities associated with day to day activities in the workplace. Some of these waste streams may not be hazardous, but the majority may contain a component(s) that may need special treatment. The nature of these waste streams may also vary due to composition and physical form. In order to make informed decisions on determining the appropriate waste management options to handle, treat and dispose of waste, the different waste streams must be identified in terms of hazardous and non-hazardous wastes.

Waste streams can be categorised into 6 (six) different streams, based on similar health and environmental concerns namely:

- ***Inorganic wastes*** – acids, alkalis, cyanide wastes, heavy metal sludges and solutions, asbestos wastes and other solid residues.
- ***Oily wastes*** – primarily from the processing, storage and use of mineral oils.
- ***Organic wastes*** – halogenated solvents residues, non-halogenated solvent residues, polycarbon based (PCB) wastes, paint and resin wastes.
- ***Putrescible Organic Waste*** – wastes from production of edible oils, slaughter houses, tanneries and other *animal based products.*
- ***High Volume / Low Hazard Wastes*** – waste based on their intrinsic properties present relatively low hazards but may pose problems due to high volumes such as fly ash from power plants.
- ***Miscellaneous Wastes*** – infectious waste from diseased human/animal tissue, redundant chemicals, laboratory wastes and explosive wastes from manufacturing operations or redundant munitions.

The following shall apply to the temporary storage of waste at source:

- The employer shall provide adequate and appropriate containers / receptacles for the temporary storage of waste at source;
- Adequate containers must be available to store different types of waste separately to allow for recycling and disposal per the integrated waste management plan;
- Dedicated storage areas for various types of waste must be allocated and clearly demarcated;
- Waste collected at source shall be collected on a daily basis;

- Waste must be stored in such a manner that it can be safely accessed and loaded;
- Should waste be stored in containers, drums or skips care must be taken that:
  - Waste types (special vs. controlled vs. general waste) are not mixed.
  - Waste is not kept in a corroded or worn container.
  - The container is secure so as to prevent accidental spillage or leakage.
  - All waste skips and containers are labelled with their contents.
  - Skips or containers do not overflow.
  - Skips for special waste is always covered.
  - Skips for controlled waste is covered skips wherever possible.
- Waste must be kept in such a way as to prevent it falling while in storage or while it is being transported;
- Waste must be protected from scavenging by people and animals;
- Do not dispose of (burn, bury or treat) waste on site;
- Collection of waste must be scheduled and the site/location manager must be notified beforehand of collection times and type of waste to be collected; and
- Implement dust suppression measures, such as wetting of access routes and accumulated controller waste.

4.5 Policy and Legislative Context

Table 11: 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 COMPLIY 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).	The project requires a Mining Permit authorisation from the Department of Mineral Resources.	A mining permit was lodged with the (SAMRAD) DMR on 26 February 2020.
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	The project requires a mining permit authorisation from the Department of Mineral Resources.	An Application for Environmental Authorisation will be submitted to the Mpumalanga DMR.
NEMA Environmental Impact Assessment (EIA) Regulations, 2014.	This Basic Assessment and Environmental Management Plan to be conducted. Specialist environmental information of the project area will be assessed. Mitigation measures and recommendations where provided according to best practice standards.	An Application for Environmental Authorisation will be submitted to the Mpumalanga DMR with the mining permit application lodgement on SAMRAD.
The South African Constitution. **The South African Constitution (Act 108 of 1996) constitutes the supreme law of the country and guarantee the rights of all people in South Africa.**	Applied at potential impacts identification as well as mitigation measures and public participation.	A public participation process will be followed and consultations will be done regarding the proposed project. An EMPr and awareness plan will be designed according to the issues raised during this process.
National Environmental Management: Biodiversity Act, 2004.	Presence of indigenous trees or threatened species, if permit is required. To be determined by ecologist prior to mining activities.	The EMP will regulate the applicant to apply for Tree Removal Permit from the Relevant authority prior to the potential removal of any sensitive and/or protected species.
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 project activities do not trigger a waste management license but proper waste management measures will be addressed in the EMPr.
Section 38 of the National Heritage Resources Act (Act No. 46 of 1999).	Legislation consulted during the impact assessment process, to determine what legal requirements with regards to the	An upload of the BAR will be done on the SAHRIS online system for comment.

	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 - access to site was denied by the landowners at this stage of the process.	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 **The NWA (Act No. 36 of 1998)**	The proposed activities do require a water use license.	The department has been notified of the proposed project and comments will be addressed.
National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004);	Dust monitoring on site during the operation.	As part of the EMPr dust suppression methods will be used.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996);	Health and Safety Policy.	Risk Impact Assessment to be conducted.
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.
EMalahleni Local Municipality.	Source of background demographic and socio-economic information.	Utilized as a source of demographic and socio-economic information for the Nkangala District.

4.6 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).

South African economy heavily relies on the mining sector. Successful mining for coal will boost the current struggling national economy as the project will advance to mining right phase. The mining sector has provided more employment opportunities for the citizens in general. The Project is in line with the relevant IDP, SDF, EMF and PDP. There is no reason why this development should not be considered at this particular point in time considering the high probability of a reserve as proved by other resources in the vicinity of the area.

Although small scale mining (>5 ha) is not seen as an activity that significantly and sustainably contributes to an area's economy, it is a precursor to possible mining right activities. The activity of mining has numerous social and economic benefits in local, regional and national context. These include: 1. SMME development 2. Development to future opportunities 3. Skills development 4. Job creation 5. Local economic development 6. Contribution to local and national tax income (royalties, companies' tax etc.) 7. Contribution to the national gross domestic product.

The need to conduct small scale mining is therefore a crucial step in being able to ascertain if it is feasible to investigate future mining and in turn the benefits indicated in points 1-7.

4.7 Motivation For The Overall Preferred Site, Activities And Technology Alternative.

Located in the Witbank Coalfield, a basin like feature that extends from Brakpan in the West through to Belfast in the East. The northern boundary is the sub-crop against the pre-Karoo basement rocks of predominantly the Waterberg sandstones and the south is a prominent pre-Karoo basement ridge called the Smithfield ridge. The basin was formed in the shallow cratonic paralic environment with slow but consistent subsidence during the late Carboniferous and early Permian. This basin was first exploited before the beginning of the 20th Century in the Brakpan (Apex Mines region) and has been the focus of concerted exploration and exploitation since. The basin is the type area for the multiple Seam deposit type with the development of five major Seam horizons which may in places be composite Seams.

The major controls on the development of the coal are proximity to undulations of the "basement" topography, through erosion channelling and sediment influx into swamp beds and finally erosion of the current erosion surface. The primarily economic coal Seams have been the No. 2 Seam, The No. 4 and No. 4 Lower Seam and in place the No. 5 Seam. Structurally the coal horizons are undeformed with each displaying a very slight dip to the south east of less than a degree and minor discrete faulting events that have a southwest to northeast trend of graben features and other minor faulting events. The most distinctive post-depositional feature is the intrusion of dolerites related to the Lesotho Basalts that have resulted in a variety of sills and dykes of various ages.

The most prominent of the dykes in the area is the Ogies dyke a 12 to 20 m thick essentially vertical intrusion with an east-west strike. The No. 4 Dolerite sill, a 20 to 70 m thick multiple flow event, has a preferential intrusion horizon above the No. 5 coal Seam, but in places it transgresses through the coal bearing strata to the pre-Karoo basement and forms in other places a barrier to erosion. The large amount of exploitation in the region has resulted in the development of an efficient coal transportation infrastructure that is now resulting in previously uneconomic coal Seams such as the No. 1 and No. 2 Lower coal Seams becoming economic propositions.

Basement topography and the present-day erosional surface control the distribution of the coal Seams and not all five Seams may be present at any one locality. The D and E Seams are thin to absent over much of the Coalfield and only the E Seam reaches mineable thicknesses in isolated patches in the northern parts of the Coalfield. The B and C Seams are most widely developed, and to mineable thicknesses, in the Coalfield. The A Seam has, over large areas of the northern and central areas of the Coalfield, been removed by erosion. Although to a lesser extent, the B and C Seams have also been removed by erosion.

Locally, fluvial channels cause erosion resulting in the non-deposition and thinning of coal Seams. The effects of channelling are evident in the central parts of the Coalfield where thick channel sandstones have been delineated which affect the C and C Lowers Seams.

The coal Seams are generally flat-lying to gently undulating with a regional dip to the south-west. The Seams are relatively unaffected by folding although faulting and associated dolerite (igneous) intrusions are common throughout the Coalfield. Dolerite intrusions take

the form of vertical to near vertical dykes, often intruding existing faults, and sills, which are parallel to bedding planes. Sills are also often transgressive resulting in the relative displacement of strata.

The number of sill's increases to the south and up to eight major sills have been identified. An additional effect of dolerite intrusions is the burning or devolatilisation of coal in close proximity to the dolerites. Large areas of coal in the south have either been completely destroyed (burnt) or devolatilised by numerous dykes ranging in thickness from 3 – 5 m. Dolerite intrusions not only sterilise available resources but also disrupt mining activities.

All infrastructure will be temporary and/or mobile.

4.8 Full Description Of The Process Followed To Reach The Proposed Preferred Alternatives Within The Site.

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

(i) Details of the development footprint alternatives considered.

With reference to the site plan provided as Annexure 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;

Mining permit application for the mining of coal on a portion of portion 46 of the Farm Elandsfontein 309 JS, Magisterial district of eMalahleni, Mpumalanga.

(b) the type of activity to be undertaken;

Minerals that will be mined in the mining site is coal. This section presents a detailed description of all the activities associated with the proposed mining application.

Site Preparation

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

- provide sufficient stable topsoil material for rehabilitation (in this case concurrently as mining continues);
- optimise the preservation and recovery of topsoil for rehabilitation;
- identify soil resources and stripping guidelines;
- identify surface areas requiring stripping (to minimise over clearing);
- manage topsoil reserves to not degrade the resource;
- identify stockpile locations and dimensions; and
- identify soil movements for rehabilitation use.

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

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

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

Based on the final void having a considerable surface area relative to the total area mined and topsoil being recovered from all areas to be mined, it is considered that a topsoil surplus over the life of mine will occur. However, the Project topsoil budget will be reviewed following completion of topsoil recovery from the deeper profiles within the Algatorque – Elandsfontein project.

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

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

Box Cut Opencast Mining with a Roll-over Rehabilitation Sequence

The most economical method of coal extraction from coal seams depends on the depth and quality of the seams, and also the geology and environmental factors of the area being mined. The impact of coal mining processes is generally differentiated by whether they operate on the surface or underground. In this instance the mineral will be won by means of opencast surface mining methods as indicated in the figures above. Coal is mined only where technically feasible and economically justifiable. Evaluation of technical and economic feasibility of a potential mine requires consideration of many factors: regional geologic conditions, overburden characteristics, coal seam continuity, thickness, structure, quality, and depth; strength of materials above and below the seam for roof and floor conditions; topography (especially altitude and slope); climate; land ownership as it affects the availability of land for mining and access; surface drainage patterns; ground water conditions; availability of labour and materials; coal purchaser requirements in terms of tonnage, quality, and destination; and capital investment requirements.

The Algatorque - Elandsfontein project operation proposes to use the rollover mining and rehabilitation method. Roll-over opencast mining is typical of small scale opencast mining operations in the Mpumalanga coal fields. The proposed mining entails only opencast methods for this stage of the project. The open-castable reserves will be mined in conventional truck and shovel mining methods using the lateral roll-over technique in a single direction. This would mean mining from the one side of the development footprint in a linear fashion towards the opposite side while backfilling and rehabilitating the area that has already been mined, thus creating the effect that the mining cuts are rolling over in a single direction. Sustainable development applied to mining works necessarily includes rehabilitation with the aim of either restoring the land to its original use, or eliminating or reducing adverse environmental impacts to a long-term acceptable condition. The process is driven primarily by legislation which ensures that the mine owner must comply with the intention of achieving those end conditions, which are defined in broad terms by guidelines.

An initial box cut as well as an access pit ramp into the box will be constructed first. A double box cut has been planned to enable mining in both a northerly and southerly direction, thereby increasing the face length and production rates. The ramp will have a maximum slope of 12˚. Topsoil from the initial box cut will be stripped, where after the subsoil and hard overburden will be drilled, blasted and removed. Topsoil, subsoil and hard overburden will each be stockpiled separately. After removal of the coal from the initial box cut, subsequent box cuts will be made and the initial void filled with the stockpiled hard overburden, subsoil and finally topsoil which will then be seeded and grasses to re-establish vegetation coverage to grazing capability.

The primary procedures that will be implemented during the mining process include;

- Removing and stockpiling of topsoil;
- Construction of the pollution control evaporation dam(s) also used for dust suppression;
- Trenching around the mining footprint to ensure storm water is diverted away from the open cast pit;
- Blasting, stripping and stockpiling of overburden;
- Excavation of the initial strip of the box-cut;
- Excavation of coal (ROM);
- Crushing, screening and stockpiling coal;
- Backfill rehabilitation concurrently as mine progress forward.

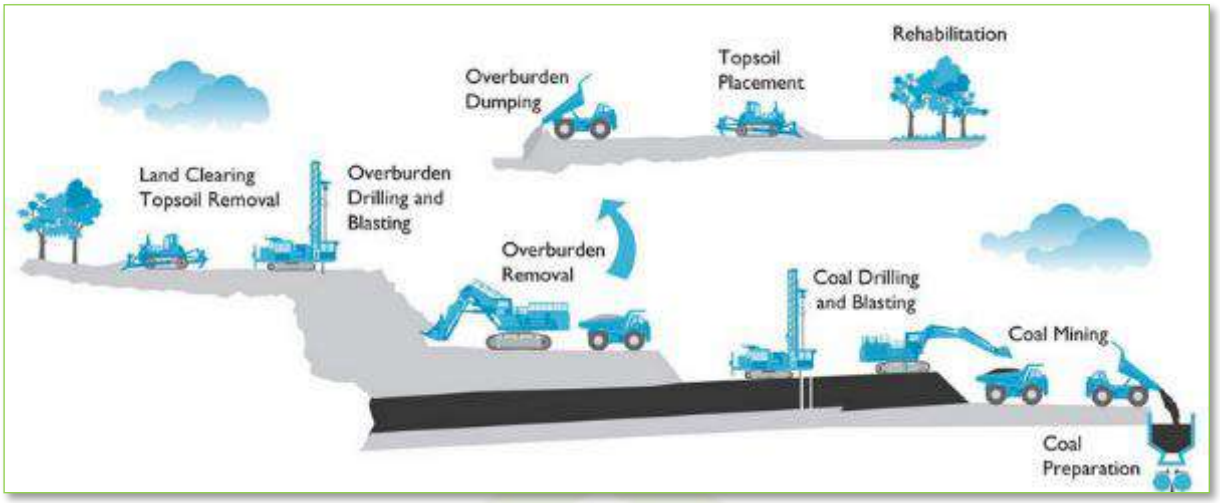


Figure 21: Typical coal surface mining opencast sequence indicating primary procedures

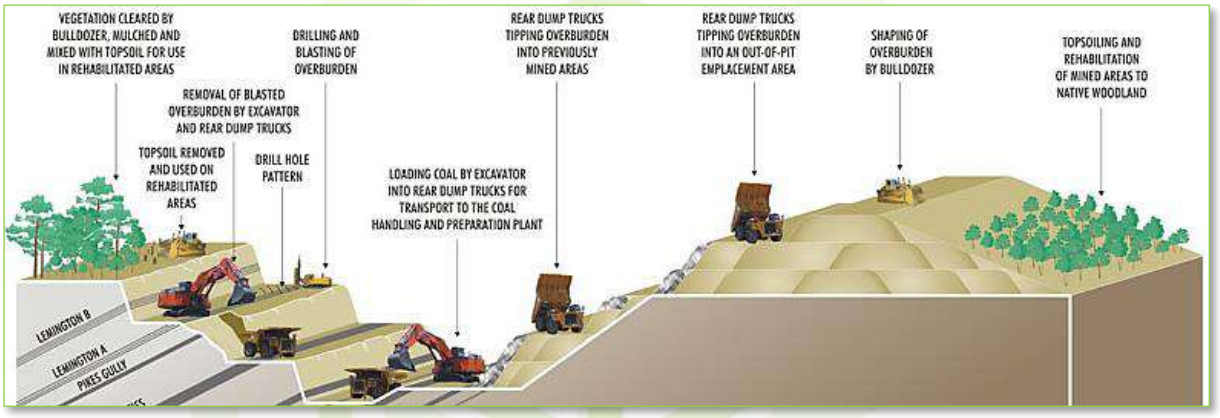


Figure 22: Typical coal surface mining opencast sequence indicating rollover backfill rehabilitation methodology

The figure below indicates the typical mining sequence and can be summarized as; initial removal of the overburden which will then be stockpiled behind the mining area to ensure it can be replaced back in the initial box cut. The physical mining of the coal seam follows which is then placed into trucks to be taken to the crushing and screening facility. From here discard coal will be extracted and replaced in the bottom of the opencast pit, while the product will be taken to the weighbridge via trucks and then removed off site. The overburden is replaced back into the pit as mining progress leaving a minimum area open at a single time. The topsoil which was stripped and stockpiled separately before mining commenced is then replaced and per the land capability specialist report prepared to the optimal composition to ensure the field can be restored to grazing land as was the pre-mining land use.

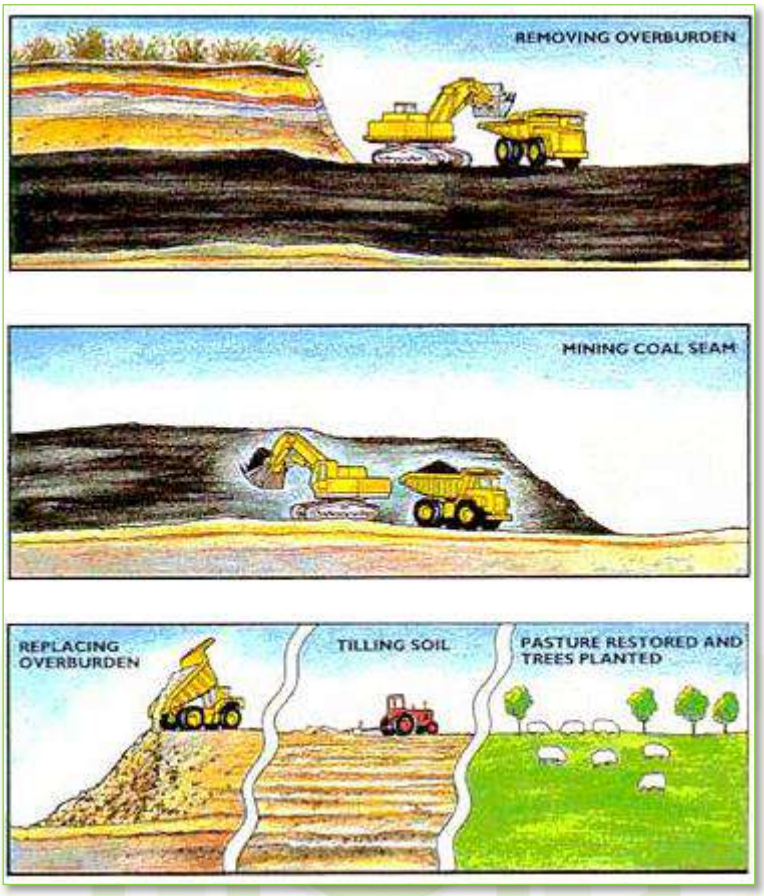


Figure 23: Opencast Coal Mining Sequence

The sequence in the following figure can serve as a further illustration of the anticipated project. Step (1) is where the topsoil will be stripped and stockpiled separately. After this drilling takes place to enable blasting of the overburden. During step (2) the overburden is then removed by conventional truck and shovel methodology and stockpiled separately within the mining footprint. Step (3) includes the removal of under burden which is typically associated with more hard material than fine material (typical of overburden) and is usually the sandstone layer on top of the coal seam. This material is also stockpiled separately. During step (4) physical extraction of coal or winning of the mineral takes place and step (5) indicates the conventional truck and shovel methodology of removing the material.

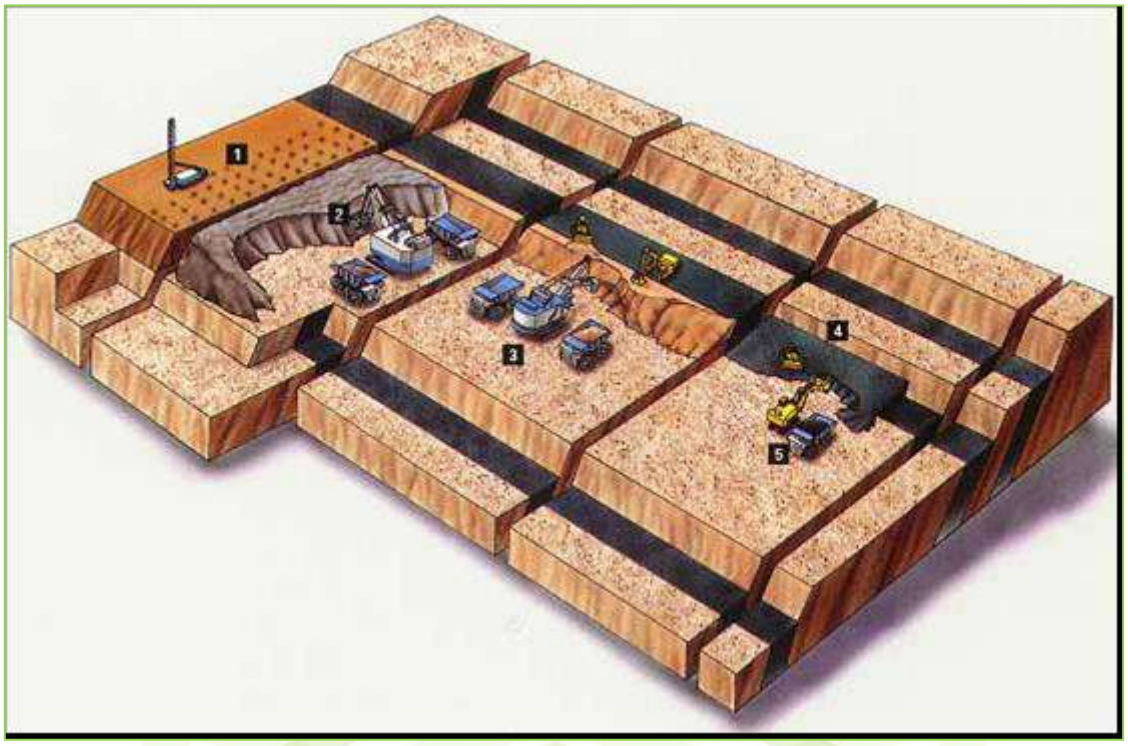


Figure 24: Opencast coal mining typical progressive steps (No 1- 5)

The following basic principles of rehabilitation form the basis of the roll-over mining methodology that entails concurrent rehabilitation as mining progress:

- Prepare a rehabilitation plan prior to the commencement of mining which includes detailed surveys of the pre-mining environment to ensure the landscape can be restored to the pre-mining environment as close as feasible;
- Agree on the long-term post-mining land use objective for the area with the relevant government departments, local government councils and private landowners. The land use must be compatible with the climate, soil, topography of the final landform and the degree of the management available after rehabilitation;
- Progressively rehabilitate the site, where possible, so that the rate of rehabilitation is similar to the rate of mining;
- Prevent the introduction of noxious weeds and alien vegetation (typical to areas of disturbance);
- Minimise the area cleared for mining and associated infrastructure to only what is ultimately required and no additional clearance of unnecessary areas;
- Reshape the land disturbed by mining operations so that it is stable, adequately drained and suitable for the desired long-term land use;
- Minimise the long-term visual impact by creating landforms which are compatible with the surrounding landscape;
- Reinstate natural drainage patterns disrupted by mining wherever possible;
- Minimise the potential for erosion by wind and water both during and following mining;
- Characterise the topsoil and retain it for use in rehabilitation. It is preferable to reuse the topsoil immediately rather than storing it in stockpiles. Only discard if it is physically or chemically undesirable, or if it contains high levels of weed seeds or plant pathogens;
- Consider spreading the cleared vegetation on disturbed areas;
- Deep rip compacted surfaces to encourage infiltration, allow plant root growth and key the topsoil to the subsoil, unless subsurface conditions dictate otherwise;
- Ensure that the surface one or two metres of soil is capable of supporting plant growth;
- If topsoil is unsuitable or absent, identify and test alternatives substrates, e.g. overburden that may a suitable substitute after addition of soil improving substances;
- Re-vegetate the area with plant species consistent with the post mining land use; and
- Monitor and manage rehabilitation areas until the vegetation is self-sustaining.

The proposed project entails to make use of a mobile crushing and screening facility to ensure it can be easily moved and also reduce the footprint required for rehabilitation post life of mine. No washing of coal on site is proposed as the final product from the mobile crushing and screening facility will be taken away off site, and therefore significantly reduce the environmental impacts associated with washing of coal. The image below is a typical representation of a crushing and screening plant with associated activities. Coal from the ROM stockpile is loaded into trucks and then hauled to a feed din from where it is fed via a conveyor into the crushing and screening facility. Coal is then stockpiled according to the required top sizes from where it can be loaded transported to the weighbridge once again via truck hauling, weighed and taken off site. The process in itself is quite simple and straight forward as no washing of the coal will take place on site.

ACCESS AND HAUL ROADS CONSTRUCTION

The mine access road will lead off one of the dirt roads serving the purpose to only give farmers access to their properties. The dirt road will be upgraded to the applicable standards which includes a gravel road leading into the mine. The road will be used to access the mine offices, workshop complex, and mining area (including mobile crushing and screening facility with ROM stockpiles). Coal transportation trucks will also use this road to enter and exit the mine premises, including travelling to the weighbridge. The weighbridge will be a 22 m x 3 m, 70 ton weighbridge adjacent to the new access road. Several temporary haul roads will also be constructed to access the mine area as well as the ROM stockpiling area. These haul roads will be used by mine personnel to access the mine areas for their day to day duties and the dump trucks will use the road for haulage of coal to the ROM stockpiles. The roads will be constructed to have a width of 8 m while dust suppression using water carts with an added chemical dust suppressant (environmentally friendly) product will be employed.

In order to maintain a gravel road properly operators must clearly understand the need for three basic items:

- A crowned driving surface,
- a shoulder area that slopes directly away from the edge of the driving surface, and
- a ditch.

The shoulder area and the ditch of many gravel roads may be minimal. This is particularly true in regions with very narrow or confined right-of-ways. Regardless of the location, the basic shape of the cross section must be correct or a gravel road will not perform well, even under very low traffic. The figure below illustrates the components of a typical cross section of a gravel road that must be considered.

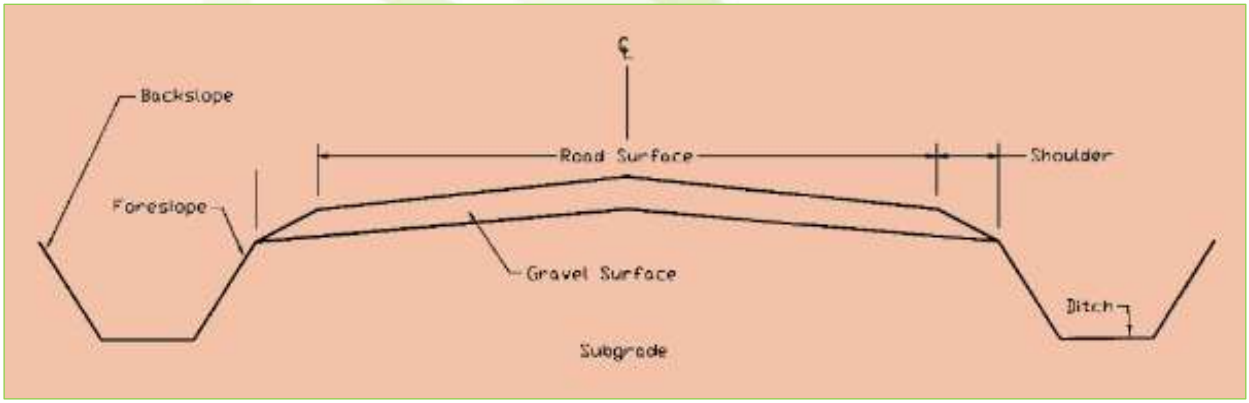


Figure 25: The components associated with a gravel road section

Gravel roads tend to rut more easily in wet weather. Traffic also tends to displace gravel from the surface to the shoulder area and even to the ditch during dry weather. Managers and equipment operators have the continual responsibility of keeping the roadway properly shaped. The shape of the road surface and the shoulder area is the equipment operator's responsibility and is classified as routine maintenance. Keeping the fore-slope and ditch established and shaped is often the maintenance operator's responsibility as well. The main aim of the design and associated maintenance is to keep water drained away from the roadway. Standing water at any place within the cross section (including the ditch) is one of the major reasons for distress and failure of a gravel road.

There is sometimes a need for specialized equipment to do major reshaping of the cross section, especially in very wet conditions. However, the operator of routine maintenance equipment must do everything possible to take care of the roadway. The recommended

shape of each part of the cross section will be considered during road planning. When a gravel road is maintained properly, it will serve low volume traffic well. Unfortunately, most gravel roads will fail when exposed to heavy hauls even when shaped properly. This is due to weak subgrade strength and marginal gravel depths which are often problems with gravel roads. The low volume of normal traffic does not warrant reconstruction to a higher standard. However, improper maintenance can also lead to very quick deterioration of a gravel road, especially in wet weather. The maintenance equipment operators must always work at maintaining the proper crown and shape. During mining extra maintenance and wetting of the roads to ensure minimal dust generation will be required.

Semi Temporary Site And Security Offices

The site offices for the project, including a small security hut at the entrance of the mining area next to the main entrance road will consist of container-type offices that is commercially available as off the shelve products, as illustrated in the image below. This ensures minimal construction requirements on site and also minimal footprint. Keeping the disturbance area minimal and ensuring ease of mine closure and rehabilitation after life of mine make the temporary offices ideal, especially considering the short duration of the proposed activities and requirement of these offices. The visual impact associated with the structures will also be considered and natural colour paint will be applied to the structures to blend in with the background features.

Storm water management around the facilities will also be considered and the necessary waste receptacles will be in place for general domestic waste separation and management. Waste skips will be used for waste collection and any domestic waste will be removed from the site to a licensed waste facility by a registered and approved contractor. No housing facilities will be required as personnel will not be allowed to reside on site for the duration of the project but instead live off site from the mine. The security will however be present 24 hours a day on the mine for the duration of the project and even longer during the mine closure and rehabilitation period.

Figure 26: Typical semi temporary site offices and security office

Semi Temporary Sanitation And Change House

Similar to the structure indicated in the section above, will the semi temporary sanitation and change house also be container type facilities which can easily be brought to site and also removed after life of mine. For the change house and ablution facility a septic tank system will be implemented which is temporary of nature and can also be decommissioned easily. The septic tank system will ensure a 'honey-sucker' type sewage removal vehicle can remove and dispose of sewage at an appropriate facility off site. This ensures no major construction and approval is required for a full scale sewage treatment facility. Mobile chemical toilets will also be used where necessary and supplied by an approved contractor whom 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. The current expectation is that 50 employees will require 45 liter per person per day (litre pp/day) amounting to 2 460 litres per day.

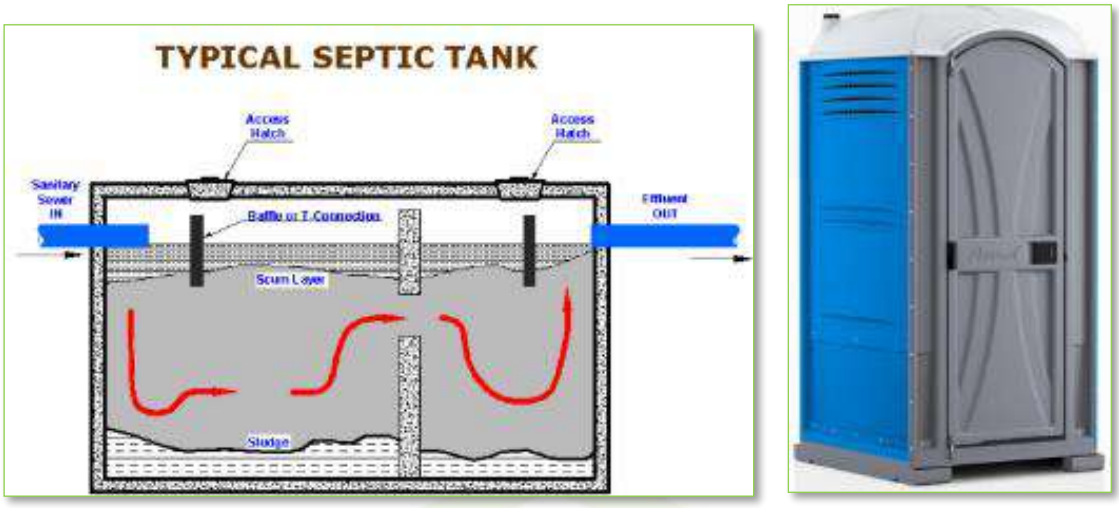


Figure 27: Typical septic tank cross section and chemical toilet illustration

MOBILE FUEL STORAGE

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

Figure 28: Typical mobile fuel storage trailer with bunded tray

POLLUTION CONTROL FACILITY/DAM (EVAPORATION AND DUST SUPPRESSION USAGES)

Water is typically the prime environmental medium (besides air) that is affected by mining activities. Mining adversely affects water quality and poses a significant risk to South Africa's water resources. Mining operations can further substantially alter the hydrological and topographical characteristics of the mining areas and subsequently affect the surface runoff, soil moisture, evapo-transpiration and groundwater behaviour. Failure to manage impacts on water resources (surface and groundwater) in an acceptable manner throughout the life-of-mine and post-closure, on both a local and regional scale, will result in the mining industry finding it increasingly difficult to obtain community and government support for existing and future projects. Consequently, sound management practices to prevent or minimise water pollution are fundamental for mining operations to be sustainable.

Pro-active management of environmental impacts is required from the outset of mining activities. Internationally, principles of sustainable environmental management have developed rapidly in the past few years. Locally the Department of Water Affairs (DWA) and the mining industry have made major strides together in developing principles and approaches for the effective management of water within the industry. This has largely been achieved through the establishment of joint structures where problems have been discussed and addressed through co-operation.

The National Water Act (Act 36 of 1998) requires that the dirty water originating from the mining operations be kept separate from the clean water systems outside and on top of the mining area. Therefore, in-pit water storage cannot be considered for this application and the additional requirements of the NWA will also need to be complied with. Data generated during the geohydrological investigation as part of the Water Use License Application phase will guide the civil engineering team to accurately size and design the pollution control facilities, in this case lined dams above ground, to be used as evaporation dams and also for water abstraction for dust suppression carts on the mine.

The main concern regarding coal mining is the correct treatment and disposal of water. Sufficient provision will be made in the form of trenches for surface water runoff diversion away from the mining area, to ensure clean and dirty water separation takes place. This way contamination of water can be minimised. Water that has been contaminated and in-pit ingress water will be pumped to above ground pollution control dams which will be lined to ensure no ground water infiltration can take place. The pollution control dam(s) will be constructed, fenced and notices erected to warn the public with regards to safety, at the proposed mining area for the storage of dirty water. The pollution control dam will be designed by a registered professional civil engineer and have capacity to handle all dirty water emanating from the dirty water areas on the mining area. An integrated Water Use License Application (IWULA) covering the mine related water uses will be submitted to the Department Water Affairs.

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

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

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

The design, operation and closure of PCDs are important aspects in the successful operation of a mine, given the inherent safety and environmental risks posed by structural failure, spillage or overtopping of these facilities. It is thus important that practitioners within this field have a good understanding of the management of water, surface and groundwater, when designing and/or operating PCDs. To this end, the Department: Water and Sanitation (DWS) have prepared an activity-related Best Practice Guideline to focus on mine water PCDs which will be adhered to during the design and construction of the pollution control dam(s).

Best practice for mine water PCDs is developed from a combination of the following requirements:

- Legislative requirements;
- Industry norms and generally accepted good practices;
- Technically and environmentally sound design practices;
- Life cycle planning for the PCD;
- Management of hazards and risks;
- Effective water resources management, both for the mine site and within the regional Catchment Management Plan, and
- Other factors, such as site specific conditions.

Effective design, operation, management and closure of PCDs are ensured through adherence to the above requirements. The image below is an illustration of the typical pollution control dam that will be constructed.

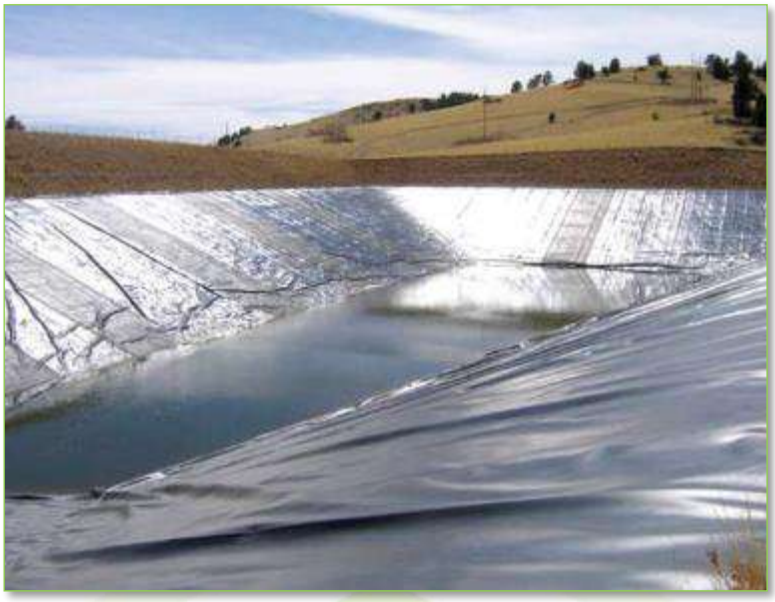


Figure 29: Lined pollution control dam (PCD) illustration

Best Practice water management for PCDs will be based on the following general principles:

- All PCDs will comply with the legal and regulatory conditions within South Africa;
- Worst-case conservative assumptions will be made in instances where the quality of water to be contained within the PCD cannot be established with certainty;
- PCDs are to be sited, sized and operated to maximise the opportunities for water reuse and reclamation and to minimise the impacts on the water resource;
- Designs will adhere to the generally accepted principles of sustainable development and Best Practice Environmental Option (BPEO), as defined in section 2 of NEMA, by integrating social, economic and environmental factors during the planning and implementation and closure phases ;
- Technical studies and the design of PCDs will be undertaken by suitably qualified personnel (registered civil engineers);
- The full life cycle of the PCD will be considered in the design, operation and closure of PCDs; and
- Designs will adopt a holistic approach, including:
  - Sustainability;
  - Full life cycle of the PCD;
  - Water quantity and quality, and
  - Surface water and groundwater.

The siting of pollution control dams is critical in order that it maximizes the containment of all polluted water. The pollution control dam design specifications are as set out below. It is a requirement that pollution control dams do not leach any of the polluted contents into the groundwater and is therefore required to be lined in order to limit seepage. It is proposed that a 1,5 mm thick HDPE lining be used to line the dam basin. The lining will be covered by a 200 mm thick soil backfill.

Clean And Dirty Water Separation

The clean and dirty water separation on the mine has been discussed to an extent under relevant sections where applicable, although, a detailed surface water management plan will be drawn up as part of the Water Use License Application 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.

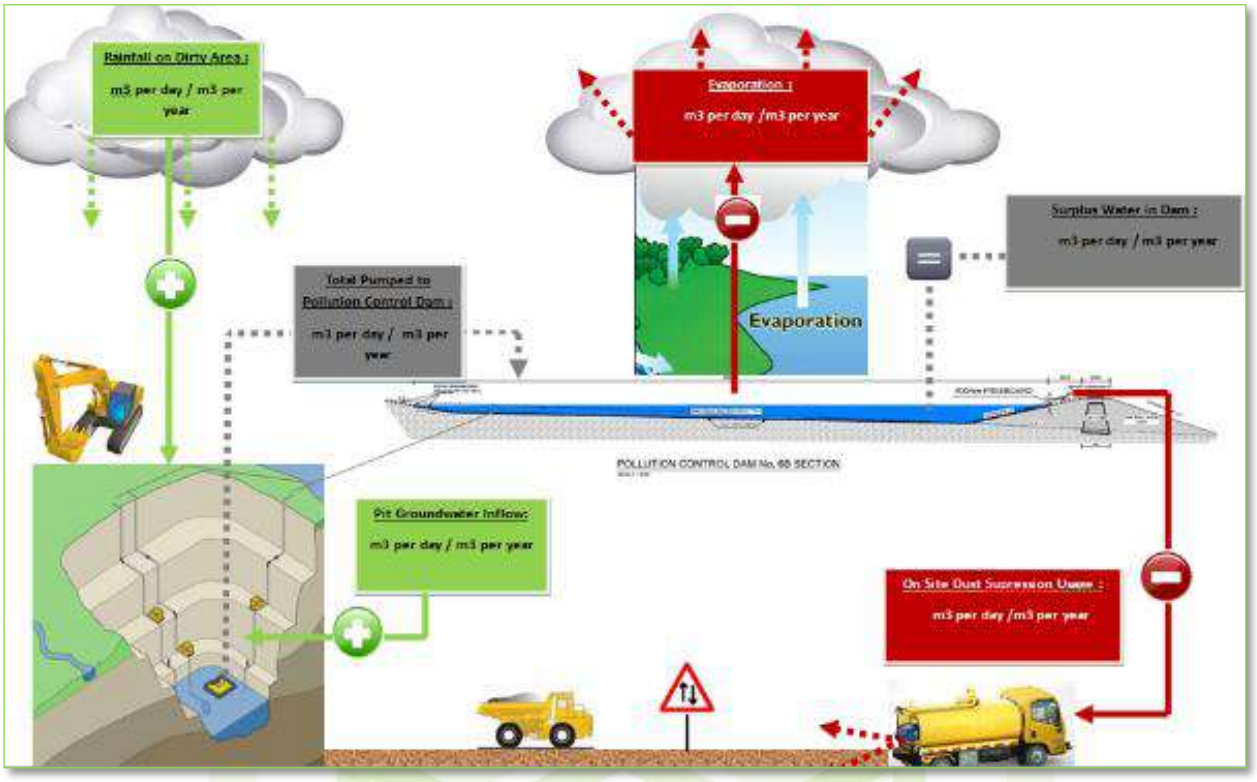


Figure 30: Typical water balance considerations during the design of a clean and dirty water separation system

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

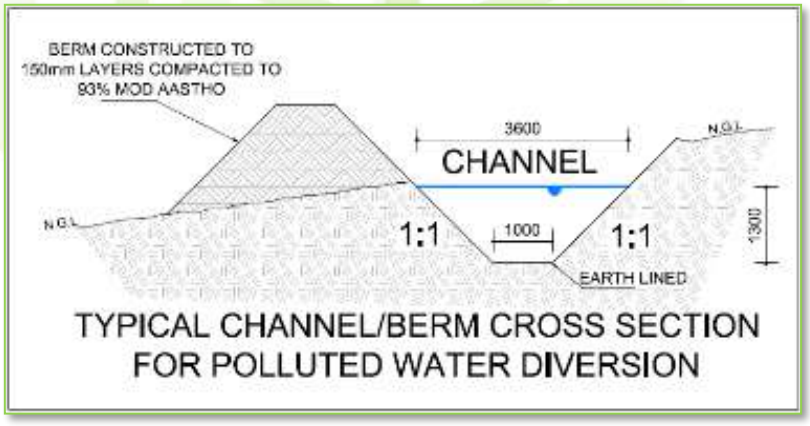


Figure 31: Typical channel/berm cross section for polluted water diversion

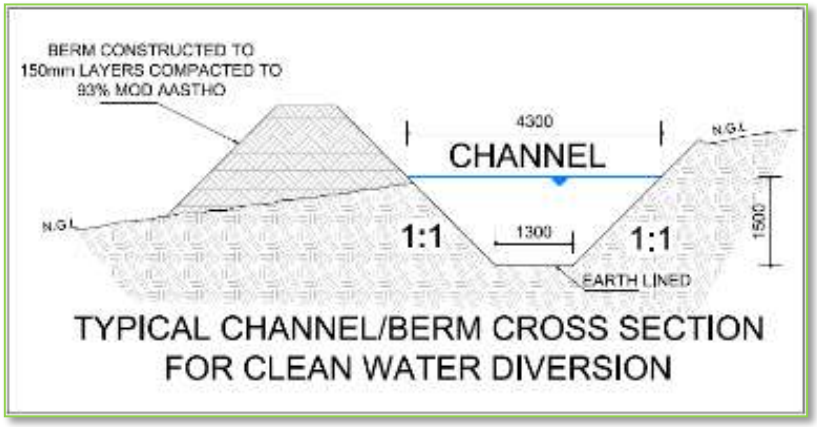


Figure 32: Typical channel/berm cross section for clean water diversion

FENCING

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

Figure 33: Typical mine fence signage

STAFF AND VISITORS PARKING

Designated parking areas will be constructed by compaction of the subsoil after removal, storage and preservation of the valuable layer of topsoil. Uncovered parking areas for mine fleet vehicles will be constructed in a separate area to the staff and visitors parking as a safety measure as the mine fleet vehicles are very large and pose a safety hazard. The staff and visitors parking will be separate from the latter and possibly covered. Storm water management control around these areas will be implemented while the necessary signage will be erected to ensure optimal safety while reverse parking will be implemented at all parking bays. The necessary waste receptacles as well as oil spill kits will be provided at these sites in case of accidental spillage or leakage of hydrocarbon fuel/oil/greases from the vehicles.

DRILLING AND BLASTING

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

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

The risks associated with blasting have been identified and include blast and potential fly-rock. There is a limited risk of air blast due to mining activities resulting in property damage. Blasting controls will include monitoring of blast design, powder factors and stemming levels to minimise the effects of air blast and ground vibrations. The mining area will be evacuated prior to blasting to a radius of >500 m while the adjacent property owners will also be informed accordingly prior to blasting events. Eskom has indicated that they also need to be informed well in advance of blasting events as several power lines transect the mining footprint that need to be protected.

A blast management plan will be implemented with the objectives of;

- Ensuring all relevant statutory requirements and company Policies and Standards are met;
- Managing and minimising the impact of blasting from mining operations on the environment and nearby residences;
- Maintaining an effective response mechanism to deal with issues and complaints; and
- Ensuring the results of blast monitoring comply with applicable criteria.

TOPSOIL, SUBSOIL, OVERBURDEN, DISCARD AND ROM STOCKPILES

Positions of the topsoil, subsoil and overburden stockpiles have been indicated on the mine plan. All topsoil, subsoil and overburden material will be removed during the mining operation and stockpiled separately for the purpose of backfill rehabilitation as discussed earlier. The stripping, handling and preservation of topsoil have also been discussed earlier in this report as a separate chapter due to the importance of topsoil for rehabilitation purposes. The topsoil stockpiles will not exceed a height of six meters which is high enough to reduce leaching impacts of stockpiled topsoil. The subsoil and overburden stockpiles will however exceed this height.

Topsoil will be kept separate from other stockpiles and shall not be used for construction purposes or for maintenance of the access roads. The topsoil shall be adequately protected from being blown away by wind or eroded by the force of water. The subsoil and overburden stockpile areas will cover an area of approximately 2 ha, of which the topsoil will be stripped and stockpiled separately. The hard overburden stockpiles will contain approximately 50 m^3 (bulking factor of 1.1) of blasted overburden material.

Stockpiles may be used in some instances to provide visual and noise barriers between the mining operations and neighbouring land users. These stockpiles will be constructed from either overburden or from soil and will be in place for the life of mine and will be top-soiled and grassed immediately after their construction. Topsoil removal will take place by means of excavators and hauled with Articulate Dump Trucks (ADT's).

The ROM stockpiling area will be constructed to cover an area of approximately 1ha and will not contain more than 10 000 tons of ROM coal at one period. The stockpile will also not exceed a height of 12 m. The stockpile will be used to load coal from the mining area as well as to cater for any ceases in production resulting from breakdown or disruption of workings. Dirty water emanating from this area will be diverted to the pollution control dam area.

A weighbridge will be constructed adjacent to the ROM coal stockpile area on a concrete slab footprint. The exact design will be made available once the external service providers have submitted their designs and a decision have been made regarding the procurement of a weighbridge. Below, cross sections of three typical weighbridge designs have been provided for clarification purposes. The impacts associated with these three structures are very closely related and would not significantly change the impact rating or influence the final outcome of the EIA which ever design is implemented.

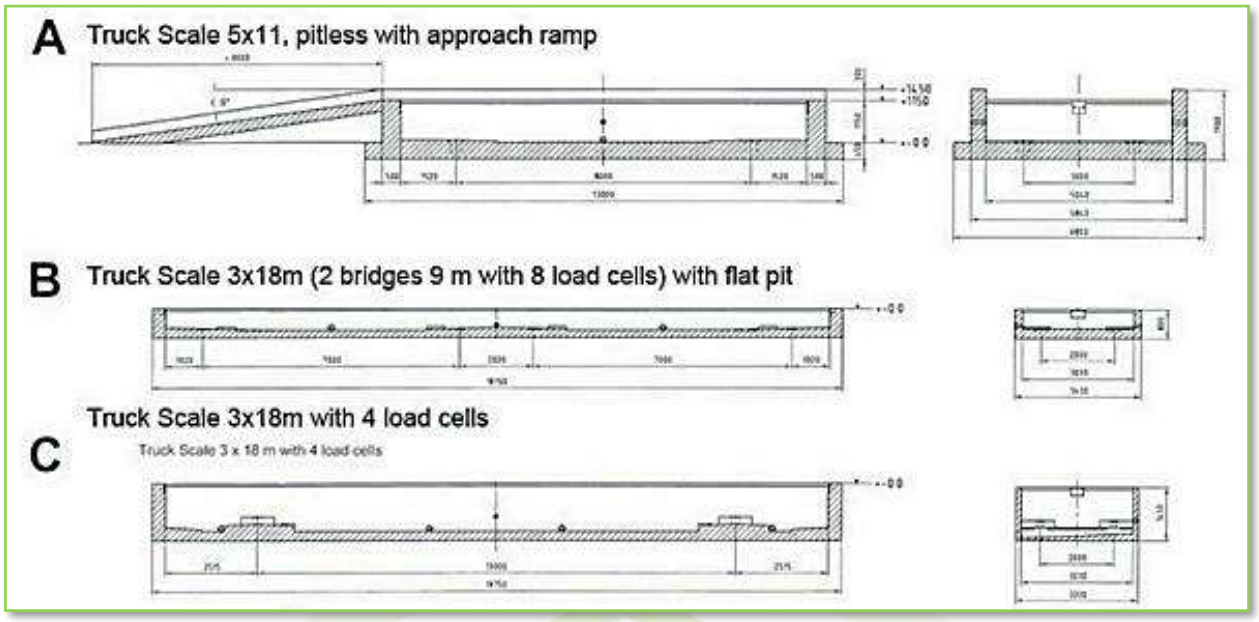


Figure 34: Three potential alternative weighbridge designs and cross sections

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. The overall aim of the project is to keep the carbon footprint of the entire project as small as possible. This will include the use of "green" products as far as possible as well as the reclamation of all building rubble during the construction phase.

Several waste streams are likely to originate from the activities associated with day to day activities in the workplace. Some of these waste streams may not be hazardous, but the majority may contain a component(s) that may need special treatment. The nature of these waste streams may also vary due to composition and physical form. In order to make informed decisions on determining the appropriate waste management options to handle, treat and dispose of waste, the different waste streams must be identified in terms of hazardous and non-hazardous wastes.

Waste streams can be categorised into 6 (six) different streams, based on similar health and environmental concerns namely:

- ***Inorganic wastes*** – acids, alkalis, cyanide wastes, heavy metal sludges and solutions, asbestos wastes and other solid residues.
- ***Oily wastes*** – primarily from the processing, storage and use of mineral oils.
- ***Organic wastes*** – halogenated solvents residues, non-halogenated solvent residues, polycarbon based (PCB) wastes, paint and resin wastes.
- ***Putrescible Organic Waste*** – wastes from production of edible oils, slaughter houses, tanneries and other *animal based products.*
- ***High Volume/Low Hazard Wastes*** – waste based on their intrinsic properties present relatively low hazards but may pose problems due to high volumes such as fly ash from power plants.
- ***Miscellaneous Wastes*** – infectious waste from diseased human/animal tissue, redundant chemicals, laboratory wastes and explosive wastes from manufacturing operations or redundant munitions.

The following shall apply to the temporary storage of waste at source:

- The employer shall provide adequate and appropriate containers/receptacles for the temporary storage of waste at source;
- Adequate containers must be available to store different types of waste separately to allow for recycling and disposal per the integrated waste management plan;
- Dedicated storage areas for various types of waste must be allocated and clearly demarcated;

- Waste collected at source shall be collected on a daily basis;
- Waste must be stored in such a manner that it can be safely accessed and loaded;
- Should waste be stored in containers, drums or skips care must be taken that:
  - Waste types (special vs. controlled vs. general waste) are not mixed.
  - Waste is not kept in a corroded or worn container.
  - The container is secure so as to prevent accidental spillage or leakage.
  - All waste skips and containers are labelled with their contents.
  - Skips or containers do not overflow.
  - Skips for special waste is always covered.
  - Skips for controlled waste is covered skips wherever possible.
- Waste must be kept in such a way as to prevent it falling while in storage or while it is being transported;
- Waste must be protected from scavenging by people and animals;
- Do not dispose of (burn, bury or treat) waste on site;
- Collection of waste must be scheduled and the site/location manager must be notified beforehand of collection times and type of waste to be collected; and
- Implement dust suppression measures, such as wetting of access routes and accumulated controller waste.

c) the design or layout of the activity;

Mining methods vary widely and depend on the location, type and size of mineral resources. Surface mining methods are most economical in situations where mineral deposits occur close to the surface (e.g. coal, salts and other evaporate deposits or road quarry material) or form part of surface deposits (e.g. alluvial gold and diamonds, and heavy mineral sands). For this specific project the mining of coal by means of surface mining methods are viable due to the fact that the resource is situated close enough to the surface to make it economically mineable. Typical surface mining methods include: strip mining and open pit mining, as well as dredge, placer and hydraulic mining in riverbeds, terraces and beaches. The Algatorque - Elandsfontein project will be mined by means of open pit or also known as opencast mining methods following a roll over rehabilitation sequence. These activities always disrupt the surface and this, in turn, affect soils, surface water and near-surface ground water, fauna, flora and all alternative types of land-use.

Besides the rate and method of mining, the location, variety and scale of mine infrastructure also influences the nature and extent of impacts. The Algatorque - Elandsfontein project will be mined relatively quickly in a period of 3 years compared to other mining operations that could last for several years and/or even decades. The fast mining sequence will ensure impact duration during mining is short. Typical mine infrastructure includes: haul roads and spoil dumps; surface facilities e.g. offices, workshops, car parks and storage yards); tailings and waste rock disposal areas; transport and service corridors (e.g. roads, pipelines, conveyers, power and water corridors); product stockpiles; chemicals and fuel storage, pollution control dams, storm water management infrastructure and temporary

housing facilities.

Figure 35: Conceptual Mine layout

d) the technology to be used in the activity;

All equipment to be used will be provided by contractors.

As a summary the following activities and technologies will be carried out and are associated with the proposed Algatorque - Elandsfontein project:

- Site preparation with topsoil removal;
- Box cut opencast mining with a roll over rehabilitation sequence;
- Hauling, access road, haul road, and road diversion of the road;
- Clean and dirty water separation system;
- Trenching;
- Fencing;
- Drilling and blasting;
- Topsoil, subsoil, overburden, discard and ROM stockpiles;
- Waste management; and
- Mine closure and rehabilitation.

- **the operational aspects of the activity; and**

The following section serves as a summary of the three phases which have been described in more detail in the previous section.

❖ CONSTRUCTION PHASE

It is assumed that the construction activities will only take place during daylight hours. The following activities during the construction phase are identified:

- Site Clearing: Stripping and removal of topsoil & vegetation;
- Construction of any surface infrastructure e.g. haul roads, pipes, storm water diversion berms (including transportation of materials & stockpiling); and
- Blasting and development of initial boxcut for mining (incl. stockpiling from initial cuts).

During the construction assessment phase, it is expected that, the main sources of impact will result due to the construction of haul roads, the plant area and the initial box cut associated with open pit mining. Construction is commonly of a temporary nature with a definite beginning and end. Construction usually consists of a series of different operations, each with its own duration and potential for impacts.

The construction phase includes;

- Construction and Grading of Haul Roads
  - Scraping;
  - Overburden handling;
  - Overburden stockpiles; and
  - Truck transport and dumping of debris.
- Preparation of plant (crushing and screening) area
  - Clearing of area for infrastructure;
  - Overburden handling;
  - Overburden stockpiles; and
  - Truck transport and dumping of debris.
- Establishment of mining operations
  - Removal of overburden; and
  - Setting up of site offices and workshop

❖ OPERATIONAL PHASE

The operation phase of the proposed mining will involve/include the following:

- Removing and stockpiling of topsoil;
- Construction of the pollution control evaporation dam(s) also used for dust suppression;
- Trenching around the mining footprint to ensure storm water is diverted away from the open cast pit;
- Blasting, stripping and stockpiling of overburden;
- Excavation of the initial strip of the box-cut;
- Excavation of coal (ROM);
- Crushing, screening and stockpiling coal;
- Backfill rehabilitation concurrently as mine progress forward.

❖ DECOMMISIONING AND CLOSURE PHASE

It is assumed that the decommissioning and closure activities will only take place during daylight hours. The decommissioning phase is associated with activities related to the demolition of infrastructure and the rehabilitation of disturbed areas. The following activities are associated with the decommissioning phase:

- Existing buildings and structures demolished, rubble removed and the area levelled;
- Remaining exposed excavated areas filled and levelled using overburden recovered from stockpiles;

- Stockpiles to be smoothed and contoured;
- Topsoil replaced using topsoil recovered from stockpiles; and
- Disturbed land prepared for revegetation.

Truck and shovel methods would be used during roll-over backfilling of cut / strips. Compaction and final top soiling will be conducted to bring the final topography back to its pre-mining contours. Finally seeding will be conducted in accordance with the seasonal precipitation in order to facilitate quick root establishment and therefore minimise erosion potential.

e) the option of not implementing the activity.

The option of not approving the activities will result in a significant loss to valuable information regarding the coal reserve status on this property.

In addition to this, should economical reserves be present and the applicant does not have the opportunity to mine, the opportunity to utilize these reserves for future phases will be lost.

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

1) Identification of Interested and Affected Parties (IAPs);
2) Notification of IAPs regarding the proposed project;
3) A public information meeting with IAPs;
4) Gathering comments, issues and concerns from IAPs;
5) Responding to IAP comments, issues and concerns;
6) Compilation and submission of results of consultation report to the DMR; and
7) Providing IAPs with the opportunity to review and comment on the basic assessment report.

Each of the processes is described in detail in the sections 1-7 below.

1) Identification of Interested and Affected Parties

The application area extends over approximately 4.93 hectares of commercial land consisting of properties. No land claims were identified within the project area as per the Commission of Restitution of Land Rights.

The registered owners of the farms were listed as follows:

Table 12: Directly affected landowners

	Landowner	Farm Portion
1.	**Evraz Highveld Steel & Vanadium Ltd.**	In respect of portion of portion 46 of the farm Elandsfontein 309 JS in the magisterial district of Emalahleni, Mpumalanga Province of South Africa.

Interested and affected parties (IAPs) that were identified include the following: -

- Landowners and legal occupiers within the project area – as indicated in the table above.
- District Municipality: Nkangala District Municipality.
- Local Municipalities: eMalahleni Local Municipality.
- Organs of State:
  - Department of Mineral Resources Mpumalanga - Legal and Environmental Sections;

- DARLEA;
- Department of Water & Sanitation – Mpumalanga;
- Department of Rural Development & Land Reform;
- South African Heritage Resources Agency & Mpumalanga Heritage Resources Agency; and
- Land Claims Commission.

The details of all the IAPs were compiled into a database that is included as Annexure B: Public Participation process.

2) Notification of Interested and Affected Parties

Eco Elementum notified IAPs by providing each person with an information letter (written notice) and Background Information Document (BID) that included a description of the project, the public participation process and how they can get involved in the process. The notification letter also included a comment sheet whereby all IAPs can respond with issues, concerns or comments. Emails and SMS were sent to the identified occupiers and/or land owners of the respective properties. Proof of the notification are provided in Annexure B: Public Participation process.

Other forms of notification included the placement of Site Notices x 4 (as per the Regulation required size) at various locations. Site notices were placed at various access points along the secondary road which transverses the site.

The site notices are available for a period of 30 days whereby IAPs can register to be provided with more information on the project. Photos of the site notices are provided in Annexure B: Public Participation process.

1 x English adverts was placed in a local newspaper. The advert will include a brief project description, location of the project, date of public meeting, methods to register as an IAP and review period of the BA report.

3) Public Information Meeting

Instead of a public meeting, online group meetings will be scheduled upon request, and recorded for reporting purposes. This is in adherence to the COVID regulations.

4) Gathering Comments, Issues and Concerns from IAPs

IAPs will be provided with the opportunity to register as IAPs and raise issues and concerns over 30 days review time to form part of the public consultation report.

5) Responding to Comments, Issues and Concerns from IAPs

All comments, issues and concerns will be compiled and responded by email or verbally.

6) Compilation of a Report on the Results of the Public Participation Process

The public consultation process is documented in accordance with the DMR standard template for results of public consultation. The report will be submitted to the DMR and eMalahleni Local Municipality and will have 30 days to comment on the report.

7) Review and Commenting on the Basic Environmental Impact Assessment Report (BAR)

The draft BAR will be made available for review and comment 30 days. The IAPs were notified in the written notices and site notice that the BAR was made available for review online and electronically via We Transfer by request.

The table below summarises the issues and responses raised during the PPP to date.

iii. Summary of issues raised by I&Aps

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

Table 13: Identified Interested & Affected Parties

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s					
Highveld Steel Andrea de Souza Thea Oberholzer	X				(1)
Matusson & Associates – Piers Marsden (Business Rescue Practitioner)	X				
Lawful occupier/s of the land					
Trans Alloys	X				
Landowners or lawful occupiers on adjacent properties	X				

Municipal councillor	**X**				
Municipality	**X**				
eMalahleni Municipality	**X**				
Nkangala District Municipality	**X**				
MDEDET	**X**				
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA)					
National Roads Agency	**X**				
SANBI	**X**				
ESKOM	**X**				
Transnet	**X**				
DWS	**X**				
SAHRA	**X**				
Telkom	**X**				
SAN parks	**X**				
Mpumalanga Provincial Govt Officer	**X**				
SAHRA	**X**				
DWA – working for water	**X**				
DEA Pollution and waste management directorate	**X**				
Mpumalanga Tourism and Park Agency Development	**X**				
Mpumalanga Department of Agriculture and Land Affairs	**X**				
Communities	**X**				
Khanyisile Mbali	**X**				
Nkosinathi Mtsweni	**X**				
Mcolisi Roy Nyambi	**X**				

Sebastian Seiaelo	**X**				
Phumla Mishka Khumalo	**X**				
Dept. Land Affairs	**X**				
Agri Mpumalanga	**X**				
Thulani Mtsuki Attorneys	**X**				
Zenani France Sibanyoni –Jiyane Algatorque Coal Air Pollution Trust Fund	**X**				
Dept. Environmental Affairs	**X**				
Authorization and Waste Disposal Management	**N/A**			-	
Pollution and Waste Management Directorate	**X**			-	
Environmental Impact Management	**X**			-	

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

1) Baseline Environment

a. Type of environment affected by the proposed activity.

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

Baseline physical environment

Key aspects of the baseline environment that are likely to impact on the scope of the impact assessment and management measures that are implemented as well as project decisions regarding alternatives are listed below.

Baseline Environmental Characteristics

A preliminary desktop study was conducted to focus on topology, surface water, wetlands, soils, land capability, noise, socio-economic and habitat availability for species of vegetation, mammals, and avifauna (birds) of the study area. The data was supplemented by previous surveys conducted in the area, literature investigations, specialist studies, personal records and historic data.

Figure 36: Nkangala District Municipality

The location of the proposed development is in Mpumalanga Province. The site falls within the Nkangala District Municipality and the eMalahleni Local Municipality.

The closest town to the study area is Emalahleni and is located about 12 km east-northeast of the area demarcated for prospecting and mining. The N4 highway is located about 2.5 km to the north. The study area falls within the Nkangala District Municipality and the Emalahleni Local Municipality in the Mpumalanga Province. In terms of vegetation, the study area falls within the Grassland Biome, Mesic Highveld Grassland Bioregion and Eastern Highveld Grassland vegetation unit. The Grassland Biome covers approximately 28% of South Africa (Mucina & Rutherfords 2006). According to Mucina & Rutherfords (2006) this vegetation unit has a conservation status of endangered. The conservation target for this area is 24% and only a small portion is conserved in statutory and private reserves. Eastern Highveld Grassland consists of the plains between Belfast in the east and the eastern side of Johannesburg in the west and also extends towards Bethal, Ermelo and the west of Piet Retief.

This vegetation type is associated with slightly to moderately undulating planes and includes low hills and pan depressions. The general vegetation is short dense grassland with small scattered rocky outcrops and some woody species. About 44% of this vegetation unit has been transformed by cultivation, plantations, mines, urbanisation and the building of dams. Although no serious alien invasions are reported, Acacia mearnsii may become dominant in disturbed areas. Erosion in these areas is low (Mucina & Rutherfords 2006).

- **Climate**

Methodology and Data Sources

The climate information was obtained from the Climate of South Africa database.

Regional Description

Mpumalanga's weather is naturally defined by its topography. Mpumalanga is a province of two halves, namely the high-lying grassland savannah of the Highveld escarpment and the subtropical Lowveld plains. The western side of Mpumalanga, on the Highveld escarpment, is like a rise of tropics, an ascent into an uncompromising range of temperatures. The west is drier, hotter and much colder than the rest of the Mpumalanga province.

The Lowveld is subtropical, due to its proximity to the warm Indian Ocean and latitude. The Highveld is comparatively much cooler, due to its altitude of 2300 m to 1700 m above sea level. The Drakensberg Escarpment receives the most precipitation, with all other areas being moderately well-watered by mostly summer thunderstorms. The Highveld often experiences severe frost, whilst the Lowveld is mostly frost-free. Winter rainfall is rare, except for some drizzle on the escarpment. The differences in climate are demonstrated below by the capital, Nelspruit, which is in the Lowveld, located just an hour from Belfast on the Highveld.

Mean Monthly and Annual Rainfall

The proposed coal mining area is located in the summer rainfall region of South Africa and thus receives most of its rainfall during this period. Station 0478093 Ogies reflects a mean annual precipitation (MAP) of 719 mm, recorded over the course of 92 years (1908 - 2000) (Jones and Wagner, 2010). Precipitation is often characterised by intense thunderstorms, which occur mainly in the late afternoon, from October to March, with the maximum in January. These thunderstorms, although brief, are often ferocious, and are accompanied by thunder, lightning and occasional hail, and are generally followed by clear skies (DEA, 2010).

Table 14: Average rainfall per month, over a ten month period from 1989 – 1999

MONTH	AVERAGE NUMBER OF RAINY DAYS PER MONTH	AVERAGE RAINFALL PER MONTH (mm)
January	9.9	87.5
February	7.1	99.5
March	7.6	82.3
April	2.9	31.6
May	0.8	4.1
June	1.5	14.2
July	0.4	1.6
August	1.0	6.1
September	3.2	30.4
October	6.4	79.1
November	7.8	98.9
December	9.7	85.7

Wind speed and direction

Wind roses summarize the occurrence of winds at a specified location via representing their strength, direction and frequency. Calm conditions are defined as wind speeds of less than 1 m/s which are represented as a percentage of the total winds in the centre circle. Each directional branch on a wind rose represents wind originating from that specific cardinal direction (16 cardinal directions). Each cardinal branch is divided into segments of different colours which represent different wind speed classes. For the current wind roses, wind speed is represented in classes, 1 to 2 m/s in blue, 2 to 4 m/s in dark green, 4 to 6 m/s in light green and > 6 m/s in yellow. Each circle represents a percentage frequency of occurrence.

Between 00:00 to 05:59, winds are predominantly from the north (15% of the time) and north-north-east (13% of the time). During the morning (06:00 to 11:59), winds are predominantly from the north (15.5% of the time) and north-north-west (10.5% of the time). During the afternoon (12:00 to 17:59), winds are predominantly from the north-west (14.5% of the time) and north-north-west (12% of the time). During the evening (18:00 – 23:59), winds are predominantly from the north (11.0% of the time) and north-north-east (10.75% of the time).

During summer (DJF), winds are predominantly from the north (17.5% of the time) and north-north-east (10.5% of the time). During autumn (MAM), winds are predominantly from the east (10.5% of the time) and east-south-east (9.46% of the time). During winter (JJA), winds are predominantly from the south-east (13.75% of the time) and east-south-east (13.5% of the time). During spring (SON), winds are predominantly from the north (22.5% of the time) and north-north-east (13%).

The average monthly wind speed is 10.26 m/s for the period 1993 - 2003. The maximum wind speed of 13.6 m/s was measured in October 1995 and the minimum wind speed of 8 m/s was experienced in June and July 2000.

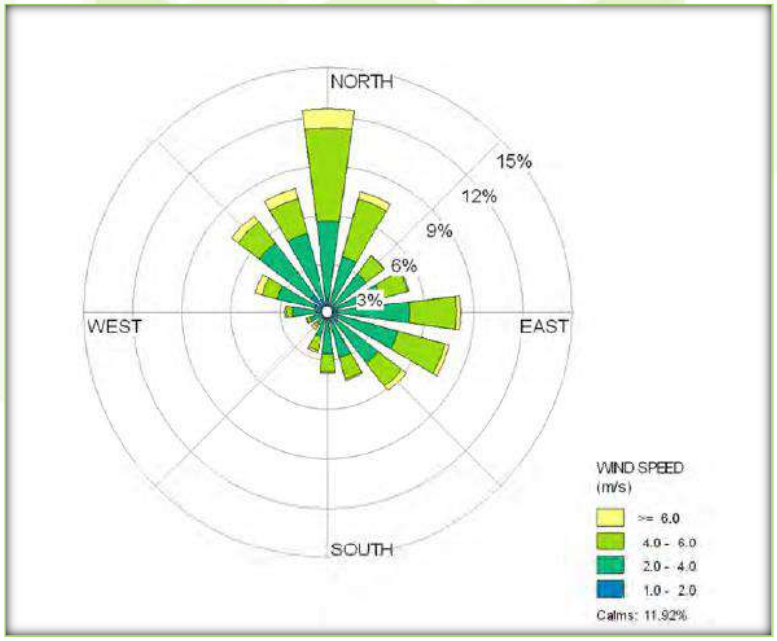


Figure 37: Modelled wind rose for 2010 (average wind velocities and directions)

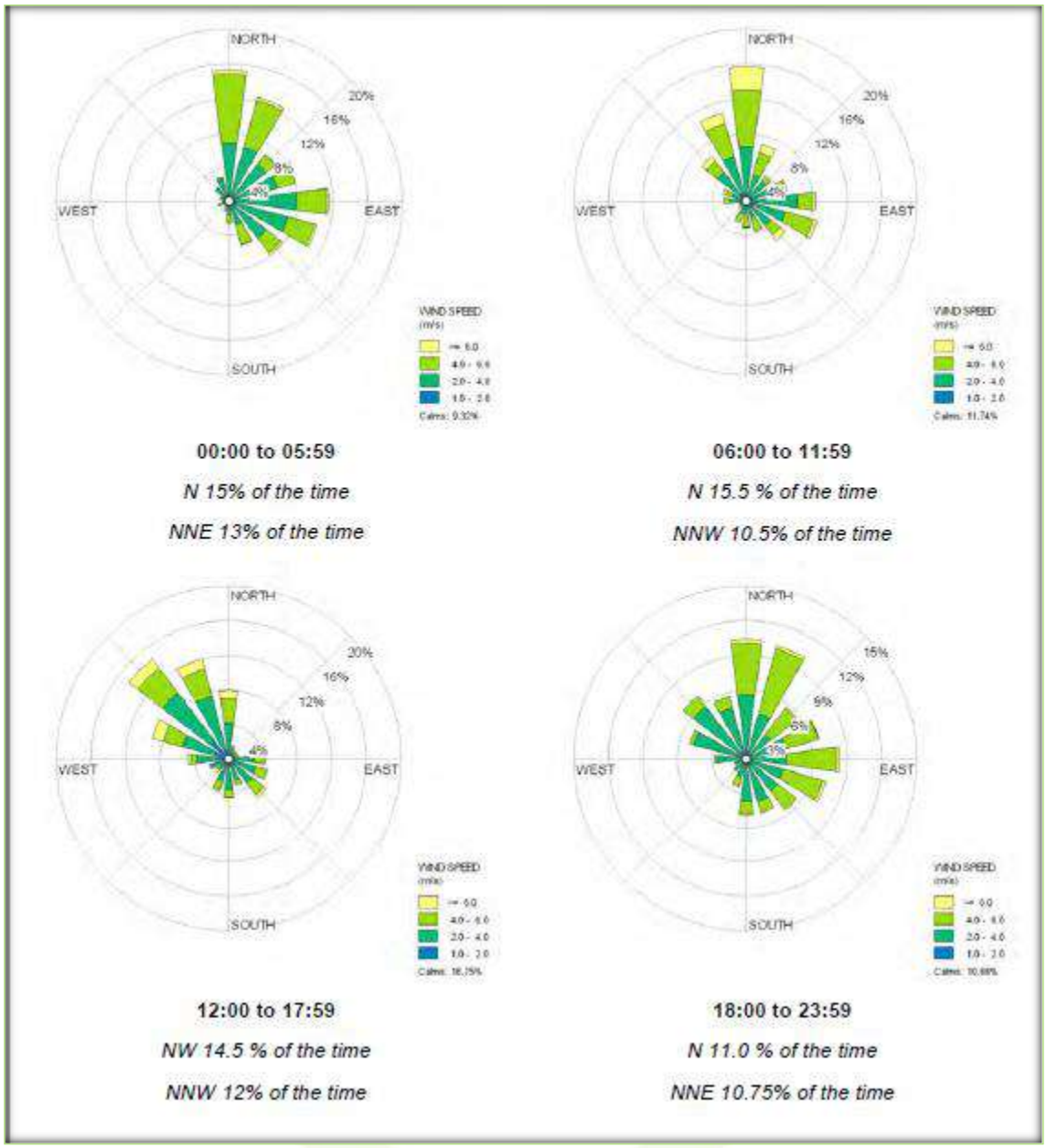


Figure 38: Modelled diurnal wind roses with predominant wind direction for 2010

Mean monthly maximum and minimum temperatures

The temperature profile depicts what is typically expected for the Highveld. The highest temperatures in the region are experienced during the summer months of December, January and February and the lowest during the winter months of June, July and August. The average daily maximum temperatures range from approximately 24°C in January to approximately 16°C in June, with minima ranging from approximately 13°C in January to approximately 1°C in June (World Weather Online, 2011).

The mean daily maximum temperature is 46 – 27°C in December / January and in July 17°C. The mean daily minimum ranges from 13°C in January to 0°C in July.

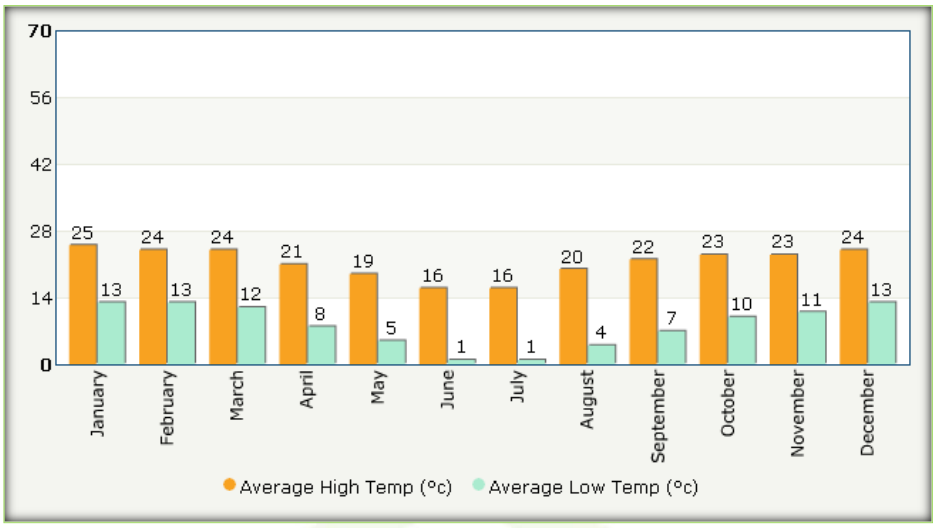


Figure 39: Average high and low temperatures for Ogies in 2010 (source: World Weather Online, 2011)

Mean monthly evaporation

Gross annual average "A" pan evaporation at Bethal is 1,702 mm, and at Kriel, 1,733 mm. Maximum evaporation occurs in summer from October to January, due to high summer temperatures. Thunderstorms are frequent during the rainy season and are usually accompanied by lightning, heavy rain, strong winds and sometimes hail. The storms are highly localised.

Table 15: Evaporation records for station 0478/867 Bethal

Month	Mean monthly evaporation (mm)
January	179.8
February	151.1
March	147.8
April	111.1
May	94.8
June	79.2
July	89.0
August	132.0
September	167.0
October	186.6
November	167.6
December	195.9
Annum	**1702.0**

- **Sensitivities**

There are no foreseen climatic sensitivities associated with the site or the proposed activity.

❖ **Geology and Soils**

Methodology and Data Sources

A desktop screening assessment, using a Geological Map was undertaken of the geological environment. The geological data was taken from the Environmental Potential Atlas Data (EMPAT) from the DEA.

Regional Description

The Kaapvaal Craton underlies the north-eastern part of the country. It is made up largely of Archaeoan gneisses and granitoids (Basement Complex), along with lesser volumes of metamorphosed, volcano sedimentary rocks (greenstone belts). In Mpumalanga the Basement Complex is found in the Lowveld and as scattered patches in the southern Highveld. This stratum consists of various

rocks such as dolerite, granite, gneiss, gabbro, norite, tuff, and shale. The gneiss and granites are weakly mineralised but do host pegmatite minerals (including feldspar, mica, and silica), corundum, graphite, and epigenetic copper and gold in places. The Barberton Supergroup represents the greenstone belts in Mpumalanga. This stratum is found in the Barberton and northern part of the Eerstehoek areas. The greenstones are economically important, hosting gold, antimony, copper-zinc, iron, asbestos, talc, mercury, magnesite and gemstone deposits. Rocks found in this stratum are arenite, conglomerate, shale, lava, pyroclastic, lutaceous arenite and volcanic rocks.

The Barberton Mountain Land is the most-significant gold producing greenstone belt in South Africa. A small patch of the Murchison Supergroup is found in the northern part of the Kruger National Park and is a source of antimony. Rocks in this stratum include lava and schist. Large sedimentary basins of the Kaapvaal Craton hold some of South Africa's richest mineral resources. The sedimentary strata of the Witwatersrand Supergroup and the West Rand Group (lower layers of Witwatersrand Supergroup) and Central Rand Group (upper layers of Witwatersrand Supergroup) are confined to the Balfour area in Mpumalanga. This stratum constitutes the world's largest repository of gold.

Rocks that typically forms part of this strata are quartzite, conglomerate and shale. The Pongola Supergroup is of similar strata and is found in the Piet Retief and eastern part of the Ermelo districts. Rocks in this stratum include basalt, andesite, quartzite, shale and hornfels. Volcanic and sedimentary rocks of the Ventersdorp Supergroup, which overlies the Witwatersrand Supergroup, host gold concentrations along parts of their basal contact with the Witwatersrand strata. The Ventersdorp Supergroup is found in the Balfour area and small patches in the western part of the Standerton area. Rocks found in this stratum include andesite and tuff. The Transvaal Sequence was formed by the infilling of the Transvaal basin. This stratum is located in the north-western part of Mpumalanga, and stretches from Pilgrim's Rest to Delmas. The Bushveld Complex intrudes the Transvaal Supergroup. The complex covers the northern part of the Northern Highveld. The economic value of this stratum is the significant resources of chrome, platinum, cobalt, copper, nickel, vanadium, tin, fluorite, black norite, red syenite, titaniferous magnetite uranium, baddeleyite, gold, silver, vermiculite and merchant grade phosphate (apatite). The Waterberg Group covers part of the Transvaal Sequence in the Kwa-Mhlanga, Witbank and Middelburg areas. The vast Karoo basin that covers about two thirds of South Africa, hosts the fluviodeltaic sediments and coals of the extensive Ecca Group. The southern part of Mpumalanga up to the southern half of Witbank, Middelburg, Belfast, the western half of Carolina, Delmas, Kriel, Ermelo, Bethal, Balfour, Standerton, Amersfoort, Volksrust, Wakkerstroom and patches in the Piet Retief district, are covered by the Ecca Group. Sediments of the Karoo Sequence are also found in the north-western part and on the eastern border of Mpumalanga. These overlie shallow lithosols and well-developed, sometimes leached, mature soils, respectively. The main geological types are quartzites, shales, basalts, andesites, conglomerates, irons, granites and gneiss.

Quartzite ridges of the Witwatersrand Supergroup and the Pretoria Group as well as the Selons River Formation of the Rooiberg Group (last two are of the Transvaal Supergroup), supporting soils of various quality (shallow Glenrosa and Mispah forms especially on rocky ridges), typical of Ba, Bc, Bb and Ib land types.

Table 16: Lithostratigraphy

AGE	SEQUENCE	GROUP	FORMATION	LITHOLOGY
Permian	Karoo		Ecca	(Pe) Shale, shaly sandstone, grit sandstone, conglomerate, coal in places, near grit and top.
Permian	Karoo		Dwyka	(Pd) Tillite, shale
Mogolian1			Intrusive	(di) Diabase
Vaalian	Rashoop Granophyre Suite		Intrusive	(Vra) Red to grey granophyric quartz feldspar rocks
Vaalian			Loskop	(Vl) Shale, sandstone, conglomerate, volcanic rocks
Vaalian		Pretoria	Magaliesburg	(Vm) Quartzite, minor hornfels

Vaalian		Pretoria	Silverton	(Vsi) Shale, carbonaceous in places, hornfels, chert.
Vaalian		Pretoria	Daspoort	(Vdq) Quartzite

- **Sensitivities**

There are no foreseen geological sensitivities posed upon the site or the proposed activity.

❖ **Topography and Land Capability**

Methodology and Data Sources

The topography of the area was taken from the Surveyor General 1:50 000 topocadastral map sheet of the area. Land Use was determined utilising a Geographic Information Systems (GIS) desktop study, the data was obtained from the DWAF database.

Regional Description

The topography of a particular area will determine the following factors:

- Flow of surface and groundwater;
- Depth of soils and the potential for soil erosion, dependent on the slope of the study area;
- Type of land use;
- Aesthetic appearance of the area; and
- Climatic factors such as wind speeds and direction.

Changes in the topography caused by the mining activities could therefore alter all of the above mentioned aspects of the environment. Project-related activities have the potential to alter the topography of the site through the establishment of both temporary and permanent infrastructures. The topography of Mpumalanga can be split into three broad zones, namely Highveld, Escarpment and Lowveld. The upper part of the Olifants River catchment forms part of the Highveld and is composed of undulating plains and pans, and a large open flat area, referred to as the Springbok Flats. The municipal area of Emalahleni is situated in the Highveld region with an average elevation of 1 629 m above sea level and altitudes varying between 1 300 to 1 650 masl. The average elevation of the project area is 1 550 MASL.

Sensitivities

There are no foreseen topographical sensitivities in the study area.

❖ **Geohydrology**

Methodology and Data Sources

The basic geohydrological assessment is partially based on a desk-top study with all the information gathered from previous geohydrological investigations conducted for the area. Site specific studies and associated information have been assessed and used for the investigation as part of the EIA. The following studies have been used as references:

- Digby Wells Environmental, 2015. *Environmental Impact Assessment for BHP Billiton Weltevreden Expansion Project.* (https://sahris.sahra.org.za/sites/default/files/additionaldocs/KPSXW_EIA_20150424_Draft%20Environmental%20Impact%20Assessment_Approved_V4_0.pdf)
- Shangoni AquiScience, 2019. *Nasonti Technical Services (Pty) Ltd: Geohydrological Impact Assessment.*
- GPT, 2018. *Basic groundwater assessment for Portion 46 of the farm Elandsfontein 309 JS.*

Site-specific information sources include:

- A hydrocensus conducted in the Algatorque mining permit area by Eco Elementum (Pty) Ltd. in February 2020.
- Monitoring borehole information obtained from EVRAZ Highveld Steel and Vanadium Limited.

Project Description

A description of the regional area information is given below:

The Algatorque mining permit are is located in the Highveld region of Mpumalanga and in a summer rainfall region. The mean annual precipitation is ± 700 mm/annum, while the evaporation can vary anywhere between 1 480 to 1 720 mm/annum. Drainage over the regional area is towards the west, while locally drainage is towards the south. The Algatorque mining permit area is underlain by sedimentary rocks from the Karoo Super group's Vryheid Formation. Geological structures such as dykes and faults are known to exist in the region of the Algatorque mining permit area. These structures and the weathered zone are possible pathways of elevated groundwater flow and contamination migration. Five coal seams are present in the Witbank Coalfields. The 4 seam will be the deepest seam mined at the Algatorque mining permit area. Two main aquifer systems are found in the Algatorque mining permit region. Firstly, the shallow weathered aquifer and secondly, the deeper, secondary aquifer. Groundwater levels in the shallow aquifer generally varied between 2 and 13 mbs. Deeper levels were observed in the boreholes located within the mining region just south of Algatorque and in one user borehole in Clewer. The deeper levels are therefore expected to be the result of dewatering for mining purposes and domestic purposes. The water levels in the deep, secondary aquifer boreholes varied between 0.4 and 14 mbs. The overall quality of the groundwater in the area indicate negative impacts from the historical activities of EVRAZ Highveld Steel & Vanadium.

Groundwater Sources:

Recharge:

Natural recharge: in the region of the Algatorque mining permit area the natural recharge is estimated between 1 and 3% of the MAP. Rivers and drainage systems can also be seen as potential recharge sources. Gaining or losing streams play a role here. Losing streams "lose" their water to the aquifer, making it a natural recharge source. The streams in the vicinity of the proposed project have not been identified as losing or gaining streams or even disconnected streams if they are not connected in any way to the groundwater regime.

Artificial recharge: Artificial recharge from sources including PCD's, RWD's etc. are foreseen since these activities are proposed for the mining operation. The existing Scrubber dam which will be utilised as the PCD for the mining activities is unlined and will be an artificial recharge source of potential poor quality water. The backfilled opencast pit can act as an artificial recharge source since the recharge through the spoils can recharge the underlying aquifer directly. Artificial recharge from surrounding mining operations may already be taking place/have taken place.

Contamination Sources: At the proposed mining operation the potential contamination sources include the Scrubber dam, RWD and the plant area during the operational phase and the opencast pit itself, especially post closure and any carbonaceous source which may include ROM stockpiles or overburden stockpiles.

Groundwater pathways:

- Fault zones and dykes surrounding the proposed project area may be potential pathways for groundwater contamination migration. No site-specific geological structure information is available, but it is typical for Karoo geology to have these types of structures present.

Groundwater receptors:

- River Systems: any contamination from potential sources may be discharged in terms of baseflow into the receiving river systems in the area. No river systems are expected to be impacted on by the Algatorque mining activities alone.
- Potential groundwater users: In the area of the proposed mining operation's impact zone no known groundwater users exist. The impact zone may increase should pathways such as geological structures be present.

Opencast pit: once dewatering of the pit commence, water will flow towards the pit and therefore act as a groundwater receptor, even though an artificial receptor.

The potential impacts as a result of the proposed mining operations at the Algatorque mining permit area are:

Construction phase:

- Impacts in terms of groundwater levels are expected during this phase. The dewatering of the box-cut will cause a drawdown in the water levels within the immediate vicinity of the cut.

- Fuel spillages from construction vehicles may occur during this phase.

Operational phase:

- Impacts in terms of groundwater levels are expected during this phase. The dewatering of the pit will cause a drawdown in the water levels within the immediate vicinity of the opencast activities.
- The drawdown cone extent will extent some area from the mining operations in the shallow weathered aquifer.
- The maximum drawdown is expected to be as deep as the difference between the static water level and the deepest floor elevation in the pit.
- No adverse impacts on the groundwater qualities surrounding the opencast are expected during this phase.
- Groundwater quality impacts from the proposed infrastructure including the plant area, RWD and Scrubber dam can be expected during the operational phase.

Post Closure:

- The sulphate concentrations in the pit area increases as a result of acid generation.
- The water level post-closure will start to rise as the back-filled pit starts to fill.
- Decant may occur once the water level in the back-filled opencast pit has recovered.
- Once the water levels have recovered, a groundwater pollution plume will start to migrate down gradient away from the pit.

The proposed potential mitigation measures for the mining operation are summarised below:

Operational phase:

- Groundwater levels in the monitoring boreholes should be measured on at least a quarterly interval.
- Should the water levels of surrounding users be influenced in terms of groundwater level or quality decline, the users should be compensated.
- Monitor groundwater inflow rates on a monthly basis throughout the mining operation.
- The groundwater quality in the monitoring boreholes should be analysed on a quarterly basis.
- Annual reporting on the groundwater qualities and levels should be conducted and submitted to the DWA.
- The numerical model should be updated once more time-series monitoring data (water levels and qualities) are available.
- Cut-off trenches and passive treatment of contaminated water collected in the trenches downgradient of potential sources such as the Scrubber dam should be implemented.

Post-closure phase:

- Carbonaceous material should be placed at the deeper base of the opencast pit to allow flooding with groundwater as soon as possible. This will reduce the redox reaction potential as oxygen is excluded from the system.
- Rehabilitation should occur in such a manner that surface runoff is directed away from the rehabilitated pit and recharge to the pit minimized.
- Flow paths which include fracture zones should be sealed to reduce inflow of fresh groundwater and outflow of contaminated groundwater.
- Methods of handling the potential decant as well as poor quality water in cut-off trenches from the Scrubber dam should be investigated and may include treatment of polluted water. Passive treatment options should be investigated.
- The groundwater quality in the monitoring boreholes should continue to be analysed on a quarterly interval basis.

The impacts are described below and summarised in Table 17 below.

Table 17: Potential impacts and recommended mitigation measures

Phase	Potential Impacts	Mitigation Measures
Construction	This phase is not expected to influence the groundwater levels. With the exception of lesser oil and diesel spills, there are also no activities expected that could impact on regional groundwater quality.	A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills.
Store all potential sources in secure facilities with appropriate storm water management, ensuring contaminants are not released into the environment.		
Ensure that the appropriate design facilities (berms, storm water channels etc.) are constructed before constructing the coal handling facilities / boxcuts / adit.		
Implement the EMP's of other environmental related aspects, including pollution prevention and impact minimisation.		
Groundwater monitoring boreholes should be sited at designated positions based on final infrastructure layout, to comply with the design requirements of a groundwater monitoring system, as recommended.		
Groundwater monitoring boreholes should be installed to comply with the minimum requirements as set by governmental guidelines.		
Operational	During the operational phase, it is expected that the main impact on the groundwater environment may be de-watering of the surrounding aquifer. Water entering the mining area will have to be pumped out to enable mining activities. This may cause a lowering in the groundwater table in- and adjacent to the mine.	Monitor static groundwater levels on a quarterly basis in all boreholes within a zone of one kilometer surrounding the mines to ensure that any deviation of the groundwater flow from the idealized predictions is detected in time and can be reacted on appropriately.
If it can be proven that the mines are indeed affecting the quantity of groundwater available to certain users, the affected parties should be compensated. This may be done through the installation of additional boreholes for water supply purposes, or an alternative water supply.		
The numerical model should be updated during operation of the mines by using the measured inflows, water levels and drilling and pump test information to re-calibrate and refine the impact prediction		
If it is proven that dewatering of the mines is impacting on baseflow, various options should be investigated such as if clean discharge is available to be pumped back into the surrounding streams/rivers/wetlands. A surface water specialist should be consulted in this regard.		
Groundwater quality must be monitored on a quarterly basis.		
The monitoring results must be interpreted annually by a qualified hydrogeologist and the monitoring network should be audited annually to ensure compliance with regulations.		
The numerical groundwater model must be updated by calibrating the model with monitoring data.		
Water retention dams should be lined to prevent ingress of contamination.		
Geochemical testing of the backfill material and pillar material should be conducted to aid in the prediction of contaminant release and potential geochemical changes induced in the subsurface, by means of geochemical modelling.		

Clean and dirty water systems should be separated as planned.		
It must be ensured that a credible company removes used oil after vehicle servicing.		
A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills.		
Store all potential sources in secure facilities with appropriate storm water management, ensuring contaminants are not released into the environment.		
Sewage effluent emanating from latrines or ablution blocks should be treated to acceptable levels before discharge into the environment.		
Phase	**Potential Impacts**	**Mitigation Measures**
Post-Mining	Following closure of the mine, the groundwater level will rise to an equilibrium that will differ from the pre-mining level due to the disturbance of the bedrock. However, this change is likely to be minimal. Decant may occur after the rebound of groundwater levels. Once the normal groundwater flow conditions have been re-instated, polluted water (caused by interactions of geological materials and groundwater) could potentially migrate away from the mining areas.	The final backfilled opencast topography should be engineered such that runoff is directed away from the opencast areas.
Treatment of the decant may be viable, however all passive methods should be investigated first during the operational phase of the mine.		
Major fractures encountered while mining must be sealed by grouting, both on inflow and outflow areas.		
All sulphate containing waste material should be stored at the base of the opencast and flooded as soon as possible to exclude oxygen.		
A pollution control dam could be used to intercept polluted seepage water. This should be considered if it is found that the streams/rivers/wetlands are indeed negatively affected by pollution. Regular sampling of the streams/rivers/wetlands is essential to decide on this option if needed.		
Implement as many closure measures during the operational phase, while conducting appropriate monitoring programs to demonstrate actual performance of the various management actions during the life of mine.		
All mined areas should be flooded as soon as possible to minimise oxygen from reacting with the remaining pyrite.		
Mining should remove as much coal as possible from the opencasts and underground and separate acid forming and non-acid forming material. Deposit acid forming material at the base of the opencast.		
The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the opencast area.		
Quarterly groundwater sampling must be conducted to establish a database of groundwater quality to assess plume movement trends.		
Audit the monitoring network annually.		
Remove or remediate areas of hydrocarbon contaminated soils by following a risk based approach, take action if a negative risk is found. A risk assessment should be conducted by a qualified hydrogeologist.		

- Surface Drainage Features

Methodology and Data Sources

A specialist wetland delineation was conducted by Eco Elementum on the proposed mining area.

Regional Description

The study area is split in half by the B11K Quaternary Catchment that forms part of the Upper Olifants River Catchment, and the and B20G Quaternary Catchment that belongs to the Wilge River catchment area. The closest river to the study area is the Saalboomspruit, a perennial river flowing about 3 km to the southwest of the demarcated area.

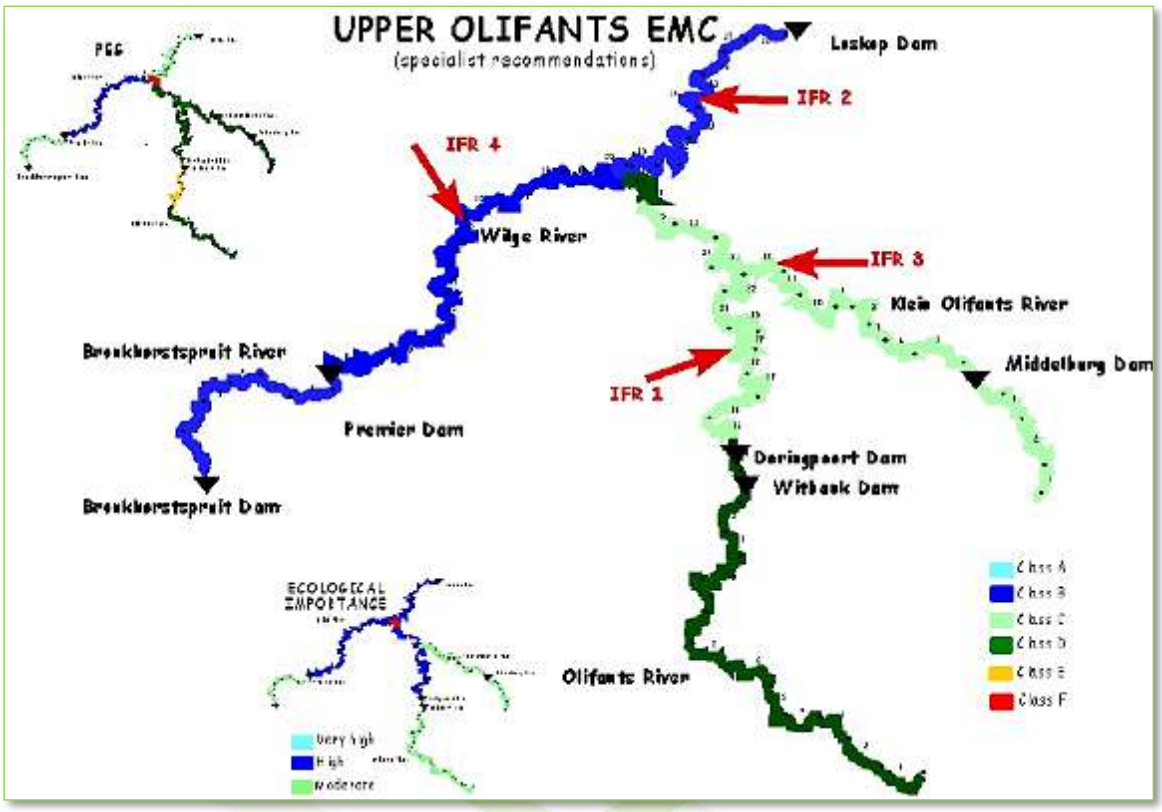


Figure 40: Upper Olifants River Water Management Area, (DWA 2001)

Figure 41: Olifants WMA Management Areas

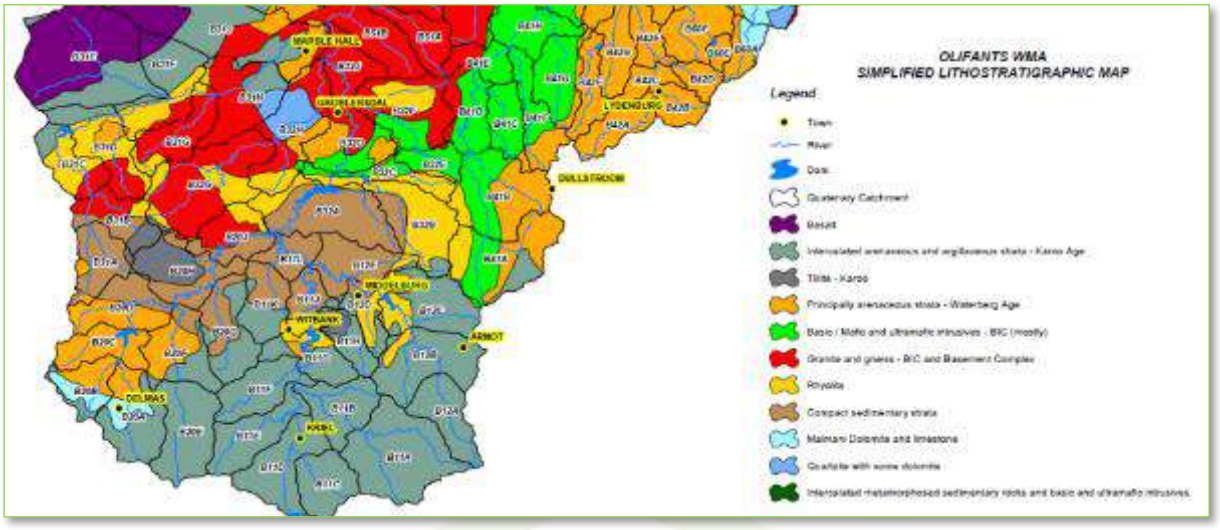


Figure 42: Olifants WMA simplified Lithostratigraphic map

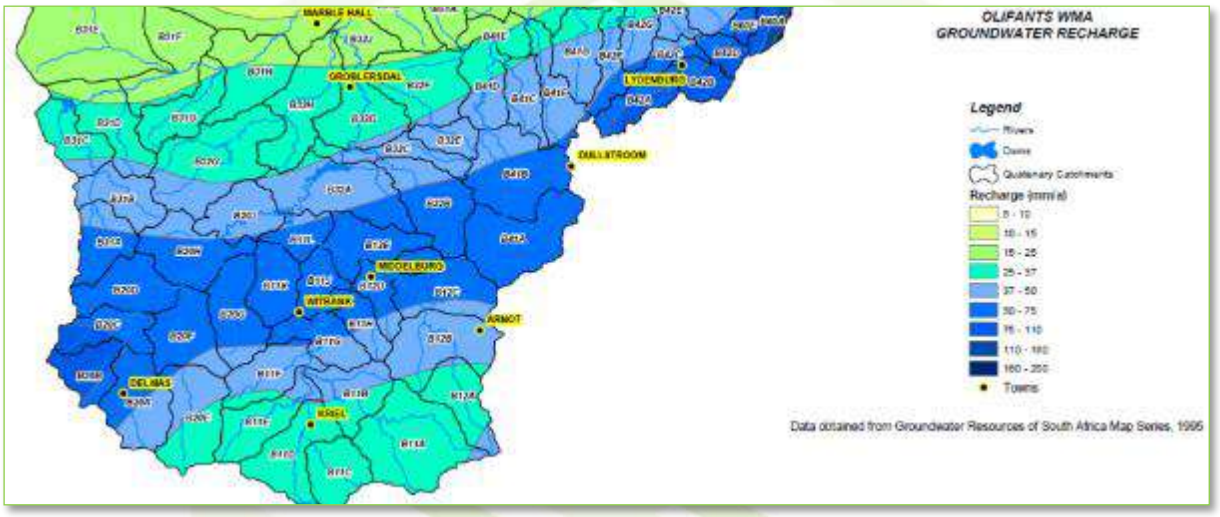


Figure 43: Olifants Groundwater recharge map

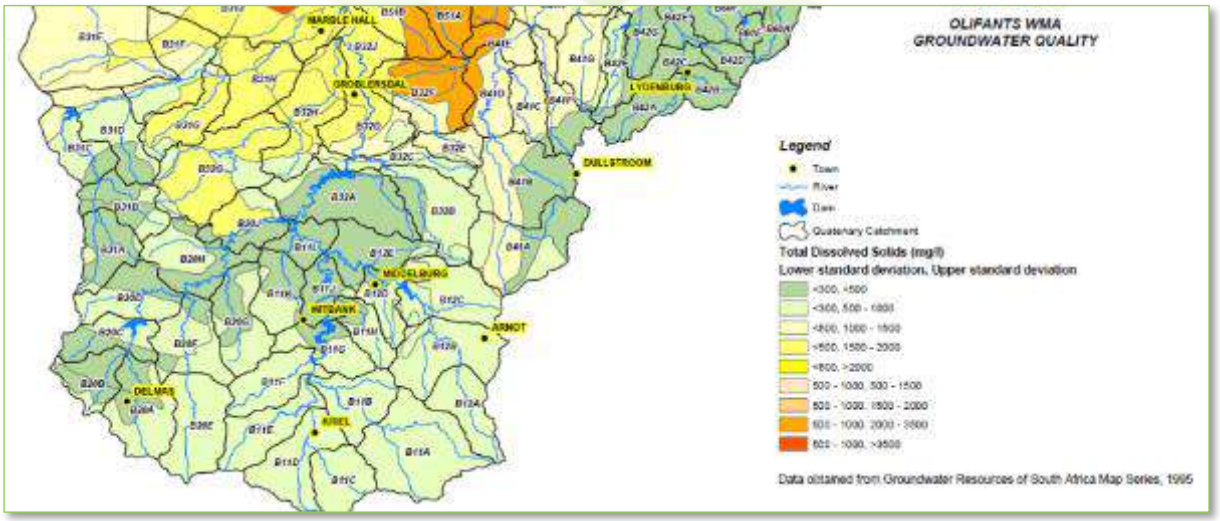


Figure 44: Olifants ground water quality

The study area is split in half by the B11K Quaternary Catchment that forms part of the Upper Olifants River Catchment, and the and B20G Quaternary Catchment that belongs to the Wilge River catchment area. Groundwater Harvest Potential Map of South Africa (Baron et al, 1998) classifies the study area as having an estimated groundwater harvest potential I of 10 000 to 15 000 m^3/km^2/year (i.e. relatively low). The average borehole yield is > 0.4 litres per second (L/s), and the total dissolved solids concentration of the (unpolluted) groundwater is between 200 and 300 mg/l (i.e. relatively fresh). No major groundwater abstractions are shown on the DWA1:500 000 scale hydrogeology map of the area (Sheet 4626 Johannesburg) in the area. The GRA2 data for the quaternary catchment B12B is summarized in the table below:

Most of the upper Olifants River Catchment falls within the Highveld Ecoregion, (elevation of 1460 to 1750 mamsl), characterised by gently undulating grasslands with numerous wetlands, and underlain the Vryheid formation Karroo Series sediments. Median annual simulated runoff per quaternary catchment varies from 10 to 460 mm. The coefficient of variation for annual simulated runoff per quaternary catchment varies between 40 and 160 % (Kleynhans *et al,* 1998).

Reserve Determination

Table 18: Reserve determination (Water Quality)

Parameter	Ambient Ground Water Quality	Basic Human Needs Reserve	Ground Water Quality Reserve
Electrical Conductivity (mS/m)	38	<150	41.8
pH	7.6	5.0 – 9.5	5.0 – 9.5
Sodium (mg/l)	17	<200	18.7
Magnesium (mg/l)	18	<100	19.8
Calcium (mg/l)	29	<150	31.9
Chloride (mg/l)	21	<200	23.1
Sulphate (mg/l)	21	<400	23.1

Table 19: Target water quality ranges

Chemical Parameter	Target Water Quality Ranges[9]		
	Class 0	Class I	Class II
pH	5-9.5	4.5-10	4-10.5
Electrical Conductivity	<70	70-150	150-370
Calcium as Ca	<80	80-150	150-300
Magnesium as Mg	<70	70-100	100-200
Sodium as Na	<100	100-200	200-400
Chloride as Cl	<100	100-200	200-600
Sulphate as SO_4	<200	200-400	400-600
Nitrate as NO_2 - N	<6	6-10	10-20

Table 20: Reserve determination (Water Quantity)

Tertiary	Recharge (Mm^3/a)	Groundwater baseflow (Mm^3/a)	Baseflow required	BHN Reserve (Mm^3/a)[10]	Reserve as % of Recharge
B12	50.25	11.08	5.06	-	10.00

Wetlands

From the NFEPA database, flat wetlands were identified within the project boundary. During the field survey these wetland areas was confirmed to be a part of the Scrubber Dam.

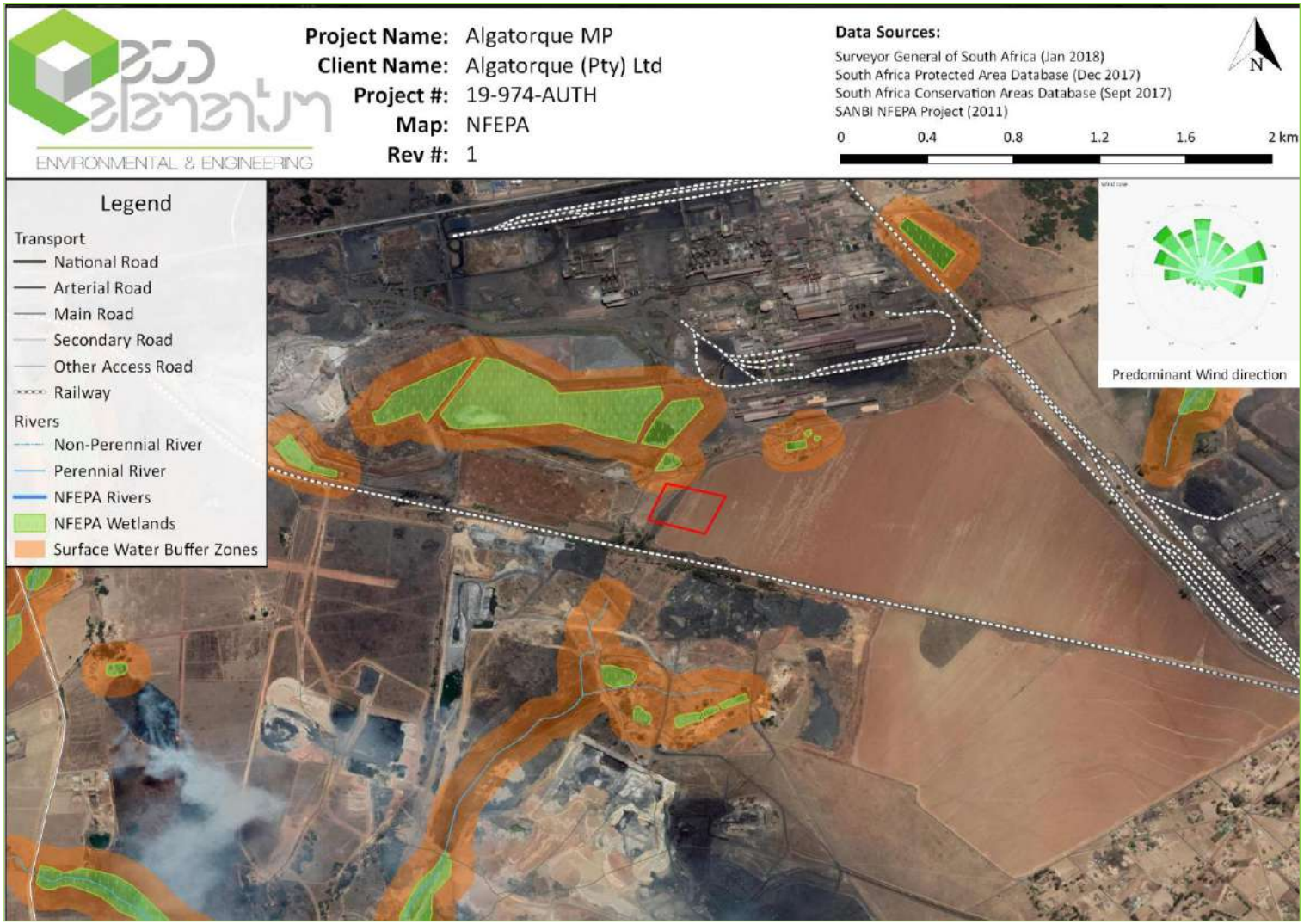
The Scrubber Dam has not been lined and have been seeping water through the walls. This created several pockets of several small artificial wetlands within the area.

No Red-List Category plant species were found during the BA study phase. The preferred site for mining activities is classified as moderately to heavily modified. Most of the area falls within the Eastern Highveld Grassland (Gm 12) vegetation type of the Grassland Biome. According to the Mpumalanga Biodiversity Sector Plan (MBSP) as well as the National List of Threatened Ecosystems, the Eastern Highveld Grassland's conservation status is Vulnerable (Mucina & Rutherford, 2006), with a conservation target of 24.9%. Only a very small fraction is conserved in statutory and private reserves, with the description of Protection Status from SNBA as Hardly Protected. The Mpumalanga Biodiversity Conservation Plan (MBCP) identifies both terrestrial and freshwater priority areas around the mining site in terms of reaching biodiversity targets. No wetlands can be seen on the proposed site from Google Earth or GIS mapping.

The impact on the vegetation type will have a low to medium significance on the site and low on the regional scale if disturbances are kept within the areas considered to be moderately to heavily modified areas and both aquatic and terrestrial CBA and ESA areas are avoided. If the project is approved, protected and red data plant species should be removed and transplanted if found on these sites. In conclusion this site is quite small and is considered moderately to heavily modified. If the mining permit is granted, mining activities should be conducted in such a way as to not disturb any red data species, or any other species or habitats in a significant way.

Sensitivities

Please refer to the maps below, Figure 46 indicating the buffer zones. All the surface water bodies are considered to be sensitive features, and should be avoided as far as possible.


Project Name: Algatorque MP
Client Name: Algatorque (Pty) Ltd
Project #: 19-974-AUTH
Map: NFEPA
Rev #: 1
Data Sources:
Surveyor General of South Africa (Jan 2018)
South Africa Protected Area Database (Dec 2017)
South Africa Conservation Areas Database (Sept 2017)
SANBI NFEPA Project (2011)
N
0 0.4 0.8 1.2 1.6 2 km
Legend
Transport
National Road
Arterial Road
Main Road
Secondary Road
Other Access Road
Railway
Rivers
Non-Perennial River
Perennial River
NFEPA Rivers
NFEPA Wetlands
Surface Water Buffer Zones
Predominant Wind direction

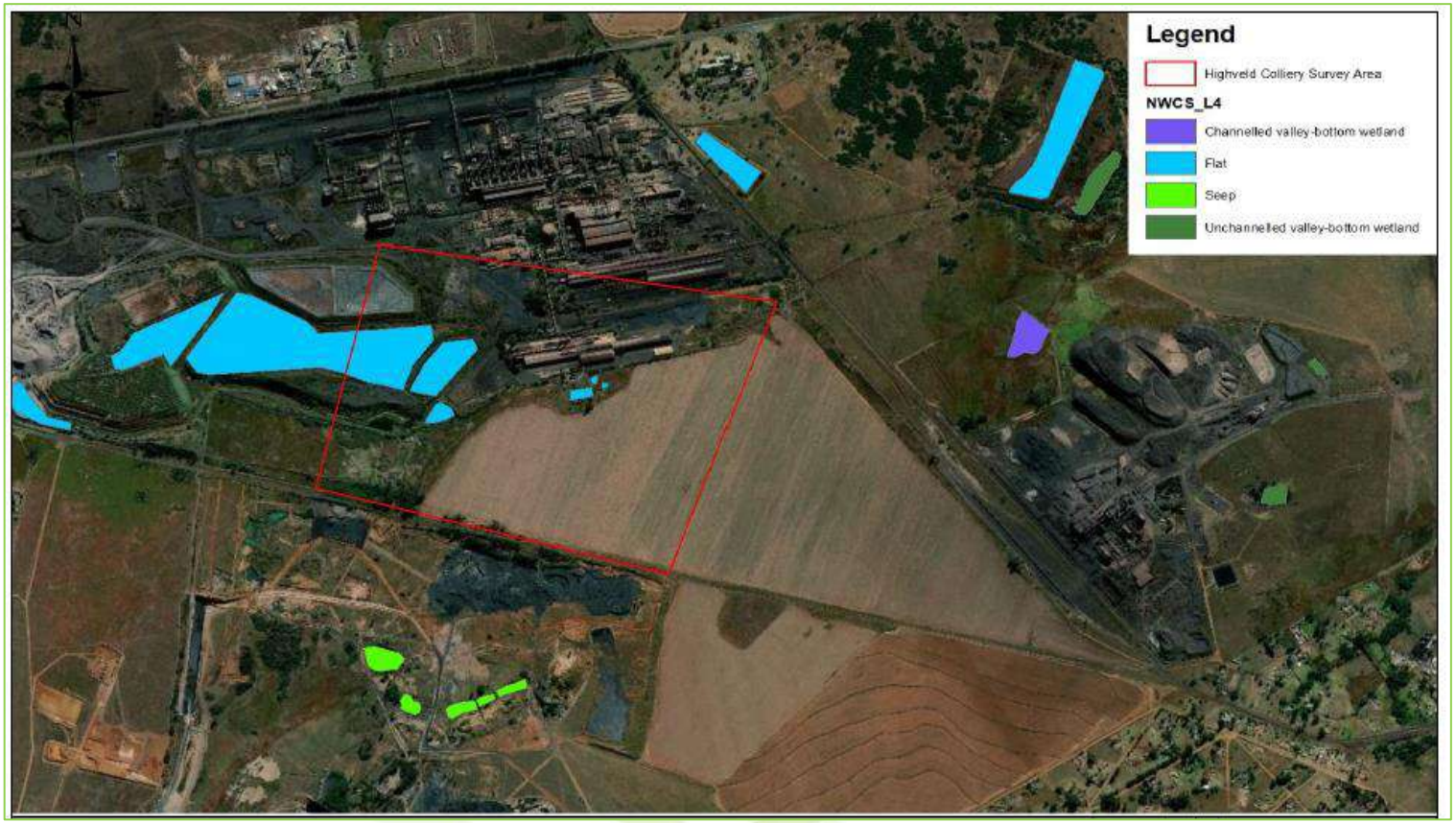


Figure 45: Proposed NFEPA sensitive areas with buffer zone

❖ **Fauna and Flora**

Methodology and Data Sources

A desktop ecological assessment will be completed by Eco Elementum to identify the sensitive flora and faunal species that may occur in the area.

Regional Description

This desktop study was compiled to form part of the Basic Assessment for the application of a Mining Permit by Algatorque (Pty) Ltd. The study area is located on portion 46 of farm Elandsfontein 309 JS, approximately 20 km west of the town of Witbank, Magisterial District of Emalahleni, Nkangala District Municipality in the Mpumalanga Province. The total area under this application is 4.65 ha.

The scope of the study included a desktop study to indicate the potential presence of common species of fauna and flora as well as red data or protected species and habitats, and consisting of the following:

- Review of existing information for the area e.g. EIAs, Specialist studies, prospecting right, WULA etc.;
- Analysis of recent Google maps;
- Desktop study of fauna and flora in the area;
- Review of endangered species known to occur in the area;
- Writing, printing and submitting of report to client.

Most of the site falls within the Eastern Highveld Grassland (Gm 12) vegetation type of the Grassland Biome. According to the Mpumalanga Biodiversity Sector Plan (MBSP) as well as in the National List of Threatened Ecosystems, the Eastern Highveld Grassland's conservation status is **Endangered** (Mucina & Rutherford, 2006), with a conservation target of 24%. Only a very small fraction is conserved in statutory reserves (Nooitgedacht Dam and Jericho Dam Nature Reserves) and in private reserves (Holkranse, Kransbank, Morgenstond), with the description of Protection Status from SNBA as Hardly Protected.

The Mpumalanga Biodiversity Conservation Plan (MBCP) identifies both terrestrial and freshwater priority areas in terms of reaching biodiversity targets. No wetlands can be seen on the proposed site on Google Earth.

According to the MBCP Terrestrial and Freshwater maps the conservation status of the site is Heavily Modified.

Available literature on fauna and flora for this site is spares and field studies might be needed to verify data and supplement information.

Proposed mining activities will potentially destroy the vegetation component and habitat at each site and the associated animals will move away from the sites (if any are present), however, the significance of the impact will only be able to be predicted once fieldwork has been completed.

The impact on the vegetation type will have a low to medium significance on the site and low on the regional scale if disturbances are kept within the areas considered to be moderately to heavily modified. If the project is approved, protected and red data plant species should be removed and transplanted if found on these sites.

- **Sensitivities**

In conclusion, this site is quite small and is considered moderately to heavily modified. If the mining permit is granted, mining activities should be conducted in such a way as to not disturb any red data species, which none was found, or any other species or habitats in a significant way.

❖ **Visual Impact**

Methodology and Data Sources

A Visual screening assessment and view shed, using a 1:50 000 geological map and 1:10 000 aerial photographs were undertaken of the geological environment. The geological data was taken from GIS and the Environmental Potential Atlas Data (EMPAT) from the DEA.

Regional Description

The visual impact as result of the proposed mining is expected to be of a low significance.

No new infrastructure to be permanently erected on the surface, as this will only be a temporary activity.

Screening elements such as trees and berms can often soften the visual impact of the temporary activities, if it poses a problem.

The Witbank area is mainly known for its coal mining activities. Two other main activities taking place include power generation by the burning of coal and agriculture. Research on Visual Impact Assessment conducted in the area for mines concluded that due to the meandering landscapes and the uniform vegetation, the area has a medium to high visual absorption capacity. This means that mining activities can be visually absorbed by the surrounding area. If rehabilitation of the surface is done correctly no long term visual impact should be present. Coal mining and Power Stations play an important role in the "Sense of Place" that has been created in the Ermelo District as this has been taking place since the 19th century in the area and continues to be a large economic driver of the area (and the country). The Highveld is known for its Power Stations and Coal Mines.

Sensitivities

There are no foreseen visual sensitivities in the study area, as the area has been heavily modified.

- **Air Quality**

Regional Air Quality

The Highveld Priority Area (HPA)

The overarching constitutional right to an environment that is not harmful to health or well-being is captured in the objectives of the National Environmental Management: Air Quality Act (No. 39 of 2004, AQA). Importantly, the promulgation of the AQA marked a turning point in the approach to air pollution control and governance in South Africa, introducing the philosophy of Air Quality Management, in line with international policy developments and the environmental right, i.e. Section 24 of the Constitution (Act No. 108 of 1996). The focus shifted from source control to management of pollutant levels in the ambient environment. Numerous tools and instruments are incorporated into the AQA, including the establishment of Priority Areas approach (Sections 18 to 20) of the AQA in so-called "hot-spot" areas where ambient air quality standards are exceeded or may be exceeded. This important air quality management tool has three strategic drivers:

- It effectively allows for the concentration of limited air quality management capacity (human, technical and financial) for dealing with acknowledged problem areas in order to obtain measurable air quality improvements in the short-, medium- and long-term;
- It prescribes a cooperative governance regime by effectively handing-up air quality management authority to the tier of government that can provide leadership and coordination; and
- It allows for cutting edge air quality management methodologies that take into account all contributors to the air pollution problem, i.e. "air-shed" air quality management.

The Highveld area in South Africa is associated with poor air quality and elevated concentrations of criteria pollutants occur due to the concentration of industrial and non-industrial sources. The Minister of Environmental Affairs therefore declared the Highveld Priority Area (HPA) on 23 November 2007. As the area declared overlaps provincial boundaries, the Department of Environmental Affairs (DEA) functions as the lead agent in the management of the priority area and is required in terms of Section 19(1) of the AQA to develop an AQMP for the priority area.

The Highveld Priority Area covers 31,106 km^2; including parts of Gauteng and Mpumalanga Provinces (see Figure 36).

The study area concerning the proposed Elandsfontein mining permit application presently falls within the Highveld Priority Area. However, due to a lack of available ambient monitoring data for the area, this report will draw reference to air quality monitoring data referred to by the surrounding mines in the area, namely Umlabu Colliery, Spitkops and Air Quality Management Plan for the Highveld Priority Area published by the Department of Environmental Affairs (2011).

Local Air Quality

An ambient Air Quality Baseline Assessment will be conducted for the proposed mining permit site during 2018. The study will focus on the proposed mining permit holder to comply with the South African National Standards 1929:2004 and resulting in the ambient air quality to be of a high standard. However, mining activities such as blasting and transportation of coal do negatively impact on the receiving environment. This impact is mitigated by the mine by means of dust suppression and other management measures to such a level where the impact is negligible small.

Sensitivities

Impacts related to the mine permit and air quality are minimal and there are no foreseen air quality sensitivities posed upon the site or the proposed activity.

❖ Cultural and Historical Environment

Methodology and specialist study

Mpumalanga has some of the richest geological, archaeological and cultural heritage in the world. The Karoo rocks contain massive seams of coal, which were formed in vast swamps from decomposing forests during a 100-million-year period between 200 and 300 million years ago, when Africa was attached to South America, India and Antarctica as part of the super-continent Gondwanan. Primitive plants, such as the famous *Glossopteris* flora, had colonised the entire southern hemisphere, and dinosaurs roamed across the landscape of Mpumalanga. Fossils of these animals are found in abundance and are commonly displayed in local museums.

Development at Transalloys, Emalahleni

A Cultural Heritage Impact Assessment was done for the construction of two pollution control dams for Transalloys on portions 34 and 35 of the Farm Elandsfontein 309 JS and portions 20 and 24 of the Farm Schoongezicht 308 JS. This development borders the proposed mining concerned in this report to the east. The HIA revealed one graveyard containing 90 graves consisting of different types of grave dressings and headstones. The oldest grave dates to 1947 and the most recent to 1960 (Van Vollenhoven 2014).

Klarinet Phase 2 Residential Development, Emalahleni

The HIA survey done for the development of a residential area on various portions of the Farm Blesboklaagte 296 JS and a portion of erf 5017 Klarinet X 7, located about 13 km northeast of the proposed mining revealed five heritage sites. These sites include building foundations, a possible grave, two graveyards and a single grave (Van Vollenhoven 2015).

A detailed phase 1 heritage assessment will be required when the drilling locations are identified and before any construction or operations may occur.

Sensitivities

The study area: Portions 46 of the Farm Elandsfontein 309 JS

As can be seen from previous research done in the area the general region is significant from a heritage perspective. Heritage sites are likely to include graveyards and Historical remains. Since heritage sites, such as graves, are not always clearly identifiable as it might consist of stone cairns, it is advised that a qualified archaeologist inspect the proposed mining permit sites prior to development to establish whether the site might be sensitive from a heritage perspective.

The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences.

A fundamental aspect in the conservation of a heritage resource relates to whether the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. There are many aspects that must be taken into consideration when determining significance, such as rarity, national significance, scientific importance, cultural and religious significance, and not least, community preferences. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and if appropriate mitigated in order to gain data / information which would otherwise be lost. Such sites must be adequately recorded and sampled before being destroyed.

❖ Social and Economic Environment

The role of an SIA as part of an EIA study cannot be downplayed as it aids in providing a better understanding of the affected communities who make up the social environment. The Guidelines for Involving Social Assessment Specialists in EIA Processes (DEADP, 2007), outlines the following as key components of an SIA:

- "Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA.

- Collecting baseline data on the current social environment and historical social trends.
- Identifying potential alternatives.
- Identifying and collecting data on the SIA variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities.
- Assessing and documenting the significance of social impacts associated with the proposed intervention.
- Assessing the alternatives and identifying potential mitigation measures.
- Developing a Monitoring and Evaluation Programme."

The project is located in eMalahleni Local Municipality, a municipality covering just less than 2,700 km² in Nkangala District Municipality, Mpumalanga Province. The local municipality has a population of approximately 407,100 (increasing by 23% since 2005) and a relatively high population density of 152 per km² compared to national levels of 41 per km².

The municipality is mostly characterised by rural farmland, dispersed urban settlements, coal mines and power stations. Although eMalahleni is traditionally known for coal mining and electricity production, other manufacturing industries are also developing, making eMalahleni a prominent industrial node. Urban centres have largely been developed around mining and electricity operations, some of which are now decommissioned. These account for the high population density and include the eMalahleni complex, the largest urban area in the municipality, Kriel, and Ogies, the closest buying centre to the project area approximately 10km away, housing several businesses including filling stations, groceries, banks and medical facilities. The project footprint is located on mine-owned land. Two small businesses, an engineering firm and a small restaurant / shop, are within 100 m of the project footprint. Within a 5 km radius, the project area is surrounded by agricultural land to the south and west, interspersed with farm houses, operations and farmworker housing, and mine-owned land to the north and east. Heavy vehicles on surrounding roads and evident mining activities are visible everywhere in this area.

Given the natural resources of the municipality and associated developments, employment is centred on the mining and quarrying industry sectors and the wholesale and retail trade, each sector representing 23% of employment in eMalahleni Local Municipality. However, mining and quarrying have a significantly larger economic contribution, with the sector representing 40% of Gross Value Added (GVA) in the municipality, compared to only 6% at national level. Manufacturing, predominantly in eMalahleni town, is the second largest and increasingly important economic contributor, representing 18% of GVA in 2010, an increase of 6% since 2000.

Table 21: Annual household income categories in the Olifants WMA (Census 2001)

Income Category	Number of Households
Very Poor (no income-R9600)	261 827
Poor (R9601-R38 400)	133 456
Tolerable (38 401-R76 800)	35 036
Comfortable (R76 801-R153 600)	20 790
Wealthy (R153 601 & above)	13 286
Total	**464 395**

Table 22: Employment by sector in the Olifants WMA (Census 2001)

Sector	Employment
Agriculture; hunting, forestry and fishing	25 959
Mining and quarrying	33 858
Manufacturing	30 415
Electricity; gas and water supply	7 668
Construction	20 309
Wholesale and retail trade; repairs, hotels and restaurants	40 693
Transport, storage and communication	11 752
Financial intermediation; insurance; real estate and business services	16 711
Community; social and personal services	57 393
Private households	35 212
Extraterritorial organisations	11
Representatives of foreign governments	16
Undetermined	21 924
Total	**301 920**

❖ Mpumalanga Province

The trade industry (wholesale and retail trade) employed the largest share of individuals in the province at 24.9 per cent at the end of the first quarter 2012. This was larger than the 24.8 per cent share registered 12 months earlier.

Community and social services (16.3 per cent) was the second biggest employer, albeit with a smaller share than at the end of the first quarter 2011 (19.6 per cent). The utilities industry was the smallest in both quarters, followed by transport as the second smallest. In this regard, transport (14 000), agriculture (12 000) and mining (12 000) were the three industries in Mpumalanga that recorded the highest employment increase from the start of the first quarter 2011 to the end of the first quarter 2012. Private households (not in industry in the true sense of the word) also registered an increase of 13 000 year-on-year. Community services (23 000) recorded the highest number of job losses over the same period. The strong reliance upon Community Services as most important economic sector, in e.g. employment provision still raises some concern in the CRDP municipalities. Primary industries (viz. Agriculture and Mining) provide fuel for the economic vehicle to run – but the engine resides in the Secondary industries, viz. Manufacturing, Utilities and Construction. The contribution in these industries is extremely low and should become the future focus to facilitate the process of alleviating and ultimately eradicating poverty.

The implementation of the CRDP projects in the seven pilot municipalities in Mpumalanga provided the opportunity for hindsight analysis. The CRDP wards were selected from the following seven (7) local municipalities: Mkhondo, Dr Pixley ka IsakaSeme, Albert Luthuli, Nkomazi, Bushbuckridge, Dr JS Moroka and Thembisile Hani. There should be an increased motivation for the inhabitants in these wards to become involved in the secondary industries – especially manufacturing and utilities.

It is clear from the above that the non-CRDP municipal areas dominated the provincial economy in 1996 (85.6 per cent) and strengthened its position over the 14-year period with an 87.1 per cent contribution to provincial GVA in 2010. In 2010, the CRDP municipal areas made only meaningful contributions to the provincial community services (30.3 per cent), agriculture (29.2 per cent), construction (20.2 per cent) and trade (19.1 per cent) industries. Over the 14-year period under consideration, the CRDP grouping only increased its share of agriculture (from 28.5 per cent to 29.2 per cent) and utilities (from 6.7 per cent to 7.3 per cent).

To follow is an excerpt from the report, indicating the key findings:

- Unemployment was considerably higher in the 7 CRDP areas (average of 38.4 percent) compared to the 11 non-CRDP areas (19.7 per cent);
- A higher share of the population in the CRDP areas lived in poverty (an average of 51.4 per cent) compared to residents in the non-CRDP areas (37.5 per cent);

- The CRDP areas 'percentage of households with formal housing (89.7 per cent) and electrical connections (85.9 per cent) were higher than non-CRDP areas;
- Bushbuckridge finished 2010 with the lowest infrastructure index score (an indicator of service delivery) of the 18 municipalities in Mpumalanga;
- The community services industry was the industry that employed the largest number of workers and made the largest economic contribution in the CRDP areas –a high dependence on government;
- Four of the CRDP areas recorded poverty rates of more than 50 per cent, with Mkhondo registering the highest (worst);
- Three of the CRDP areas recorded unemployment rates of more than 40 per cent, with Bushbuckridge registering the highest (worst); and
- Five CRDP areas are expected to achieve economic growth in excess of 3.0 percent over the period 2010-2015, with Dr Pixley Ka Isaka Seme leading at 4.7 per cent.

Mpumalanga province is the second smallest in size after Gauteng measuring 76495km^2 and covering 6.3% of the land area in the country. This current land area represents a decrease in the land area as the size recorded during census 2001 was 79487 km^2. This decrease is attributed to the allocation of land to the City of Tshwane from the Victor Kanye (previously called Delmas) (Statistics SA, 2012).

The province is bordered to the North by Limpopo, to the West by Gauteng, to the South West by Free State, to the South East by KwaZulu Natal and Swaziland to the East. The administrative capital of the province is Nelspruit which is located approximately 400 km from Johannesburg.

Figure 46: Provincial Boundary Changes from 2001 to 2011 (Statistics SA, 2012)

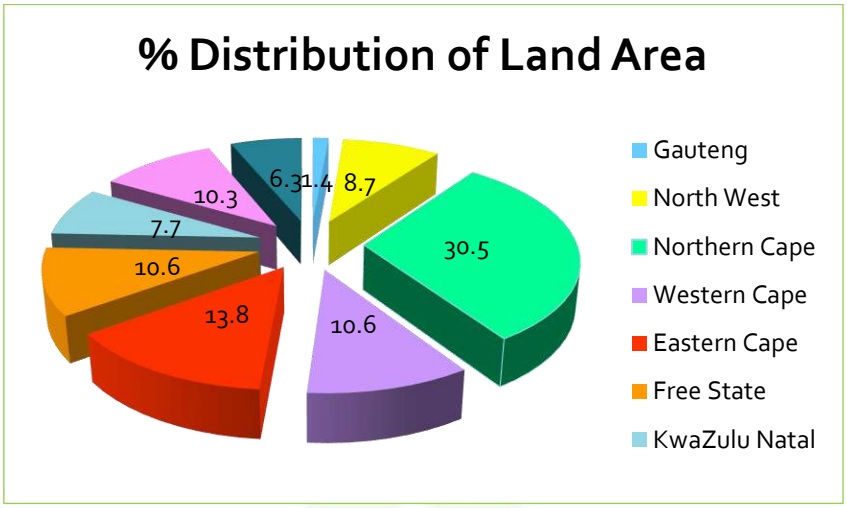


Figure 47: South Africa Land Area Distribution (Statistics SA, 2014)

Population

The population of Mpumalanga has been steadily rising over the years with the current population recorded as 4 039 939 persons. A comparison between the three census periods reveals that between 1996 and 2001, the population increased by 7.7%, from 2001 to the 2007 Community Survey (CS) it increased by 8.3% and finally by 10.9% from the CS to 2011.

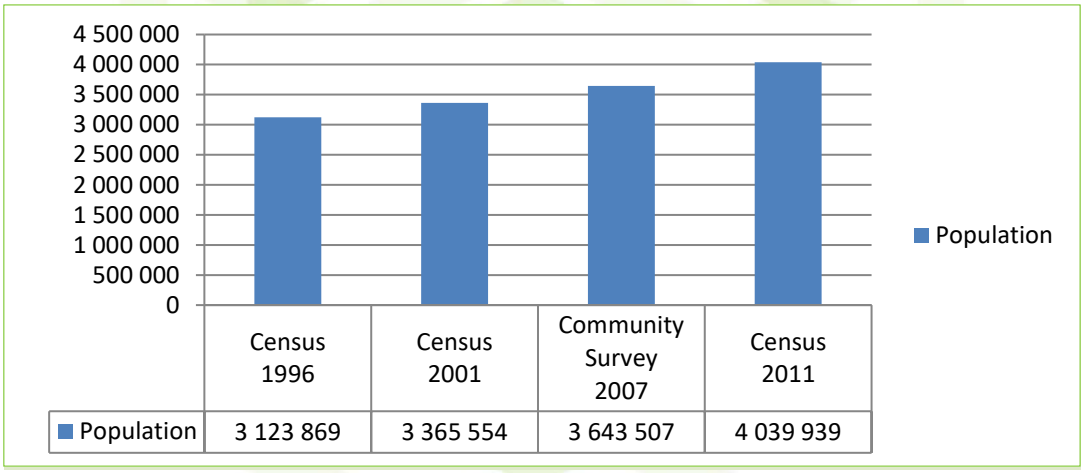


Figure 48: Population of Mpumalanga Province (Statistics SA, 2014)

The number of households in the province has also been increasing over the years in line with the increasing population as shown. Over a 15 year period, the number of households has risen from 669801 in 1996 to 1 075 488 in 2011.

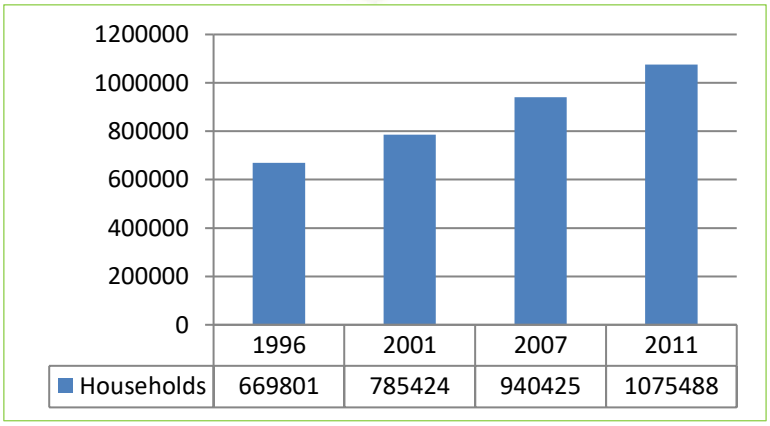


Figure 49: Number of Households in Mpumalanga (Statistics SA, 2014)

Age-Sex Structure

The figure below illustrates the age-sex structure of the province which reveals that the population in Mpumalanga is mainly made up of young people falling under the age of 35. From a sex perspective, 48.6% of the population is composed of males while 51.4% are females, a ratio that has been maintained over the years from 1996.

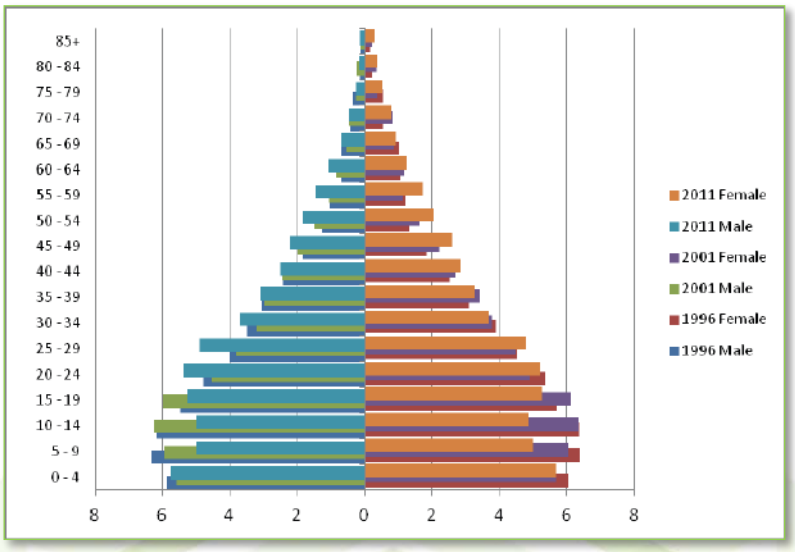


Figure 50: Age-Sex Structure (Statistics SA, 2014)

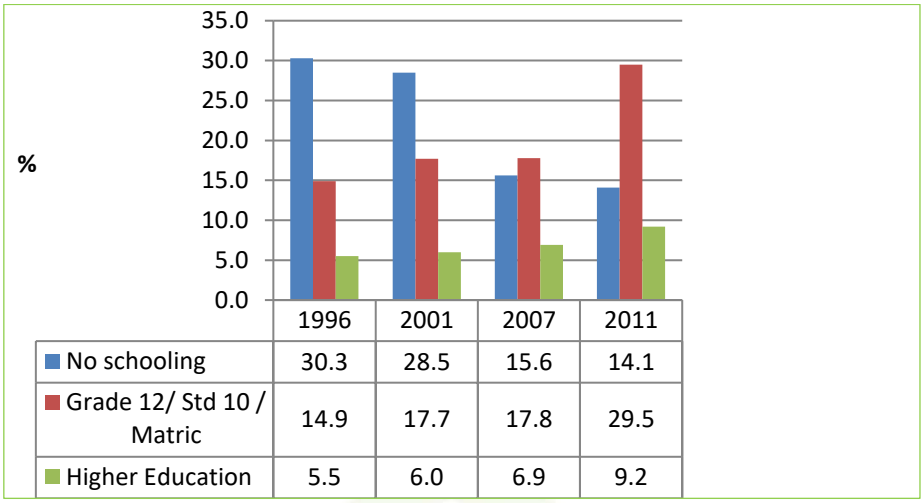
Marital Status

In terms of marital status, the majority of the population has never been married a situation that has remained almost constant at over 60% over the three census periods. In contrast, the segment of the population that is married or living together as partners has remained under 30%.

Figure 51: Marital Status (Statistics SA, 2014)

Education

The level of education of the people (aged 20 years and above) of Mpumalanga shows a trend of fluctuation amongst those who have no form of schooling and those who have a grade 12 / Std 10 / Matric level of education. During censuses 1996 and 2001, a large segment of the population had no schooling whereas census 2011 revealed that the majority had at minimum a grade 12 / Std 10 / matric level of education. In contrast, the number of people who have received higher education training has steadily been rising over the years.

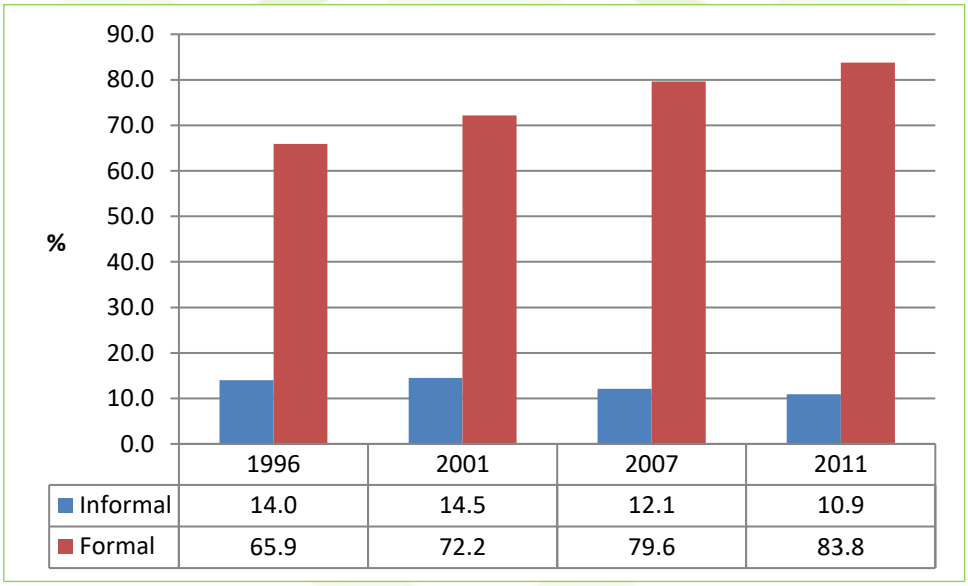


	1996	2001	2007	2011
No schooling	30.3	28.5	15.6	14.1
Grade 12/ Std 10 / Matric	14.9	17.7	17.8	29.5
Higher Education	5.5	6.0	6.9	9.2

Figure 52: Level of Education for those Aged 20 Years and Older (Statistics SA, 2014)

Type of Dwelling

The majority of the population of Mpumalanga lives in formal dwellings whereas the percentage of the population living in informal dwellings has been gradually declining.

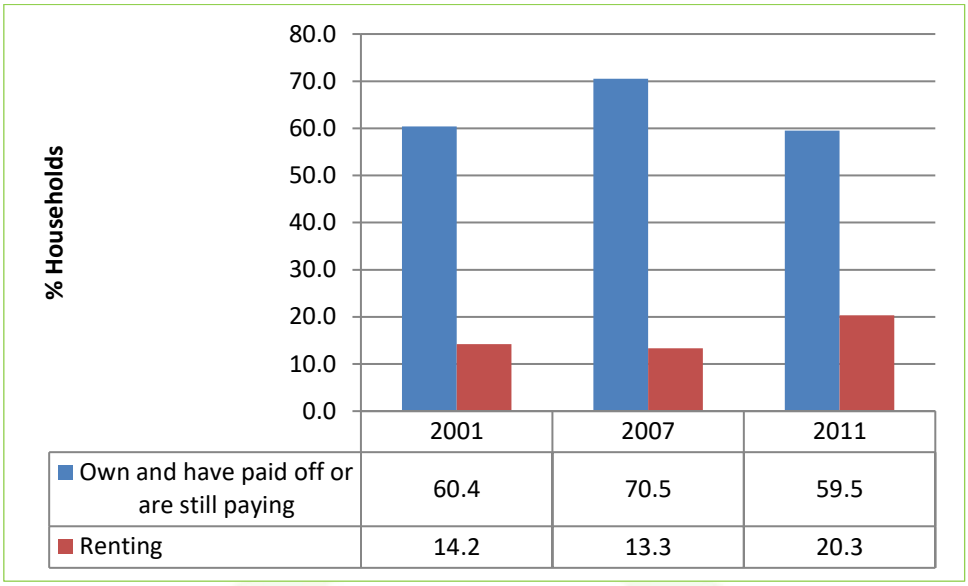


	1996	2001	2007	2011
Informal	14.0	14.5	12.1	10.9
Formal	65.9	72.2	79.6	83.8

Figure 53: Types of Dwellings (Statistics SA, 2014)

Tenure Status

Majority of the residents (over 50% of households) of Mpumalanga own their houses which they have paid off or are still paying for and this has been varying over the years. The percentage of households that rent houses has also been changing with a sharp increase experienced for the period 2007 to 2011.

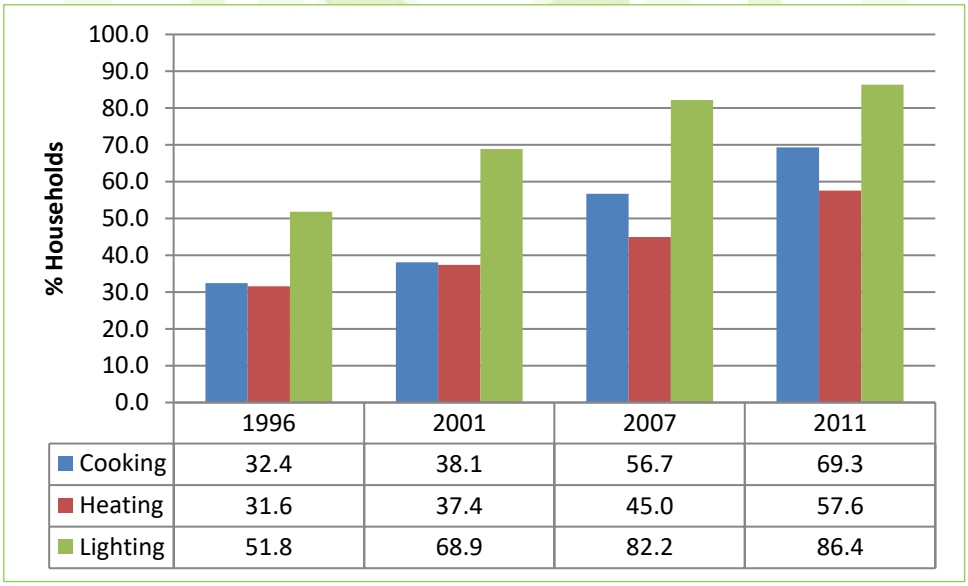


	2001	2007	2011
Own and have paid off or are still paying	60.4	70.5	59.5
Renting	14.2	13.3	20.3

Figure 54: Tenure Status (Statistics SA, 2014)

Electricity Use

Electricity is used for various purposes in the province and these include cooking, heating and lighting. The largest percentage of households utilizes electricity for lighting, followed by cooking and lastly for heating and all this use has been steadily increasing over the years.

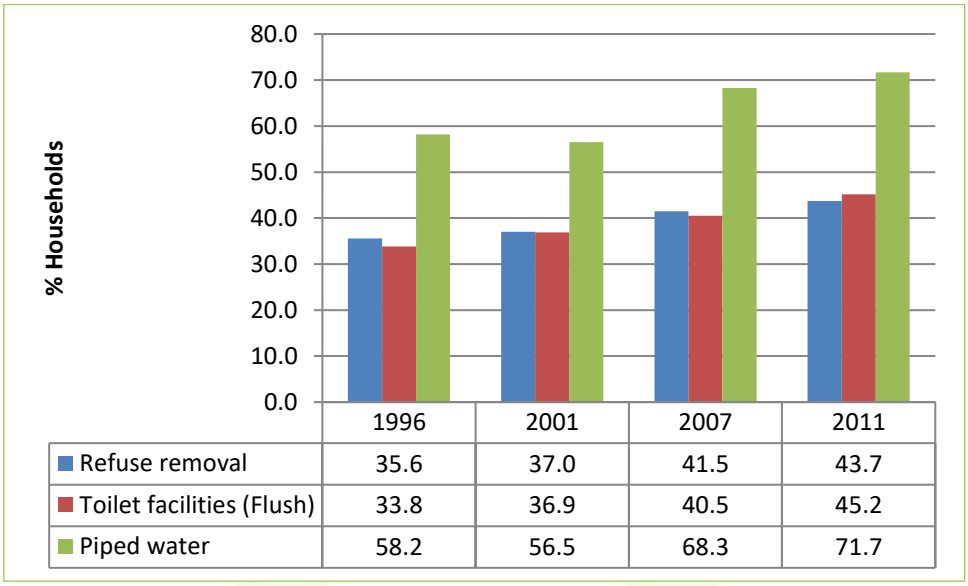


	1996	2001	2007	2011
Cooking	32.4	38.1	56.7	69.3
Heating	31.6	37.4	45.0	57.6
Lighting	51.8	68.9	82.2	86.4

Figure 55: Electricity Use in Mpumalanga (Statistics SA, 2014)

Access to Basic Services

The provision of basic services namely, refuse removal, toilet facilities and potable water is one of the major responsibilities of local municipalities. In Mpumalanga, 30% of the households at minimum have access to these basic services of which the highest percentage of households recorded during census 2011 had access to piped water. Access to refuse removal services and flush toilets has been increasingly steadily although it still remains relatively low at below 50% of the households.

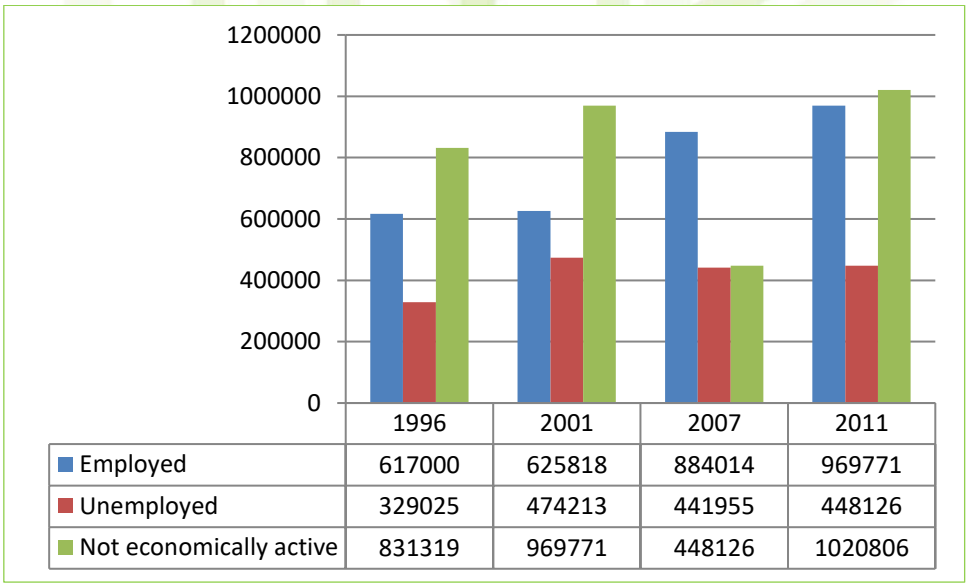


	1996	2001	2007	2011
Refuse removal	35.6	37.0	41.5	43.7
Toilet facilities (Flush)	33.8	36.9	40.5	45.2
Piped water	58.2	56.5	68.3	71.7

Figure 56: Access to Basic Services (Statistics SA, 2014)

Labour Force

The number of people in the province who are employed has been constantly increasing with over 800 000 persons recorded to be employed during census 2011. In contrast, the number of people unemployed has remained low over the years at slightly over 400 000 during the last two census events. The unemployment rate (*defined as percentage of unemployed persons over the sum of employed and unemployed persons*) has indicated variations by ranging from 34.8% in 1996 to 43.1% in 2001 to 31.6 in 2011. The highest number of people who are not economically active was recorded in 2011 at over 1 million.



	1996	2001	2007	2011
Employed	617000	625818	884014	969771
Unemployed	329025	474213	441955	448126
Not economically active	831319	969771	448126	1020806

Figure 57: Employment and Unemployment (Statistics SA, 2014)

- **Nkangala District Municipality (DC31)**

Nkangala District Municipality is a Category C municipality found in the Mpumalanga province. It is composed of six local municipalities: Victor Khanye/Delmas, eMalahleni, Steve Tshwete, Emakhazeni, Thembisile and Dr JS Moroka.

The main towns are Steve Tshwete, eMalahleni, Thembisile, Dr JS Moroka, Delmas and Emakhazeni. The headquarters of the district is in Middelburg (Steve Tshwete Local Municipality). The population is divided as follows: 435 226 people reside in eMalahleni, being the largest number, with Thembisile as the second-largest municipality with a population of 278 518 people.

Nkangala is the economic hub of Mpumalanga and is rich in minerals and natural resources. The Districts' economy is dominated by electricity, manufacturing and mining. These sectors are followed by community services, trade, finance, transport, agriculture and construction.

- **eMalahleni Local Municipality (Ward 2)**

The local economic growth and associated employment opportunities have resulted in a large population influx into the municipality, causing a population growth 17% higher than in South Africa as a whole over the last five years. The requirements of the mining and manufacturing sectors for a skilled workforce attract the educated and economically active population into the area. As such, education levels are above average, the population of working age is greater, the population not economically active is lower and more than 50% of households earn above R19,200 per annum. Although employment levels are higher in eMalahleni Local Municipality than at national level, the higher proportion of economically active population results in higher unemployment figures. As such, should employment opportunities be created, it is expected that positions can be filled locally.

The disadvantage of a large population influx is the resulting pressure on local services. The eMalahleni Local Municipality Integrated Development Plan 2010/11 (IDP) indicates a housing backlog of 45,408, the highest housing backlog in Nkangala District Municipality. EMalahleni Local Municipality has committed to build 7,900 houses per annum to address the backlog and increasing sizes of informal settlements. In addition, household electricity provision is 18% lower than at national level and the eMalahleni Integrated Development Plan indicates that 9,716 households do not have adequate water supply and 18,585 households do not have sufficient sanitation services.

Continued developments over the next 20 years will increase pressure on the local municipality to ensure sufficient raw water supply that can be purified to satisfy the projected water demands. The Witbank Dam, which has a 98% assured yield of 32 million m³/annum (87.7Ml/d), is the major source of water, supplying almost 90% of potable water demand in eMalahleni Local Municipality. However, given the population growth, the projected water demand for 2 046 is almost double this current yield at around 171Ml/d[3].

a. Description of the current land uses.

Terrain and Land use

The study area is characterised by disturbed Highveld Steel activities, forms part of the Highveld Steel property. Surrounding land use is aligned to the above, with various other industrial operations located adjacent to or in the vicinity of the proposed mining permit area. Apart from the local roads, the main infrastructural land use in the vicinity is represented by Witbank town and power station.

Table 23: Property location and coordinates

Property	Portion	Map Reference (1:50 000)
Elandsfontein 309 JS	46	4629CC

The study area is characterised by disturbed industrial and coal mining and logistical activities. The general surroundings are characterised by agricultural land and both land parcels have residences.

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

The main environmental features would be those associated with the ecology, heritage and the surface water bodies. The NFEPA wetland areas and water management areas are indicated in Figure 6. The Mining permit activities will allow for enough flexibility in location to avoid wetlands, rivers and associated buffer zones (servitudes). If there is a need to conduct activities in any of these areas, then the necessary applications will be sought and approved prior to conducting activities in these areas.

The mining site is mainly on industrial lands and is totally disturbed already from a vegetation point of view.

The impact on the vegetation type will have a low significance on the site and very low on the regional scale if disturbances are kept within the areas considered to be moderately to heavily modified areas and both aquatic and terrestrial CBA and ESA areas are avoided. If the project is approved, the mining activities area should be marked and protected and red data plant species should be removed and transplanted if found on these sites.

This site is considered heavily modified but both aquatic and terrestrial CBA and ESA occur on the one portions of the farm, however the mining permit site is located on an industrial area and it is highly unlikely that red data or other species or habitats of importance still remain on site.

c. Environmental and current land use map.

(Show all environmental, and current land use features)

Please refer to Land Use (Figure 4) and surrounding land use (Figure 5) maps below.

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

Table 24: Impact Assessment Register

ACTIVITY 1: IMPACTS RELATING TO CONSTRUCTION ACTIVITIES (footprint <5 ha)
Activities including:
Site preparation with removal of soil and existing vegetation,
site establishment,
building of access road,
haul road,
vehicular movement,
Erection of all mining infrastructure etc.

Potential Impact/Cause of Construction Activities	Affected Aspect	Project Phase	Scale	Category Rating						Significance WOM (Extent + Intensity + Duration + Probability) x WF	Mitigation and Management Type	Significance WM (Residual Impacts) WOM x ME = WM	Compliance with Legislation
				Extent	Severity	Durations	Probability	Weighting Factor	Mitigation Efficiency				
Removal of vegetation and fragmentation of natural habitat.	Current vegetation status; Surface water; Wetland; Aquatic life.	LOM	Mining Permit footprint (<5 ha)	2	3	4	4	3	0.8	39 LOW-MEDIUM	Ecological buffers proposed (100 m from the wetland areas should be adhered to and be excluded from the mining footprint). Minimise the surface disturbance footprint. All footprint areas should also be clearly defined and demarcated and edge effects beyond these areas clearly defined. It is important that all staff and contractors are made aware of the fact that animals do occur on the site and that it is made very clear that animals are not to be harmed, captured, trapped or disturbed during construction and operations. The natural vegetation within the proposed area where the development will take place will be totally destroyed; it is recommended that large trees are marked prior to clearing to ensure they are not damaged.	31.2 LOW-MEDIUM	NEMA MPRDA CARA NEM:BA ANIMAL PROTECTION ACT

											All topsoil should be stored separately from other spoil in order to be used as final cover after rehabilitation. An alien invasive monitoring, eradication and control programme is mandatory. Traps should preferably be set prior to construction in order to catch and relocate any species of conservation concern. All necessary permits should be obtained from the relevant Authorities, prior to removal of any plants. Human activities should be kept out of the natural areas and animals prevented from entering the operation. A control of access should be implemented for all remaining natural areas to prevent unnecessary destruction of habitats or disturbance of species. Ensure awareness among staff, and management systems should be set in place to prevent any form of additional disturbance from occurring. Ensure that animals are not trapped in excavations by regularly checking these and removing animals found to a save environment, this includes snakes. Close monitoring of animal communities to ensure that biodiversity is restored and self-sustaining. Reports on this should be written annually and be made available at all times. A management plan needs to be implemented for the relocation of endangered (or any) faunal life that need to be relocated, in an ongoing process until end of closure phase. Management plan for the control of invasive and exotic plant species need to be implemented. Specialist advice should be used in this regard and should be budgeted for. This should include pre-treatment, initial treatment and follow-up treatment. Rehabilitation should take place concurrently with the mining permit. Close monitoring of		

											plant communities should be done to ensure that ecological balance is restored and the environment is self-sustaining. The monitoring of the flora should be conducted annually by the environmental practitioner, until a suitably qualified specialist deems the monitoring to no longer be necessary. A report should be written and stored to be made available and should be available at all times. The monitoring of biodiversity should include the following: Continue with alien invasive monitoring, eradication and control programme. Implement an Observe and Report approach, which will enable employees to report any disturbance of fauna, or degradation that they encounter during the operational phase.		
Loss of topsoil due to – Erosion, Compaction and possible contamination	**Soil and Land Use Capability**	**Construction Operation Closure**	**Mining Permit footprint (<5 ha)**	**2**	**3**	**4**	**4**	**3**	**0.8**	**39 LOW-MEDIUM**	All footprint areas should also be clearly defined and demarcated and edge effects beyond these areas clearly defined. Management and supervision of construction teams: The activities of construction contractors or employees will be restricted to the planned areas. Instructions must be included in contracts that will restrict construction work and construction workers to the clearly defined limits of the construction site. In addition, compliance to these instructions must be monitored. No activities within the 100 m buffer zone. Construction Phase Mitigation. Stockpile Locations: Locate all soil stockpiles in areas where they will not have to be relocated prior to replacement for final rehabilitation. Demarcation of topsoil stockpiles: To minimise compaction associated with stockpile creation, it is recommended that the height of stockpiles be restricted between of 4 – 5 metres maximum.	**31.2 LOW-MEDIUM**	**NEMA MPRDA CARA NEMWA NEMBA NWA**

											Stockpiling of topsoil: Ensure all topsoil stockpiles are clearly and permanently demarcated and located in defined no-go areas. Prevention of stockpile contamination: Topsoil stockpiles can be contaminated by dumping waste materials next to or on the stockpiles, contamination by dust from blasting and waste rock stockpiles and the dampening for dust control with contaminated water are all hazards faced by stockpiles. This should be avoided at all cost and if it occurs, should be cleaned up immediately. Management of the terrain for stability: Using appropriate methods of excavating that are in accordance with regulatory requirements and industrial best practices procedures; Reducing slope gradients as far as possible along road cuts and disturbed areas to gradients at or below the angle of repose of those disturbed surfaces; and Using drainage control measures and culverts to manage the natural flow of surface runoff. Access and service road management: Existing established roads should be used wherever possible. Where possible, roads that will carry heavy-duty traffic should be designed in areas previously disturbed rather than clearing new areas, where possible. Access roads should be designed with a camber to avoid ponding and to encourage drainage to side drains; where necessary, culverts will be installed to permit free drainage of existing water courses. The side drains on the roads can be protected with sediment traps and/or gabions to reduce the erosive velocity of water during storm events and where necessary geo-membrane lining can be used. Prevention of soil contamination (Construction).		

											Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment should be contained by using a drip tray with plastic sheeting filled with absorbent material; Using biodegradable hydraulic fluids, using lined sumps for collection of hydraulic fluids, recovering contaminated soils and treating them off-site, and securely storing dried waste mud by burying it in a purpose-built containment area; Avoiding waste disposal at the site wherever possible, by segregating, trucking out, and recycling waste; Containing potentially contaminating fluids and other wastes; and Cleaning up areas of spillage of potentially contaminating liquids and solids. Operational Phase Mitigation. General Soil Management. It is recommended that concurrent rehabilitation techniques be followed to prevent topsoil from being stockpiled too long and losing its inherent fertility but opportunities may be limited by the layout of the operation. As new stockpiles are created, they should be re-vegetated immediately to prevent erosion and resulting soil losses from these stockpiles. The vegetative (grass) cover on the soil stockpiles (berms) must be continually monitored in order to maintain a high basal cover. Such maintenance will limit soil erosion by both the mediums of water (runoff) and wind (dust). Drains and intercept drains must be maintained so that they continue to redirect clean water away from the operating areas, and to convey any potentially polluted water to pollution control dams. Routine monitoring will be required in and around the sites.		

											Prevention of soil contamination. Stockpiles are managed so they do not become contaminated and then need additional handling or disposal; A low process or storage inventory must be held to reduce the potential volume of material that could be accidentally released or spilled; Processing areas should be contained and systems designed to effectively manage and dispose of contained storm water, effluent and solids; Storage tanks of fuels, oils or other chemicals stored are above ground, preferably with inspectable bottoms, or with bases designed to minimise corrosion. Above-ground (rather than in-ground) piping systems should be provided. Containment bunds should be sealed to prevent spills contaminating the soil and groundwater; Equipment, and vehicle maintenance and wash-down areas, are contained and appropriate means provided for treating and disposing of liquids and solids; Air pollution control systems avoid release of fines to the ground (such as dust from dust collectors or slurry from scrubbing systems); Closure and Decommissioning Phase Mitigation. General Soil Management. The activities of decommissioning contractors or employees will be restricted to the planned areas. Instructions must be included in contracts that will restrict decommissioning workers to the areas demarcated for decommissioning. In addition, compliance to these instructions must be monitored. All buildings, structures and foundations not part of the post-closure land use plan must be demolished and removed from site. Once the site has been cleared of infrastructure and potential contamination, the slope must be		

											re-graded (sloped) in order to approximate the pre-project aspect and contours. The previous infrastructure footprint area must be ripped a number of times in order to reduce soil compaction. The area must then be covered with topsoil material from the stockpiles. Once the land has been prepared, seeding and re-vegetation will contribute to establishing a vegetative cover on disturbed soil as a means to control erosion and to restore disturbed areas to beneficial uses as quickly as possible. The vegetative cover reduces erosion potential, slows down runoff velocities, physically binds soil with roots and reduces water loss through evapotranspiration. Indigenous species will be used for the re-vegetation, the exact species will be chosen based on research available and then experience as the further areas are re-vegetated. Prevention of soil contamination. As per construction phase.		
Cumulative dust, PM10 & PM 2.5 generation	**Local community** **Flora** **Faunal Community** **Air quality**	**Construction**	**Mining Permit footprint (<5 ha)** **Recipients within 5 km radius from the site**	**3**	**5**	**4**	**5**	**5**	**0.4**	**85** **HIGH**	It is recommended that ambient air quality monitoring be established to get a baseline condition prior to onset of the operations and to establish the level at which the proposed operations are noted to impact on the ambient air quality. Ambient air quality results can be sourced from Evraz Highveld Steel. Fallout monitoring should be continued for the life of mine to better assess the level of nuisance dust associated with both mining and process related operations. Sampling of fallout should be undertaken within the neighbouring areas (Clewer community and Highveld Steel) as well as on-site. Dust fallout monitoring should ideally be located on-site, at the crusher and in the vicinity of major material handling points and on next to any sensitive receptor areas located downwind from the emissions sources.	**34** **LOW-MEDIUM**	**NEMA** **MPRDA** **CARA** **NEMWA**

											Minimise the surface disturbance footprint of the mine. All footprint areas should be clearly defined and demarcated and edge effects beyond these areas clearly defined. Compile a Soil Management Plan (SMP) to ensure the protection of soils and maintenance of the terrain during all phases (construction, operations, decommissioning and closure) of the mine. Manage Terrain Stability. Indicative PM10 and PM2.5 dust monitoring must be undertaken at the same sites as indicated under the previous bullet and in and around potential fugitive emission sources to determine mitigation measures and focus management efforts. The mitigation and management measures discussed in this report should be sufficient to ensure the mining operation can be conducted with minimal impact on the receiving environment and therefore not have a detrimental effect.		
Impaired water quality due to dust generation settling into nearby surface water bodies (wetland)	**Downstream water users Surface water Wetland Aquatic life**	**Construction**	**Mining Permit footprint (<5 ha) Recipients within 5 km radius from the site**	**3**	**5**	**4**	**3**	**4**	**0.6**	**60 MEDIUM-HIGH**	As above.	**24 MEDIUM-HIGH**	**NEMA MPRDA CARA NEMWA**
Altering of natural hydrological regimes & due to increased stormwater	**Downstream water users Surface water resources Wetland**	**Construction Operation**	**Mining Permit footprint (<5 ha) Greater water catchment.**	**3**	**5**	**4**	**4**	**3**	**0.4**	**48 MEDIUM-HIGH**	As above including: A buffer zone of 100 m should be maintained at all wetlands associated with high risk areas for subsidence. These areas, as well as the buffers around them, should be excluded from the mine plan;	**19.2 LOW**	**NEMA MPRDA CARA NEMWA NWA MBSP**

runoff from site clearance	Aquatic life										The state of the wetlands and any subsidence in the mining area needs to be monitored by applying appropriate technology; Clean and dirty water areas must be mapped and a storm water management plan must be compiled in accordance with GN704. Ensuring properly designed storage areas (coal, waste, chemicals and mine residue) and practicing good housekeeping practices at all times by ensuring all materials are properly stored within designated areas, will further reduce the potential risk for contamination by surface water runoff. Storm water needs to adhere to RQO's, none acidic and treated prior to discharge. Storm water diversion must take place upstream of the site should form part of the SWMP. Storm water diversion upstream of the facilities should form part of the SWMP. Either run off will be contained in enclosures for collection and evaporation or run off will be captured in the drain system and channelled to the PCD.		Animal Protection
Runoff and spillages of dirty water into catchment.	Downstream water users Surface water Wetland Aquatic life	Construction Operation	Mining Permit footprint (<5 ha) Greater water catchment	3	5	4	3	4	0.2	60 MEDIUM-HIGH	Minimize the footprint of the mine. No infrastructure within the 100 m buffer of the wetland area. Separate waters of different quality to maximize re-use potential. In this case clean storm water and dirty storm water have been separated. Maximise the extent to which contaminated water is re-used by (if necessary) treating the water to a standard suitable for re-use. Zero effluent discharge policy (no discharge into any wetlands). Strict regulatory control on all water containing waste generated and disposal of effluent. Reduce impact on catchment yield by effective and efficient use of available water resources in	12 LOW TO MEDIUM	NEMA MPRDA CARA NEMWA NWA CONSTITUTION

											all sectors within the mine and by separation of clean and dirty storm water. Return post mining topography to as close to pre-mining situations as possible. Return surface water flow to original flow areas or as close as possible. Minimise the impacts on the environment (ecological, economical, and social) due to the alteration of drainage patterns in the project area. Ensure compliance with GN 704 Regulations (or latest publication). Prevent discharges of contaminated water to the environment. Recycle and re-use water where possible. Ensure that storm water design complies with DWS regulations and have sufficient capacity. Monitor on site surface water quality and quantity (as per the conditions of the WUL). Monitor seepage at PCD on a quarterly basis.		
Siltation of surface water resources leading to deteriorated water quality	**Downstream water users** **Wetland** **Aquatic life**	**LOM**	**Mining Permit footprint (<5 ha)** **Greater water catchment**	**3**	**5**	**4**	**4**	**3**	**0.2**	**48 MEDIUM-HIGH**	As above. Management measures to be included in the SWMP for all phases. It is recommended that concurrent rehabilitation techniques be followed to prevent topsoil from being stockpiled too long and losing its inherent fertility but opportunities may be limited by the layout of the operation. As new stockpiles are created, they should be re-vegetated immediately to prevent erosion and resulting soil losses from these stockpiles. The vegetative (grass) cover on the soil stockpiles (berms) must be continually monitored in order to maintain a high basal cover. Such maintenance will limit soil erosion by both the mediums of water (runoff) and wind (dust).	**9.6 LOW**	**NEMA** **MPRDA** **CARA** **NEMWA** **NWA**

											Silt traps should be placed at strategic points to prevent sedimentation leaving the site. Drains and intercept drains must be maintained so that they continue to redirect clean water away from the operating areas, and to convey any potentially polluted water to pollution control dams. Routine monitoring will be required in and around the sites. Wetland bio-monitoring must be done on a bi-annual basis to ensure more accurate results for season variability between dry and wet season conditions.		
Safety risk associated with additional traffic on local roads and haulage networks	**Local community** **Faunal Community** **Air quality**	**Construction** **Operation** **Closure**	**Local road network** **and farmers using the existing access route** **Pedestrians, Clewer - Community** **Town within close proximity**	**3**	**5**	**4**	**5**	**5**	**0.8**	**85** **HIGH**	A traffic impact assessment must be conducted prior to mining commencing. The contractor is required to monitor the condition of the roads used and repair the road where it becomes damaged due construction traffic. Access to site will be designed and constructed as per the engineered designs which will have to be approved by SANRAL and Roads Department. All intersections with main tarred roads must be clearly signposted. Set speed limits to be enforced. All mine-related vehicles and contractor vehicles to be in road worthy condition. Contractor is required to monitor the condition of the roads used and repair the road where it becomes damaged due to construction traffic. As above. All access roads must be signposted and speed limited to minimise transport noise. Equipment with lower sound power levels would be used in preference to more noisy equipment. All equipment used onsite will be regularly serviced to ensure the sound power levels	**68** **LOW-MEDIUM**	

											remain at or below the levels used in the modelling to assess generated noise levels and compliance with the criteria. The on-site road network will be well maintained to limit body noise from empty trucks travelling on internal roads. Ensure trucks and vehicles remain on roads and areas designated as a construction site to limit disturbance to areas unaffected by construction. Ensure drivers are informed that off-road travelling is prohibited. Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits.		
Increased noise levels on local level due to additional traffic flows	**Local community Faunal Community Air quality**	**Construction Operation Closure**	**Local road network and farmers using the existing access route Pedestrians, Clewer - Community Town within close proximity**	**2**	**3**	**4**	**4**	**3**	**0.6**	**39 LOW-MEDIUM**	Noise reduction is essential and Contractors must endeavour to limit unnecessary noise, especially loud talking, shouting or whistling, radios, sirens or hooters, motor revving, etc. The use of silent compressors is a specific requirement. Mining-related machine 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. Barriers (in the form of a berm) should be installed between the noise source and sensitive noise receptor, as close to the noise source as possible. The berm will help with the attenuation of noise produced by the mining activities. A basic rule of thumb for barrier height is: Any noise barrier should be at least as tall as the line-of-sight between the noise source and the receiver, plus 30%. So if the line-of-sight is 10 m high, then	**33.6 LOW-MEDIUM**	**NEMA Local By-laws Noise Regulations**

											the barrier should be at least 13 m tall for best performance.		
Excessive noise levels (excess of 65 dBA) and vibration from blasting events	Evraz Highveld Steel , adjacent landowners , local community Various structures identified as PO9 by the specialist Faunal Communities	Operation	Mining Permit footprint (<5 ha) Recipients within 10 km radius from the site	2	3	4	4	4	0.6	52 MEDIUM-HIGH	It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community of blasting dates and times. Air blast and fly rock can be controlled using proper charging methodology irrespective of the blast hole diameter and patterns used. The only way to mitigate air blast is the design of the stemming length and stemming material. This will require changed blast design to ensure energy levels remain as expected but with increased stemming lengths and the use of proper stemming material. The used of a crushed product with size of 10% of the blast hole diameter is the recommended material. An exclusion zone for safe blasting is established to be at least 220 m. Normal practice observed in mines is a 500 m exclusion zone. Regulations need to be followed for permission to conduct blasting operations with these installations within 500 m from the blast operations.	31.2 LOW-MEDIUM	NEMA Local By-laws Noise Regulations MHSA
Damage to heritage and archaeological objects	Local community South African Heritage Resource (if significant)	Construction Operation	<5 ha	2	3	4	3	4	0.2	48 MEDIUM	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 (See National Heritage Resources Act, 25 of 1999 section 36 (6)). Should the need arise to expand the development beyond the surveyed areas	9.6 LOW	NHRA

											mentioned in this study, the following applies: A qualified archaeologist must conduct a full Phase 1 Archaeological Impact Assessment (AIA) on the sections beyond the demarcated areas that will be affected by the expansion, in order to determine the occurrence and extent of any archaeological sites and the impact development might have on these sites.		
Negative socio-economic impacts (influx of workers into the area, noise and potential crime events)	**Landowners, adjacent landowners, local community**	**LOM**	**SIZ**	**3**	**5**	**4**	**4**	**4**	**0.6**	**64 MEDIUM-HIGH**	All commercial agreements/lease agreement with landowners to be finalised prior to construction commencing. In order to soften the social and economic change related to the proposed mining activities, the following is recommended: Consider the establishment of a Community Monitoring Forum (CMF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The CMF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local councillors (within the SIZ), affected landowners and the contractor(s). A comments and complaints register, accessible to members of public, should be implemented and maintained by the main contractor. In order to address any potential health impacts, it is advised that the applicant, along with the appointed contractor(s), devise and implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase. All permanent employees should receive Health and Safety, including basic HIV/AIDS awareness training at the onset of their employment. Furthermore, the movement of construction workers on and off the site should be closely managed and monitored by the applicant. In this regard the necessary arrangements should	**38.4 LOW-MEDIUM**	**NEMA CONSTITUTION**

											be made for the housing and transport of temporary construction workers. Allowance should be made for workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks. Retain as much construction expenditure as possible in the regional economy; Retain as much visitor and tourism expenditure as possible in the regional economy; Facilitate benefits to and opportunities for local business; and Ensure that all contractual arrangements between the project initiator and the affected municipalities are of such a nature that the full and honest intention of the parties is given effect to. Adhere to the principles and objectives of the Social Labour Plan and monitor progress annually (performance review).		
Positive Socio-economic impacts (job creation, increased spending power, multiplier effect, poverty alleviation	**Local Community /job seekers** **GDP**			**3**	**3**	**4**	**5**	**4**	**N/A**	**60 MEDIUM-HIGH**	N/A		**SLP** **Mining Charter**

ACTIVITY 2: IMPACTS RELATING TO BOXCUT AND EXCAVATIONS (footprint >5ha) Activities including: Opening of box-cut, Drilling and blasting, and Roll over rehab													
Aspect	Impact/Cause	Phase	Application project Scale	Category Rating						Significance WOM (Extent + Intensity + Duration + Probability) x WF	Mitigation and Management Type	Significance WM (Residual Impacts) WOM x ME = WM	Compliance with Legislation
				Extent	Severity	Durations	Probability	Weighting Factor	Mitigation Efficiency				
Faunal mortality and dispersal	Faunal Displacement and Mortality	Construction and Operation	<3 ha	2	3	3	4	4	0.8	48 MEDIUM	Procure equipment with low noise emissions where possible; Conduct blasting outside of known breeding/migration seasons; All staff must undergo relevant environmental induction and training regarding sensitive habitats, dangerous fauna, restrictive measures needing compliance etc. An exclusion zone for safe blasting is established to be at least 220 m. Normal practice observed in mines is a 500 m exclusion zone. Regulations need to be followed for permission to conduct blasting operations with these installations within 500 m from the blast operations. A buffer zone of 100 m should be maintained at all times.	38.4 LOW-MEDIUM	NEMBA Animal Protection Act

Deterioration of water quality of surface water resources (wetlands and rivers) due to runoff of contaminants into the environment.	Aquatic ecology Associated water features and downstream water users.	LOM	Mining footprint and local water catchment.	3	4	4	4	4	0.4	60 MEDIUM-HIGH	The separation of clean and dirty water on site is crucial in reducing the negative impacts of mining activities on the receiving environment. Specific management principles are outlined in the National Water Act, 1998 (Regulation No. GN 77 also called GN 704). All dirty water management facilities must be designed to cater for a 1:50 year storm event, as required by GN704 of NWA. Stormwater channels must be constructed. The purpose of these channels is to collect all the stormwater from the infrastructure area and convey it to the Pollution Control Dam (PCD); The water from the PCD will be re-used (wash water, fire water, dust suppression, etc.); Bio-monitoring must be done on a bi-annual basis to ensure more accurate results for season variability between dry and wet season conditions. Surface water should be monitored on a bi-annual basis to successfully relate the change in habitat conditions to that of the water quality. Surface water monitoring and bio-monitoring should continue once the mining operations have started. Establish a data basis which contains the monitoring and bio-monitoring data from the current and future assessments. Apply for a Water use Licence once long term databases has been established for surface water. Protect and rehabilitate wetland areas to ensure that the current integrity and functions are maintained, as well as removing alien	24 LOW-MEDIUM	NWA NEMBA

											vegetation within riparian zones and replacing it with endemic species.		
Blast and vibration impacts experiences by sensitive receptors (including rattling of roofs or door or windows, damage to properties etc.)	Landowners, adjacent landowners, informal households.	Construction Operation	MAR (>5 ha)	3	5	5	3	4	0.4	48 MEDIUM	It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community of blasting dates and times. Air blast and fly rock can be controlled using proper charging methodology irrespective of the blast hole diameter and patterns used. The only way to mitigate air blast is the design of the stemming length and stemming material. This will require changed blast design to ensure energy levels remain as expected but with increased stemming lengths and the use of proper stemming material. The used of a crushed product with size of 10% of the blasthole diameter is the recommended material. An exclusion zone for safe blasting is established to be at least 220 m. Normal practice observed in mines is a 500 m exclusion zone. Regulations need to be followed for permission to conduct blasting operations with these installations within 500 m from the blast operations.	19.2 LOW-MEDIUM	NEMA Local By-laws Noise Regulations MHSA

ACTIVITY 3: ALL COAL HANDLING (ROM) (footprint <1ha)
Activities including:
Coal stockpiling;
Cola product stockpile
Loading area;
Mobile crusher and screening facility;
Erection of all mining infrastructure etc.

Aspect	Impact/Cause	Phase	Application project Scale	Category Rating						Significance WOM (Extent + Intensity + Duration + Probability) x WF	Mitigation and Management Type	Significance WM (Residual Impacts) WOM x ME = WM	Compliance with Legislation
				Extent	Severity	Durations	Probability	Weighting Factor	Mitigation Efficiency				

Cumulative dust, PM10 & PM 2.5 generation	Surface water features (coal fines and dust generation being deposited into wetlands and rivers) Aquatic life Surrounding land users (health related and economic viability of grazing capacity).	Operation, Decommissioning	>5 ha	3	5	4	5	5	0.8	85 HIGH	Refer to Mitigation Measures under Activity 1 (All construction Activities). Ensure water separation and dirty water containment on site as per GN704 requirements. All dams will be constructed and lined as per designs and operated with a 0.8 m freeboard. Coal stockpile and handling must be in designated areas with compacted base (Class-C barrier) and must form part of the dirty water footprint and drain to the PCD. Manage dust through water carts or sprinklers. It is recommended that ambient air quality monitoring be established to get a baseline condition prior to onset of the operations and to establish the level at which the proposed operations are noted to impact on the ambient air quality. Fallout monitoring should be continued for the life of mine to better assess the level of nuisance dust associated with both mining and process related operations. Sampling of fallout should be undertaken within the neighbouring areas as well as on-site. Dust fallout monitoring should ideally be located on-site, at the crusher and in the vicinity of major material handling points and on next to any sensitive receptor areas located downwind from the emissions sources. Indicative PM10 and PM2.5 dust monitoring must be undertaken at the same sites as indicated under the previous bullet and in and around potential fugitive emission sources to	68 MEDIUM-HIGH	NEMA MPRDA CARA NEMWA NEMAQA Constitution

											determine mitigation measures and focus management efforts. Biomonitoring to be undertaken as per the recommendation of the specialist.		
Runoff and spillages of dirty water into catchment.	SIZ Downstream water users Surface water Wetland Aquatic life	Construction Operation Closure	>5 ha Water Catchment	3	5	4	3	4	0.6	60 MEDIUM-HIGH	As above. Refer to Mitigation Measures under Activity 1 (All construction Activities including stormwater management practices). Biomonitoring to be undertaken as per the recommendation of the specialist. Control through monthly surface water monitoring;	36 LOW TO MEDIUM	NEMA MPRDA CARA NEMWA NWA
Potential source of AMD (Carbonaceous material) Leachate: A Sulphates & Metals	Hydrology, Wetlands & Aquatics	Operation, Decommissioning	Catchment and aquifer	3	5	4	4	5	0.4	80 HIGH	Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements. The monitoring as recommended in the report should be established prior to operation. Additional geochemical analyses should be conducted on overburden material and coal material during operations. Discharging mine water can be treated with a lime trench to raise the pH and remove metals. The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts. Update the numerical and geochemical model against monitored data during operations.	32 LOW-MEDIIM	NEMA NEMWA NWA DMR

ACTIVITY 4: ALL MATERIAL STOCKPILE AREAS (footprint <1ha)
Activities including:
Topsoil stockpiling;
Subsoil stockpile
Overburden; and
ROM stockpile

Aspect	Impact/Cause	Phase	Application project Scale	Category Rating						Significance WOM (Extent + Intensity + Duration + Probability) x WF	Mitigation and Management Type	Significance WM (Residual Impacts) WOM x ME = WM	Compliance with Legislation
				Extent	Severity	Durations	Probability	Weighting Factor	Mitigation Efficiency				
Erosion via wind and water leading to sedimentation and pollution of water resources	Hydrology, Wetlands & Aquatics	Construction, Operation, Decommissioning	Visual catchment	3	5	4	4	4	0.4	64 HIGH	It is recommended that ambient air quality monitoring be established to get a baseline condition prior to onset of the operations and to establish the level at which the proposed operations are noted to impact on the ambient air quality. Fallout monitoring should be continued for the life of mine to better assess the level of nuisance dust associated with both mining and process related operations. Sampling of fallout should be undertaken within the neighbouring areas as well as on-site. Dust fallout monitoring should ideally be located on-site, at the crusher and in the vicinity of major material handling points and on next to any sensitive receptor areas located downwind from the emissions sources. Indicative PM10 and PM2.5 dust monitoring must be undertaken at the same sites as indicated under the previous bullet and in and	25.6 LOW-MEDIUM	NEMA NEMAQA

											around potential fugitive emission sources to determine mitigation measures and focus management efforts. Establish storm water control measures to ensure clean and dirty water separation and dirty water containment. Upslope berms to divert clean water around the site of activity into natural drainage lines and internal channels to drain dirty water from the active footprint to lined PCD.		
Potential source of AMD (Carbonaceous material) Leachate: A Sulphates & Metals	Hydrology, Wetlands & Aquatics	Operation, Decommissioning	Catchment and aquifer	3	5	4	4	5	0.2	80 HIGH	Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements. The monitoring as recommended in the report should be established prior to operation. Additional geochemical analyses should be conducted on overburden material and coal material during operations. Discharging mine water can be treated with a lime trench to raise the pH and remove metals. The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts. Update the numerical and geochemical model against monitored data during operations.	16 LOW	NEMA NEMWA
Cumulative dust, PM10 & PM 2.5 generation	Air Quality	Construction, Operation,	>5 ha Visual catchment	3	5	4	4	4	0.4	64 HIGH	All soil and overburden stockpiles must have top and toe perimeter berms to prevent soil wash out.	25.6 LOW-MEDIUM	NEMA NEMAQA

		Decommissioning									Shield visual impacts or divert clean water runoff from site. Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. A tree windbreak located downwind of the prevailing wind direction to minimise dust from the finished product stockpiles. Topsoil handling and storage procedures including stockpile inventory, vegetative cover and signage to optimise rehabilitation and minimise wind erosion.		
Change in topographical nature of the area including sense of place	Air Quality Visual Sense of place	Construction, Operation, Decommissioning	>5 ha Visual catchment	3	3	4	4	3	0.6	42 HIGH	Stockpile heights must not exceed 2 m for topsoil, 3 m for coal stockpiles, 6m for subsoil, and 20 m for overburden. Move coal stockpiles on a first-in-first-out basis to reduce extent of coal stockpile areas. Coal stockpile and handling must be in designated areas only. Conduct soil handling as per soil utilisation guide which will be included in the soil report. Vegetation removal must be over a minimal area as possible. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish approved erosion control measures such as top and toe berms around stockpiles. All soil and overburden stockpiles must have top and toe perimeter berms to prevent soil wash out. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes.	LOW-MEDIUM 25.2	NEMA NEMAQA

Uncontrolled runoff and spillages of dirty water into surrounding environment, leading to contamination of water resources.	Surface and Groundwater Resources Aquatic life Downstream water users Ecology cycles	LOM	>5 ha Water catchment	3	3	4	4	4	0.4	56 MEDIUM	100 m buffer from the wetland must be maintained throughout the LOM. All waste should be separated and stored as per the relevant Norms and Standards where and when relevant. Mine residue must be disposed of at the integrated discard dump and should be managed according to GNR632 (2015) of NEM: WA regarding planning and management of residue stockpiles and deposits. Discard dump must have a suitable liner to protect groundwater resources. Apply dust control measures and storm water runoff management measures to ensure impact area is contained to dump area and all water runoff and seepage is contained. Install downstream monitoring boreholes and monitor for potential contaminated seepage. If needed install downstream cut-off trench and direct seepage to PCD. Apply good housekeeping practices and ensure all discard is placed only in designated dump area. Visual screens (vegetated berms, trees or wind breaks) will be considered where necessary. Construct the dump as per engineered designs and clad and vegetate integrated dump as it develops. Inspect for and treat spontaneous combustion by covering areas with fine subsoil to douse the combustion. The dump development must be monitored for the life of mine and audited against the engineered designs. Surface water and groundwater and biomonitoring will continue for life of mine.	22.4 LOW-MEDIUM	NEMA NEMWA NWA NEMA MPRDA CARA NEM:BA

											Store all potential sources in secure facilities with appropriate storm water management, ensuring contaminants are not released into the environment.	
Potential source of AMD (Carbonaceous material) Leachate: A Sulphates & Metals	Hydrology, Wetlands & Aquatics	LOM	Catchment and aquifer	3	5	4	4	5	0.2	80 HIGH	Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements. The monitoring as recommended in the report should be established prior to operation. Additional geochemical analyses should be conducted on overburden material and coal material during operations. Discharging mine water can be treated with a lime trench to raise the pH and remove metals. The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts. Update the numerical and geochemical model against monitored data during operations. Monitor static groundwater levels on a quarterly basis in all boreholes within a zone of one kilometre surrounding the mines to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time and can be reached on appropriately. If it can be proven that the mines are indeed affecting the quantity of groundwater available to certain users, the affected parties should be compensated. This may be done through the installation of additional boreholes for water supply purposes, or an alternative water supply.	32 LOW-MEDIUM

Long-term impacts on water quality due to poor quality seepage from the surface pollution source areas.	Surface and Groundwater Resources Aquatic life Downstream water users Ecology cycles	Post Closure	Mining footprint 5 ha + catchment	2	5	5	3	4	0.4	MEDIUM-HIGH 60	100 m buffer from the wetland must be maintained throughout the LOM. Discard dump must have a suitable liner to protect groundwater resources. Apply dust control measures and storm water runoff management measures to ensure impact area is contained to dump area and all water runoff and seepage is contained. Install downstream monitoring boreholes and monitor for potential contaminated seepage. If needed install downstream cut-off trench and direct seepage to PCD. Apply good housekeeping practices and ensure all discard is placed only in designated dump area. Visual screens (vegetated berms, trees or wind breaks) will be considered where necessary. Construct the dump as per engineered designs and clad and vegetate integrated dump as it develops. Inspect for and treat spontaneous combustion by covering areas with fine subsoil to douse the combustion. The dump development must be monitored for the life of mine and audited against the engineered designs. Surface water and groundwater and biomonitoring will continue for life of mine. Store all potential sources in secure facilities with appropriate storm water management, ensuring contaminants are not released into the environment. Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements. The monitoring as recommended in the report should be established prior to operation.	24 LOW-MEDIUM	NEMA NEMWA NWA NEMA MPRDA CARA NEM:BA

											Additional geochemical analyses should be conducted on overburden material and coal material during operations. Discharging mine water can be treated with a lime trench to raise the pH and remove metals. The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts. Update the numerical and geochemical model against monitored data during operations. Monitor static groundwater levels on a quarterly basis in all boreholes within a zone of one kilometre surrounding the mines to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time and can be reached on appropriately. If it can be proven that the mines are indeed affecting the quantity of groundwater available to certain users, the affected parties should be compensated. This may be done through the installation of additional boreholes for water supply purposes, or an alternative water supply.		
Dump will permanently alter the topographical nature of the area.	**Visual** **Sense of Place**	**LOM**	**Mining footprint**	**3**	**5**	**5**	**3**	**4**	**0.6**	**48** **MEDIUM-HIGH**	The final backfilled void topography should be engineered such that runoff is directed away from the opencast areas. Plant some indigenous trees to create a barrier between the neighbours and roads; Dust from Stockpile areas, roads and other activities must be managed by means of dust suppression to prevent excessive dust; A wind barrier system that encloses the stockpiles and tailing dumps; Overburden should not exceed 20 m in height; and Rehabilitation of the area must be done as the mining is completed.	**28.8** **LOW-MEDIUM**	**NEMBA**

ACTIVITY 5: DIRTY WATER TRENCHES, PCD'S & OTHER SURFACE WATER MANAGEMENT CONTROL MEASURES (footprint <5 ha)
Activities including:
Clean and dirty water separation;
PCD;
Trenching; and
Surface water management controls

Aspect	Impact/Cause	Phase	Application project Scale	Category Rating						Significance WOM (Extent + Intensity + Duration + Probability) x WF	Mitigation and Management Type	Significance WM (Residual Impacts) WOM x ME = WM	Compliance with Legislation
				Extent	Severity	Durations	Probability	Weighting Factor	Mitigation Efficiency				
Altered hydrological regime (flow) of the rivers and local catchment	Downstream water users Surface water Wetland Aquatic life	LOM	Mining Permit Boundary) <5 ha water catchment SIZ (recipients within 20 km radius from the site)	3	5	4	5	4	0.4	68 MEDIUM-HIGH	Refer to Mitigation Measures under Activity 1 (All construction Activities). Saving water initiatives will be included in environmental awareness training. Utilise water on site responsibly. Record all water usage on site. Inspection of ALL water features for leaks and immediate repair. Surface water & groundwater monitoring and biomonitoring should continue for life of mine to ensure water management is effective. No mining activities within the 100 m buffer zone of the wetland.	27.2 LOW-MEDIUM-	NEMA MPRDA NEMWA NWA

Environmental pollution due to uncontrolled runoff in to surrounding environment and water resources.	Downstream water users Surface water Wetland Aquatic life	LOM	Mining Permit Boundary) <5 ha water catchment SIZ (recipients within 20 km radius from the site)	3	5	4	5	4	0.4	68 MEDIUM-HIGH	No dirty water area is within any 1:100-year flood line Water quality maintained close to baseline conditions for pH, sulphate. Iron, TDS and EC. Surface water & groundwater monitoring and biomonitoring will continue for life of mine to ensure water management is effective.	27.2 LOW-MEDIUM-	NEMA MPRDA NEMWA NWA

ACTIVITY 5: WATER SUPPLY AND STORAGE (POTABLE AND PROCESS WATER) (footprint <0.5 ha)													
Aspect	Impact/Cause	Phase	Application project Scale	Category Rating						Significance WOM (Extent + Intensity + Duration + Probability) x WF	Mitigation and Management Type	Significance WM (Residual Impacts) WOM x ME = WM	Compliance with Legislation
				Extent	Severity	Durations	Probability	Weighting Factor	Mitigation Efficiency				
Irresponsible use of water and water wastage.	Surface and groundwater resources Aquatic life Ecological life cycles	LOM	<5 ha Catchment	3	5	4	5	4	0.4	68 MEDIUM-HIGH	Refer to Mitigation Measures under Activity 1 (All construction Activities). Saving water initiatives will be included in environmental awareness training. Utilise water on site responsibly. Record all water usage on site. Inspection of ALL water features for leaks and immediate repair per intervals as stipulated in the EMP. Surface water & groundwater monitoring and biomonitoring should continue for life of mine to ensure water management is effective. Implementation of the SWMP which details the separation of clean and dirty water on site.	27.2 LOW-MEDIUM	NEMA MPRDA CARA NEMWA

ACTIVITY 6: MOBILE OFFICES, STAFF ABLUTIONS, CHANGE HOUSE WITH CONSERVANCY TANK (footprint <1.5ha)
Activities including:
Mobile offices;
Mobile sanitation and change houses;
Fencing;
Staff and visitor parking;
Waste management, and
Weighbridge.

Aspect	Impact/Cause	Phase	Application project Scale	Category Rating						Significance WOM (Extent + Intensity + Duration + Probability) x WF	Mitigation and Management Type	Significance WM (Residual Impacts) WOM x ME = WM	Compliance with Legislation
				Extent	Severity	Durations	Probability	Weighting Factor	Mitigation Efficiency				
Environmental pollution due to increased sedimentation and chemical runoff into the surrounding environment.	Surface and groundwater resources Aquatic life Ecological life cycles	LOM	< 1 ha Catchment	3	5	4	5	3	0.4	51 MEDIUM	Refer to Mitigation Measures under Activity 1 (All construction Activities). No infrastructure within the 100 m sensitivity buffer. Conservancy tanks must be designed to have sufficient capacity. Conservancy tanks to be emptied weekly. Inspect and repair all aspects of the sewage facilities as needed, including any plumbing associated with the bathrooms and toilets. Open and maintain a complaint register. Communication through CMF mechanism.	20.4 MEDIUM-	NEMA NEMWA NWA

Potential contamination of surface water bodies with sewage and nutrient enrichment of aquatic environments.	Surface and groundwater resources Aquatic life Ecological life cycles Downstream water users	LOM	< 1 ha Catchment	3	5	4	5	3	0.4	51 MEDIUM	No dirty water area is within any 1:100-year flood line Water quality maintained close to baseline conditions for pH, sulphate. Iron, TDS and EC. No infrastructure within the 100 m sensitivity buffer. Surface water & groundwater monitoring and biomonitoring will continue for life of mine to ensure water management is effective. Downstream water quality will be within background quality limits and compared to SANS 2011 drinking water quality guidelines for bacteria. Surface water monitoring, groundwater monitoring and biomonitoring will continue for life of mine. Communication through CMF mechanism.	20.4 MEDIUM	NEMA NEMWA NWA

ACTIVITY 7: MOBILE FUEL STORAGE (footprint <0.01 ha)

Activities including:

Mobile fuel bowser

Aspect	Impact/Cause	Phase	Application project Scale	Category Rating						Significance WOM (Extent + Intensity + Duration + Probability) x WF	Mitigation and Management Type	Significance WM (Residual Impacts) WOM x ME = WM	Compliance with Legislation
				Extent	Severity	Durations	Probability	Weighting Factor	Mitigation Efficiency				
Impaired water quality by hydrocarbon contamination on surface which could impact the environment through runoff and seepage.	Surface and groundwater resources Aquatic life Ecological life cycles Downstream water users	LOM	< 5 ha Catchment	3	5	4	3	4	0.2	60 MEDIUM-HIGH	No infrastructure within the 100 m sensitivity buffer. Surface water & groundwater monitoring and biomonitoring will continue for life of mine to ensure water management is effective. Hazardous good must be bunded to 110% volume capacity. All vehicles to be kept in good working order and drip trays provided. Surface water & groundwater monitoring and biomonitoring will continue for life of mine to ensure water management is effective. Sources of waste pollution must be contained and inspected regularly for structural integrity (including the PCD and other dirty water containment areas).	12 LOW	NEMA NEMWA NWA

vi. **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).

Impact Assessment and Ranking Methodology

The assessment and evaluation of environmental impacts is often complicated by the subjective nature of these impacts. Ideally, the degree of severity or significance of a particular impact should be expressed in quantitative terms, against a quantitative assessment of the conditions that pertained before a particular activity started. There must also be some expression as to whether a particular impact is desirable or not, as the desirability of an impact will depend largely on the attitude and experience of the assessment team, subjectivity is unavoidable. In order to address these issues and to provide a basis for comparison of the different impacts associated with the activities, a number of standard definitions and approaches will be used.

For the purpose of assessing impacts of the proposed project has been divided into the following phases:

Table 25: Impact Phases

Construction Phase:	All the construction related activities on site, until the contractor leaves the site. Estimated to take 7 months.
Operational Phase:	All activities, including the operation and maintenance of the proposed development. Life of Mine is planned for >5 years.
Decommissioning & Mine Closure	Mine closure is the period of time when the ore-extracting activities of a mine have ceased and final decommissioning and mine reclamation is being completed.

Impact Rating Assessment Approach

The activities arising from each of these phases were included in the impact assessment tables. This was done in order to identify activities that require certain environmental management actions to mitigate the impacts arising from them. The assessment of the impacts were conducted according to a synthesis of criteria as set out below:

Assessment Weighting – Each aspect within an impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project's life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it will be necessary to weigh and rank all the identified criteria.

Ranking, Weighting and Scaling – For each impact under scrutiny, a scaled weighting factor will be attached to each respective impact. The purpose of assigning such weightings serve to highlight those aspects considered the most critical to the various stakeholders and ensure that each specialist's element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspect criteria.

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.

Cumulative Impacts Assessment Approach

Cumulative impacts can arise from one or more activities. A cumulative impact may result in an additive impact i.e. where it adds to the impact which is caused by other similar impacts or an interactive impact i.e. where a cumulative impact is caused by different impacts that combine to form a new kind of impact. Interactive impacts may be either countervailing (the net adverse cumulative impact is less than the sum of the individual impacts) or synergistic (the net adverse cumulative impact is greater than the sum of the individual impacts). Possible cumulative impacts of the development were evaluated.

- Steps in Assessing Cumulative Impacts

Three (3) general steps, which are discussed below, were utilised in the assessment of cumulative impacts.

- Determining the Extent of Cumulative Impacts
  - To initiate the process of assessing cumulative impacts, it is necessary to determine what the extent of potential cumulative impacts will be. This will be done by adopting the following approach:
    - ✓ Identify potentially significant cumulative impacts associated with the proposed activity;
    - ✓ Establish the geographic scope of the assessment;
    - ✓ Identify other activities affecting the environmental resources of the area; and
    - ✓ Define the goals of the assessment.
- Describing the Affected Environment

  The following approach was used for the compilation of a description of the environment:
  - Characterise the identified external environmental resources in terms of their response to change and capacity to withstand stress;
  - Characterise the stresses affecting these environmental resources and their relation to regulatory thresholds; and
  - Define a baseline condition that provides a measuring point for the environmental resources that will be impacted on.
- Assessment of Cumulative Impacts

  The general methodology which was used for the assessment of cumulative impacts comprised of the following:
  - An identification of the important cause-and-impact relationships between proposed activity and the environmental resources;
  - A determination of the magnitude and significance of cumulative impacts; and
  - The modification, or addition, of alternatives to avoid, minimize or mitigate significant cumulative impacts.

Table 26: 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 20years) 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 the 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		
(L)ow	The impact alters the affected environment in such a way that the natural processes or functions are not affected.	**1**
LOW- MEDIUM	The affected environment is altered, but functions and processes continue, albeit in a modified way.	**3**
MEDIUM (M)	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.	**5**
MEDIUM-HIGH		
HIGH (H)		
Mitigation Measures		
Mitigation measures were recommended in order 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 a measurable reduction in impact. Where limited knowledge or expertise exists on such tolerance limits, the specialist must make an "educated guess" based on his/ her 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		**0.2**
MEDIUM-HIGH		**0.4**
LOW TO MEDIUM		**0.6**
LOW		**1**

Table 27: 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 28: 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 29: Significant Rating Scale with mitigation

Potential Impacts with Mitigation Measures (WM) – **In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it will be necessary to re-evaluate the impact.**		
SIGNIFICANT RATING WITH MITIGATION EQUATION Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency Or WM = WOM x ME		
S=0	INSIGNIFICANT	The impact will be mitigated to the point where it is regarded as insubstantial
SR < 30	LOW (L)	The impact will be mitigated to the point where it is of limited importance.
20<SR<39	LOW- MEDIUM	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels;
40> SR < 59	MEDIUM (M)	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
60<SR>79	MEDIUM-HIGH	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels
80<SR > 100	HIGH (H)	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, inter alia: the purpose and need for the project; views and concerns of interested and affected parties; social and political norms, and general public interest.

The methodology used for assessing impacts associated with the proposed project follows the philosophy of environmental impact assessments, as described in the booklet Impact Significance, Integrated Environmental Management Information Series 5 (DEAT, 2002b). The philosophy is summarised by the following extracts:

- The impact magnitude [or intensity] and significance should as far as possible be determined by reference to legal requirements, accepted scientific standards or social acceptability. If no legislation or scientific standards are available, the EIA practitioner can evaluate impact magnitude based on clearly described criteria. Except for the exceeding of standards set by law or scientific knowledge, the description of significance is largely judgemental, subjective and variable. However, generic criteria can be used systematically to identify, predict, evaluate and determine the significance of impacts (DEAT, 2002b).
- Determining significance [of impacts] is ultimately a judgement call. Judgemental factors can be applied rigorously and consistently by displaying information related to an issue in a standard worksheet format (Haug et al., 1984 taken from DEAT, 2002b).

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

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

The following key concerns have been identified:

- Loss of agricultural income;
- Loss of industrial income;
- Acid Mine Drainage;
- Blasting risk;
- Safety of landowners and residents;
- Conflict over land use with neighbouring businesses and community;
- Rehabilitation of the mining permit site;
- Vulnerability of surface water resources (wetlands).

The initial site layout was planned on a 4.65 ha grid and overlay all land uses, sensitive features (e.g. water resources). In order to minimise the impact of mining activities on surface water a 100-meter buffer was allocated for wetlands. The mining site is still located within the surface right holders land but agreement or compensation will need to be sought should the specific site be developed. The opencast mining site will be provided with fencing and signage to ensure no person or animal can access these site. Workers and operators will not be housed on site. In addition, rehabilitation objectives will include ensuring that the site is safe for the current land uses.

viii. The possible mitigation measures that could be applied and the level of risk.

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

To be updated after PPP.

Issue Raised	Mitigation Measure discussed	Risks associated with mitigation measure

ix. Motivation where no alternative sites were considered.

No Alternative mining site locations were considered during the study. The project location was however bound to the current location due to the underlying geology and acceptance of the application for the specific Mining Permit. The Mining Permit is dependent on the area chosen being susceptible to possible coal deposits and therefore no alternative site could be considered.

x. Statement motivating the alternative development location within the overall site. (Provide a statement motivating the final site layout that is proposed)

The final layout for the mining permit open cast pit can only be completed once the non-invasive aerial geological surveys have been completed. Construction of the opencast pit will avoid servitudes, wetlands and 100m buffer zones, rivers and 100 m buffer zones / 1:100-year flood lines (whichever is greatest), and 50 m buffer zones from potential historical sites, graves and identified protected plants. The mining location is not fixed and need approval by an environmental control officer before drilling. The ECO will, as a minimum, consider:

- Plant and animal sensitivity;
- Current land use;
- Servitudes (Transnet & Sasol Gas line);
- Sensitive features such as households; and
- Heritage sites (including graveyards).

4.9 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 were 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 VI of this report.

4.10 Assessment of each identified potentially significant impact and risk

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

Please refer to Table 24: Impact Assessment Register.

4.11 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):-

Various specialist studies were undertaken due to the Mining Permit application and the identified water sources of the proposed site. The project team consists of qualified environmental assessment practitioners that have sufficient experience to inform the report on potential impacts and the baseline environment. The EAP also considered the temporary nature and limited footprint of the proposed project site.

A preliminary desktop study in combination with the specialist studies were conducted to focus on topology, surface water, wetlands, soils, land capability, noise, socio-economic and habitat availability for species of vegetation, mammals, avifauna (birds), reptiles and amphibians of the study area. The data was supplemented by the specific specialist studies, previous surveys conducted in the area, literature investigations, personal records and historic data. The following Specialist Studies were conducted are still in progress:

1. Wetland Delineation – Eco Elementum (Pty) Ltd
2. Geohydrological Baseline study – Eco Elementum (Pty) Ltd;
3. Civil Engineer Stormwater Management Plan and PCD Design – Mr. Chris Ingram Pr (Eng.).

4.12 ENVIRONMENTAL IMPACT STATEMENT

xi. Summary of the key findings of the environmental impact assessment;

The environmental impacts associated with the proposed project are largely **low** to **moderate** with no high impacts anticipated. The most significant impacts are:

Table 30: Summary of key findings

IMPACT	SIGNIFICANCE – WITHOUT MITIGATION	SIGNIFICANCE – WITH MITIGATION	COMMENT	MITIGATION
De-watering of the surrounding aquifer –potential AMD	Water entering the mining area will have to be pumped out to enable mining activities.	Qualities of the pumped out ground water should be taken and according to the results be treated. Possibility of existing AMD in the area due to the existing neighbouring mines.	Groundwater quality must be monitored on a quarterly basis.	Monitor static groundwater levels on a quarterly basis in all boreholes within a zone of one kilometer surrounding the mines to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time. The numerical model should be updated during operation of the mines by using the measured inflows, water levels and drilling and pump test information to re-calibrate and refine the impact prediction.
Negatively affecting the surface water **Resources**	Negative Low	Negative Low	Water resources identified within 500 m of the proposed site.	-100-meter buffer has been established from any surface water resources - Storm water diversion measures and containment will be implemented. - Water will be recycled as far as possible using a closed loop sump system.
Negatively affecting the surface right holders	Neg Moderate	Negative Moderate	Agreement to be put in place between the client and surface right holders	Comply with the MPRDA & NEMA and obtain agreement with surface right holders. Implement and Comply with the EMP.
Conflicting land uses (agriculture and mining)	Moderate	Negative Low		- Mining activities will be planned to take place outside of farming activities where possible. - where not possible compensation will be discussed and agreed with the affected party. - rehabilitation will consider further use of the land.
Transnet Pipeline	Negative	Negative Low	- Mining is prohibited within 100m of our	Blasting within 500 m of a pipeline without authority is prohibited. Even if permission

			pipelines, Mining in close proximity of high pressure pipelines also requires a relaxation from the Mining Engineer, although you would still need our approval.	has been granted, strict safety parameters need to be observed, namely: Ground vibration recordings supplied for each and every blast. Transnet Pipelines representative must be present at each and every blast or an arrangement is agreed upon to get all the blasting results to us periodically.

xii. 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 Annexure

Please refer to Annexure C – Conceptual Master Plan.

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

Please refer to Table 24: Impact Assessment Register.

The biggest risks of the project are inadvertent damage to the critical biodiversity category 1 area, wetlands, heritage sites, protected species and loss of agricultural income. All these impacts can be avoided through proper planning and thorough visual surveys of sites targeted for the mining activities. Positive impact is associated with the brief creation of jobs and is considered of moderate to low significance. This has been assessed in terms of the mining operation on its own; however, should this mining permit be converted into a MR then the social benefits will be of moderate to high significance.

4.13 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 EMPr 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:

Conduct mining activities responsibly and ensure operation is compliant with legislative requirements.

- Protect the biophysical environment as far as possible, specifically wetlands and riverine areas and any protected species observed on site.
    - Protect the water resources in the area as far as possible.
    - Ensure atmospheric pollution is kept to a minimum:
    - Ensure adequate rehabilitation to allow continued grazing land use.
    - Ensure socially responsible activities.
    - Protect historical and cultural sites if they are observed on site.

4.14 Aspects for inclusion as conditions of Authorisation.

Any aspects which must be made conditions of the Environmental Authorisation

Mining is prohibited within 100 m of our pipelines, Mining in close proximity of high pressure pipelines also requires a relaxation from the Mining Engineer, although you would still need our approval. Furthermore, there are restrictive conditions imposed by the Blasting Regulations (Explosives Act) — blasting within 500 m of a pipeline without authority is prohibited. Even if permission has been granted, strict safety parameters need to be observed, namely:

- Ground vibration recordings supplied for each and every blast;
- Transnet Pipelines representative must be present at each and every blast or an arrangement is agreed upon to get all the blasting results to us periodically.

Access over our pipelines with heavy mining equipment/plant will not be allowed, provided our pipelines are adequately protected. We prefer concrete box culverts for protection when heavy tonnage trucks are crossing our pipelines frequently. Installation of above ground storage directly or in close proximity of the pipelines is also not permitted. In the interest of both parties, should permission be granted by Transnet Pipelines for the construction of roads and other associated mining facilities, a risk assessment should be conducted by yourselves as a safety precaution in the event of unforeseen circumstances.

No activity is to occur within 100 m of any servitude (Transnet & Sasol gas), wetlands and their 100 m buffer zones, within rivers and their 100 m buffer zone / 1:100-year flood line without the necessary authorisation under NEMA and NWA.

Protected species must remain *IN SITU* until the necessary permits are obtained under NEM:BA.

The impact on the vegetation type will not be significant on the site and on the regional scale. If the project is approved only the protected and red data plant species should be removed and transplanted.

Heritage sites and 50 m buffer zones will be preserved at all times unless the necessary permits are obtained under SAHRA.

Planning before carrying out mining activities in a particular area, and surveying the area before conducting invasive prospecting, is critical to ensure the sensitive areas are preserved and to ensure mining proceeds in a manner compliant with national legislation.

Rehabilitation must be applied on an on-going basis and no sites must be left exposed for more time than necessary to obtain the necessary data. All areas disturbed during the mining process must be rehabilitated to previous land use capability.

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

(Which relate to the assessment and mitigation measures proposed)

At this stage the exact locations of the mining permit is known due to the fact that the locations was fixed with the lodging of the application.

- In general, most of the area has been affected by industrial activities and most sites are not in a natural state. Wetlands must be avoided with appropriate buffer zones or the necessary permits applied for.
- The remaining areas where natural vegetation occurs must also be visually surveyed for heritage sites, but must also be surveyed by a specialist for potential protected species relevant to the region prior to commencing invasive prospecting and mining. Any heritage sites or protected species and buffer zones must be avoided or the necessary permits applied for.
- Activities must remain outside all wetland areas until authorisation has been obtained under NEMA and NWA.

4.16 Reasoned opinion as to whether the proposed activity should or should not be authorised

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

The EAP believes that the authorisation of the activity should be granted, due to existing mining footprint in the area and due to the environmental specialist that conducted their specialist's studies with strict mitigation measures that must be put in place if the project were to proceed.

ii. Conditions that must be included in the authorisation

No activity is to occur within 100 m of any servitude, wetlands and their 100 m buffer zones, within rivers and their 100 m buffer zone / 1:100-year flood line without the necessary authorisation under NEMA and NWA.

Protected species must remain *IN SITU* until the necessary permits are obtained under NEM:BA.

The impact on the vegetation type will not be significant on the site and on the regional scale. If the project is approved only the protected and red data plant species should be removed and transplanted.

Heritage sites and 50 m buffer zones will be preserved at all times unless the necessary permits are obtained under SAHRA.

Planning before carrying out mining activities in a particular area, and surveying the area before conducting invasive prospecting, is critical to ensure the sensitive areas are preserved and to ensure mining proceeds in a manner compliant with national legislation.

Rehabilitation must be applied on an on-going basis and no sites must be left exposed for more time than necessary to obtain the necessary data. All areas disturbed during the mining process must be rehabilitated to previous land use capability.

4.17 Period for which the Environmental Authorisation is required.

3 (Three) Years.

4.18 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.

The applicant representative, Mr. Nicholus Maloba (ID: 7812235978088), hereby confirms the undertaking to ensure implementation and compliance with the basic assessment report and environmental management programme.

4.19 Financial Provision

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

i. Explain how the aforesaid amount was derived.

The Quantum was calculated using the guideline document developed by the Department of Mineral Resources in 2005. In addition, consideration has been given to Section 41 of the Mineral & Petroleum Resource Development Act, N0 28 of 2002.

The quantum has been aligned with the rehabilitation and allows for the site to be rehabilitated back to the original status of the site. This will include:

1) Ensuring all pollution generating activities are eliminated.
- Ensuring all infrastructure is removed from site.
- Ensuring that the existing land use can continue.
- Ensuring that the site is safe for humans and animals.

The rehabilitation sites will have a footprint of 4.65 ha as this is the area determined that needs to be cleared for mining activities from previous experience. The maps and illustrations attached therefore indicate the site layout and sizes associated in order to do mining.

The Mining permit will be limited to a portion of Portion 46 of the Farm Elandsfontein 309 JS.

ii. **Confirm that this amount can be provided for from operating expenditure.** (Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

The provision forms part of the capital expense of the project and is not included in the operational budget allocated in the mining works programme. Allowance has been made for environmental reporting in the operational budget.

4.20 Specific Information required by the competent Authority

i. 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:-

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 Annexure .

The proposed mining activities are expected to be limited and thus opportunities for employment will be low. However, consideration will be given to local procurement of goods and services where practicable.

There may be concern that the introduction of the mining workforce into the industrial communities can result in disputes. The mining workforce is not to interfere with any other labourers or communities. No persons are to reside on the properties during any mining permit activities.

- **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. 46 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 Annexure 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

Section 3(2) of the National Heritage Resources Act, No. 46 of 1999 provides a description of all items that is classified as national estate. The EAP has evaluated the list in comparison with the project site. The results of the assessment are provided below with recommendations to the environmental officer where there was uncertainty. A heritage assessment must be initiated prior to invasive drilling.

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

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

Section 24(4)(b)(i) of the Act requires the EAP to conduct an investigation of the potential consequences of impacts of alternatives to the activity on the environment and assessment of the significance of those potential consequences. Alternatives to the project are limited to the location of mining opencast pit within the project area. Opencast pit sites are not fixed and will only be confirmed during the desktop study if the Mining Permit is warded. The EAP has however provided a grid of possible mining site locations. The mining site locations **are to be** amended on consideration of watercourses and biodiversity.

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PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1. DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

1.1 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: Mr. Vernon Siemelink/Mr. Henno Engelbrecht

Tel No.: 012 807 0383

Fax No. : 086 714 5397

E-mail address: vernon@ecoe.co.za

Name	Vernon
Surname	Siemelink
Company	Eco Elementum (Pty) Ltd
Position	Director – Senior Environmental Consultant
Location	The World Bank Office Park, 442 Rodericks Rd, Lynnwood, Pretoria
Email	vernon@ecoe.co.za
Telephone Number	072 196 9928/ 012 348 5214
Education	**M(EnvMan) - Masters in Environmental Management** Master's Degree at University of Pretoria in Pretoria, South Africa (Gauteng) **BSSc. GeoScience - Honours in Geographical Science** Honours Degree at University of Pretoria in Pretoria, South Africa (Gauteng)
Professional skills	a. Vernon Siemelink is a Director at Eco Elementum (Pty) Ltd Environmental and Project Management Professionals and has been involved in the field of environmental science and environmental management for the past 9 years. b. Vernon is a SGS IRCA Certified EMS Lead Auditor and a SETA accredited assessor. He has also completed the CEM auditor conversion training for ISO 9001, ISO 14001 and OHSAS 18001 Integrated Management Systems. c. Vernon Siemelink has been an environmental consultant and professional since 2008, specialising in the fields of: ▪ Environmental Impact Assessments and Authorisations. ▪ Water use license application. ▪ Waste use license application. ▪ Environmental Monitoring and Control. ▪ Mine Closure and Rehabilitation. ▪ Environmental Compliance and Audits. ▪ Environmental Management Systems; and Specialist Impact Studies. d. During this time, he has provided quality, environmental, and health and safety consulting and auditing services in nearly every industry sector. e. Furthermore, Vernon holds a Master's Degree in Environmental Management and an Honours Degree in Geosciences from the University of Pretoria.

Please refer to the CVs attached in Annexure A.

Skills	a. Environmental Impact Assessments. b. Basic assessments, WULA reports. c. Water use license application. d. Prospecting and Mining Right Authorizations.

	e. Environmental Management Plans. f. Public Participation. g. Environmental Authorizations. h. ISO 14001:2004 Environmental Management System Auditor. i. FSC Forest Management Auditing. j. Geographic Information System Support (ArcGISv9.2). k. SETA Accredited Assessor. l. EMSware software Administrator. **m.** Integrated Management System Auditor.
EAP Experience	Mr. Vernon Siemelink has been an Environmental Assessment Consultant for 9 years, during this time he has conducted S/EIA's, Basic Assessments, rehabilitation planning, developed EMPr (This includes conducting screening and scoping exercises, baseline studies, impact assessments, monitoring, and management planning and implementation) environmental legal assessments, ISO 14001:2004 management systems, due diligence, EMPr Performance Assessments and Integrated Water Use License Audits for clients in nearly every industry sector.

In terms of section 13 (2&3) of the 2014 National Environmental Management Act EIA regulations (GNR. 982 of 2014): In the event where the EAP or specialist does not comply with sub regulation (1)(a) (which is the independence clause), the proponent or applicant must, prior to conducting public participation as contemplated in chapter 5 of these Regulations, appoint another EAP or specialist to externally review all work undertaken by the EAP or specialist, at the applicant's cost. The external reviewer however needs to be independent. To satisfy the above requirements Algatorque (Pty) Ltd appointed Eco Elementum (Pty) Ltd as the Independent Environmental Assessment Practitioners (EAP) to review the BA Report and to oversee the PPP for the Mining Permit Application.

Please refer to Annexure A for the detailed CV's.

1.2 Description of the Aspects of the Activity

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

The following section presents a detailed description of all the activities associated with the proposed mining permit application. Due to the nature of the Mine Works Programme, and the fact that the specific mining activities required are dependent on the preceding phase, assumptions are presented where required.

Site preparation

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

- provide sufficient stable topsoil material for rehabilitation (in this case concurrently as mining continues);
- optimise the preservation and recovery of topsoil for rehabilitation;
- identify soil resources and stripping guidelines;
- identify surface areas requiring stripping (to minimise over clearing);
- manage topsoil reserves to not degrade the resource;
- identify stockpile locations and dimensions; and
- identify soil movements for rehabilitation use.

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

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

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

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

Based on the final void having a considerable surface area relative to the total area mined and topsoil being recovered from all areas to be mined, it is considered that a topsoil surplus over the life of mine will occur. However, the Project topsoil budget will be reviewed following completion of topsoil recovery from the deeper profiles within the Algatorque – Elandsfontein project.

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

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

Box Cut Opencast Mining With A Roll-Over Rehabilitation Sequence

The most economical method of coal extraction from coal seams depends on the depth and quality of the seams, and also the geology and environmental factors of the area being mined. The impact of coal mining processes is generally differentiated by whether they operate on the surface or underground. In this instance the mineral will be won by means of opencast surface mining methods as indicated in the figures above. Coal is mined only where technically feasible and economically justifiable. Evaluation of technical and economic feasibility of a potential mine requires consideration of many factors: regional geologic conditions, overburden characteristics, coal seam continuity, thickness, structure, quality, and depth; strength of materials above and below the seam for roof and floor conditions; topography (especially altitude and slope); climate; land ownership as it affects the availability of land for mining and access; surface drainage patterns; ground water conditions; availability of labour and materials; coal purchaser requirements in terms of tonnage, quality, and destination; and capital investment requirements.

The Algatorque - Elandsfontein project operation proposes to use the rollover mining and rehabilitation method. Roll-over opencast mining is typical of small scale opencast mining operations in the Mpumalanga coal fields. The proposed mining entails only opencast methods for this stage of the project. The open-castable reserves will be mined in conventional truck and shovel mining methods using the lateral roll-over technique in a single direction. This would mean mining from the one side of the development footprint in a linear fashion towards the opposite side while backfilling and rehabilitating the area that has already been mined, thus creating the effect that the mining cuts are rolling over in a single direction. Sustainable development applied to mining works necessarily includes rehabilitation with the aim of either restoring the land to its original use, or eliminating or reducing adverse environmental impacts to a long-term acceptable condition. The process is driven primarily by legislation which ensures that the mine owner must comply with the intention of achieving those end conditions, which are defined in broad terms by guidelines.

An initial box cut as well as an access pit ramp into the box will be constructed first. A double box cut has been planned to enable mining in both a northerly and southerly direction, thereby increasing the face length and production rates. The ramp will have a maximum slope of 12˚. Topsoil from the initial box cut will be stripped, where after the subsoil and hard overburden will be drilled, blasted and removed. Topsoil, subsoil and hard overburden will each be stockpiled separately. After removal of the coal from the initial box cut, subsequent box cuts will be made and the initial void filled with the stockpiled hard overburden, subsoil and finally topsoil which will then be seeded and grasses to re-establish vegetation coverage to grazing capability.

The primary procedures that will be implemented during the mining process include;

- Removing and stockpiling of topsoil;
- Construction of the pollution control evaporation dam(s) also used for dust suppression;
- Trenching around the mining footprint to ensure storm water is diverted away from the open cast pit;
- Blasting, stripping and stockpiling of overburden;
- Excavation of the initial strip of the box-cut;
- Excavation of coal (ROM);
- Crushing, screening and stockpiling coal;
- Backfill rehabilitation concurrently as mine progress forward.

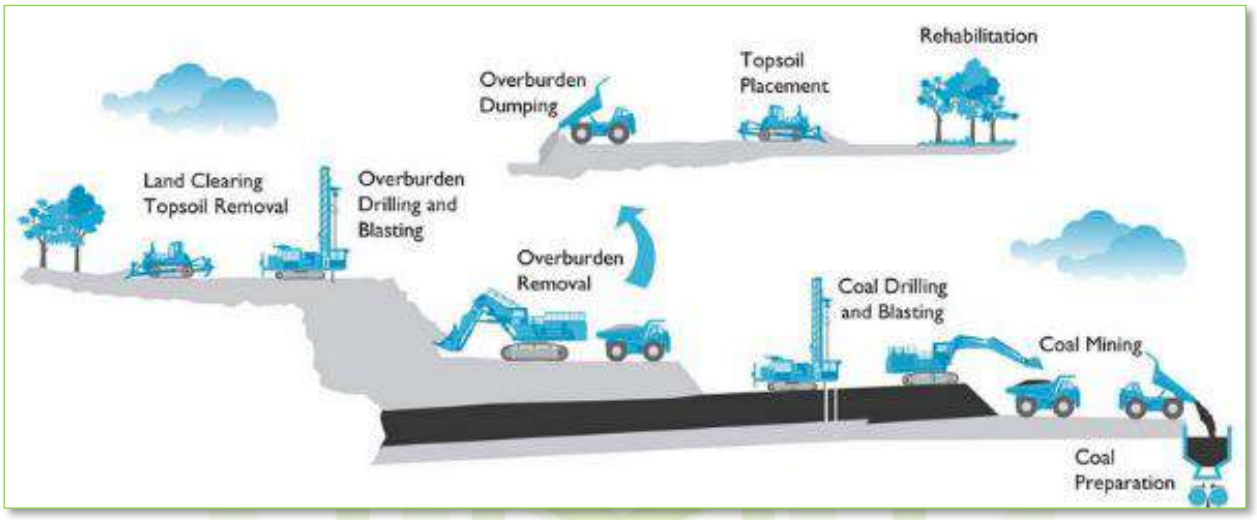

Figure 58: Typical coal surface mining opencast sequence indicating primary procedures

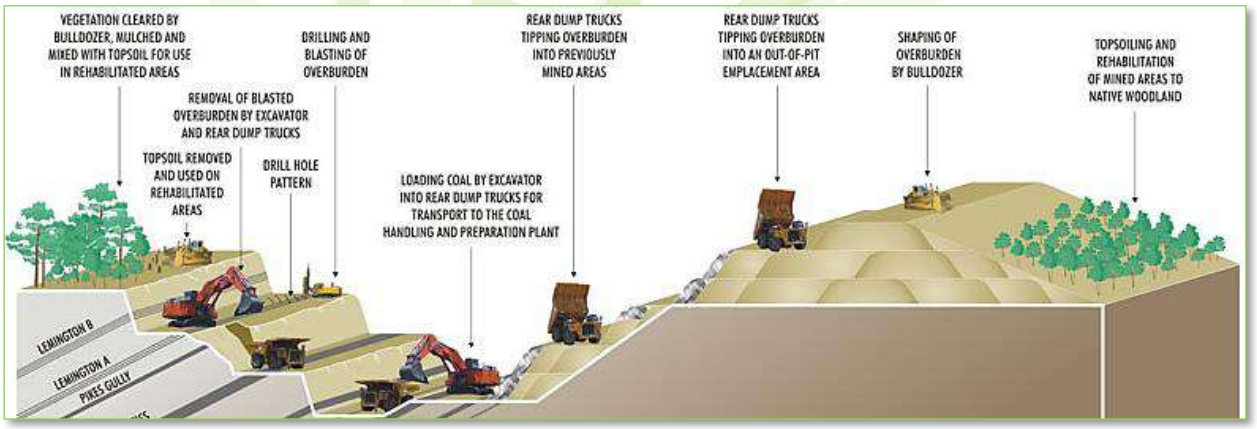

Figure 59: Typical coal surface mining opencast sequence indicating rollover backfill rehabilitation methodology

The figure below indicates the typical mining sequence and can be summarized as; initial removal of the overburden which will then be stockpiled behind the mining area to ensure it can be replaced back in the initial box cut. The physical mining of the coal seam follows which is then placed into trucks to be taken to the crushing and screening facility. From here discard coal will be extracted and replaced in the bottom of the opencast pit, while the product will be taken to the weighbridge via trucks and then removed off site. The overburden is replaced back into the pit as mining progress leaving a minimum area open at a single time. The topsoil which was stripped and stockpiled separately before mining commenced is then replaced and per the land capability specialist report prepared to the optimal composition to ensure the field can be restored to grazing land as was the pre-mining land use.

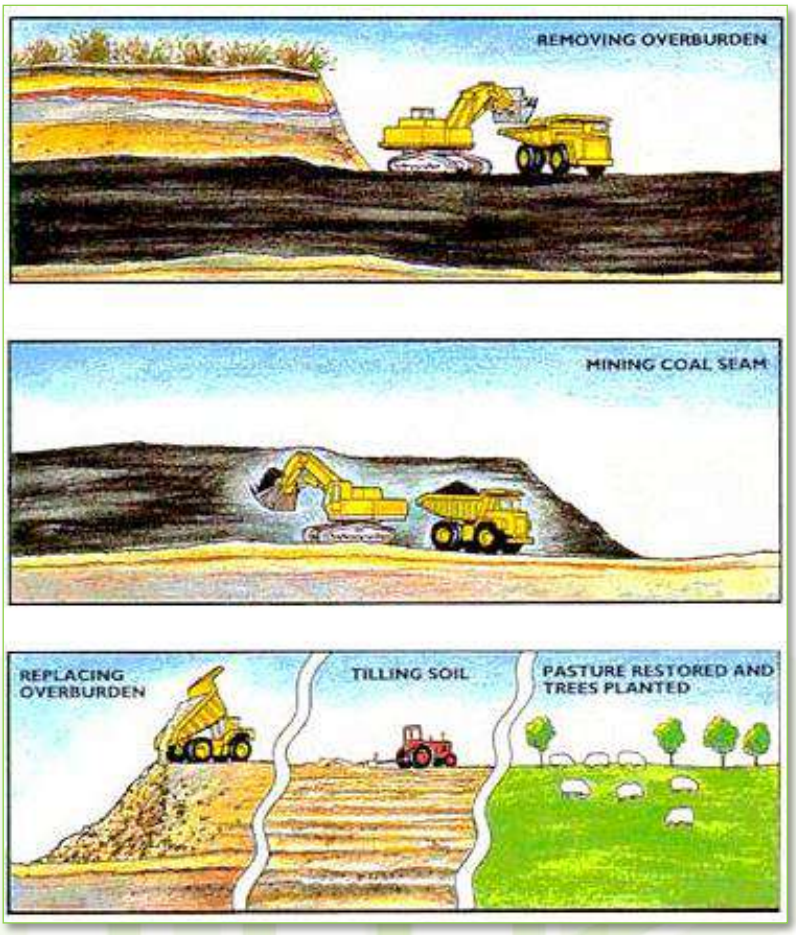

Figure 60: Opencast Coal Mining Sequence

The sequence in the following figure can serve as a further illustration of the anticipated project. Step (1) is where the topsoil will be stripped and stockpiled separately. After this drilling takes place to enable blasting of the overburden. During step (2) the overburden is then removed by conventional truck and shovel methodology and stockpiled separately within the mining footprint. Step (3) includes the removal of under burden which is typically associated with more hard material than fine material (typical of overburden) and is usually the sandstone layer on top of the coal seam. This material is also stockpiled separately. During step (4) physical extraction of coal or winning of the mineral takes place and step (5) indicates the conventional truck and shovel methodology of removing the material.

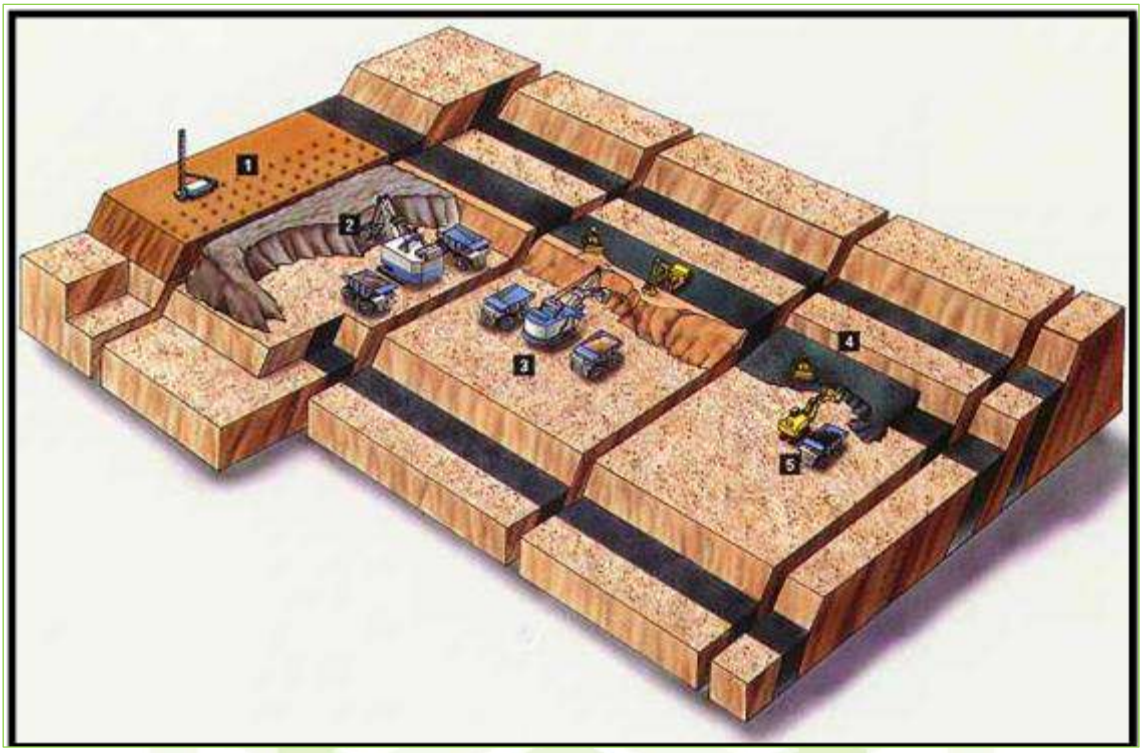

Figure 61: Opencast coal mining typical progressive steps (No 1- 5)

The following basic principles of rehabilitation form the basis of the roll-over mining methodology that entails concurrent rehabilitation as mining progress:

- Prepare a rehabilitation plan prior to the commencement of mining which includes detailed surveys of the pre-mining environment to ensure the landscape can be restored to the pre-mining environment as close as feasible;
- Agree on the long-term post-mining land use objective for the area with the relevant government departments, local government councils and private landowners. The land use must be compatible with the climate, soil, topography of the final landform and the degree of the management available after rehabilitation;
- Progressively rehabilitate the site, where possible, so that the rate of rehabilitation is similar to the rate of mining;
- Prevent the introduction of noxious weeds and alien vegetation (typical to areas of disturbance);
- Minimise the area cleared for mining and associated infrastructure to only what is ultimately required and no additional clearance of unnecessary areas;
- Reshape the land disturbed by mining operations so that it is stable, adequately drained and suitable for the desired long-term land use;
- Minimise the long-term visual impact by creating landforms which are compatible with the surrounding landscape;
- Reinstate natural drainage patterns disrupted by mining wherever possible;
- Minimise the potential for erosion by wind and water both during and following mining;
- Characterise the topsoil and retain it for use in rehabilitation. It is preferable to reuse the topsoil immediately rather than storing it in stockpiles. Only discard if it is physically or chemically undesirable, or if it contains high levels of weed seeds or plant pathogens;
- Consider spreading the cleared vegetation on disturbed areas;
- Deep rip compacted surfaces to encourage infiltration, allow plant root growth and key the topsoil to the subsoil, unless subsurface conditions dictate otherwise;
- Ensure that the surface one or two metres of soil is capable of supporting plant growth;
- If topsoil is unsuitable or absent, identify and test alternatives substrates, e.g. overburden that may a suitable substitute after addition of soil improving substances;
- Re-vegetate the area with plant species consistent with the post mining land use; and
- Monitor and manage rehabilitation areas until the vegetation is self-sustaining.

MOBILE CRUSHING AND SCREENING OF ROM COAL

The proposed project necessitates the use of a mobile crushing and screening facility to ensure it can be easily moved and also reduce the footprint required for rehabilitation post life of mine. No washing of coal on site is proposed as the final product from the mobile crushing and screening facility will be taken away off site, and therefore significantly reduce the environmental impacts associated with washing of coal. The image below is a typical representation of a crushing and screening plant with associated activities. Coal from the ROM stockpile is loaded into trucks and then hauled to a feed din from where it is fed via a conveyor into the crushing and screening facility. Coal is then stockpiled according to the required top sizes from where it can be loaded transported to the weighbridge once again via truck hauling, weighed and taken off site. The process in itself is quite simple and straight forward as no washing of the coal will take place on site.

ACCESS AND HAUL ROADS CONSTRUCTION

The mine access road will lead off one of the dirt roads serving the purpose to only give farmers access to their properties. The dirt road will be upgraded to the applicable standards which includes a gravel road leading into the mine. The road will be used to access the mine offices, workshop complex, and mining area (including mobile crushing and screening facility with ROM stockpiles). Coal transportation trucks will also use this road to enter and exit the mine premises, including travelling to the weighbridge. The weighbridge will be a 22 m x 3 m, 70 ton weighbridge adjacent to the new access road. Several temporary haul roads will also be constructed to access the mine area as well as the ROM stockpiling area. These haul roads will be used by mine personnel to access the mine areas for their day to day duties and the dump trucks will use the road for haulage of coal to the ROM stockpiles. The roads will be constructed to have a width of 8 m while dust suppression using water carts with an added chemical dust suppressant (environmentally friendly) product will be employed.

In order to maintain a gravel road properly operators must clearly understand the need for three basic items:

- A crowned driving surface,
- a shoulder area that slopes directly away from the edge of the driving surface, and
- a ditch

The shoulder area and the ditch of many gravel roads may be minimal. This is particularly true in regions with very narrow or confined right-of-ways. Regardless of the location, the basic shape of the cross section must be correct or a gravel road will not perform well, even under very low traffic. The figure below illustrates the components of a typical cross section of a gravel road that must be considered.

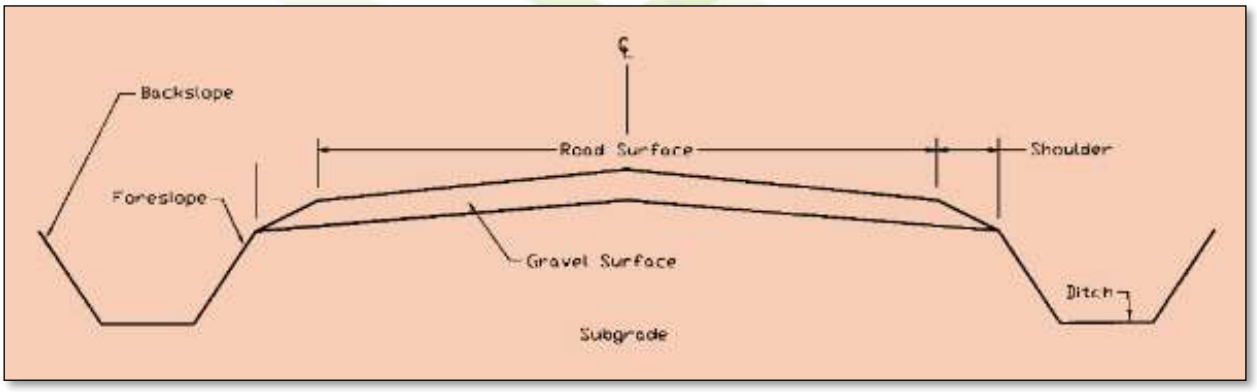

Figure 62: The components associated with a gravel road section

Gravel roads tend to rut more easily in wet weather. Traffic also tends to displace gravel from the surface to the shoulder area and even to the ditch during dry weather. Managers and equipment operators have the continual responsibility of keeping the roadway properly shaped. The shape of the road surface and the shoulder area is the equipment operator's responsibility and is classified as routine maintenance. Keeping the fore-slope and ditch established and shaped is often the maintenance operator's responsibility as well. The

main aim of the design and associated maintenance is to keep water drained away from the roadway. Standing water at any place within the cross section (including the ditch) is one of the major reasons for distress and failure of a gravel road.

There is sometimes a need for specialized equipment to do major reshaping of the cross section, especially in very wet conditions. However, the operator of routine maintenance equipment must do everything possible to take care of the roadway. The recommended shape of each part of the cross section will be considered during road planning. When a gravel road is maintained properly, it will serve low volume traffic well. Unfortunately, most gravel roads will fail when exposed to heavy hauls even when shaped properly. This is due to weak subgrade strength and marginal gravel depths which are often problems with gravel roads. The low volume of normal traffic does not warrant reconstruction to a higher standard. However, improper maintenance can also lead to very quick deterioration of a gravel road, especially in wet weather. The maintenance equipment operators must always work at maintaining the proper crown and shape. During mining extra maintenance and wetting of the roads to ensure minimal dust generation will be required.

Semi Temporary Site And Security Offices

The site offices for the project, including a small security hut at the entrance of the mining area next to the main entrance road will consist of container-type offices that is commercially available as off the shelve products, as illustrated in the image below. This ensures minimal construction requirements on site and also minimal footprint. Keeping the disturbance area minimal and ensuring ease of mine closure and rehabilitation after life of mine make the temporary offices ideal, especially considering the short duration of the proposed activities and requirement of these offices. The visual impact associated with the structures will also be considered and natural colour paint will be applied to the structures to blend in with the background features.

Storm water management around the facilities will also be considered and the necessary waste receptacles will be in place for general domestic waste separation and management. Waste skips will be used for waste collection and any domestic waste will be removed from the site to a licensed waste facility by a registered and approved contractor. No housing facilities will be required as personnel will not be allowed to reside on site for the duration of the project but instead live off site from the mine. The security will however be present 24hours a day on the mine for the duration of the project and even longer during the mine closure and rehabilitation period.

Figure 63: Typical semi temporary site offices and security office

Semi Temporary Sanitation And Change House

Similar to the structure indicated in the section above, will the semi temporary sanitation and change house also be container type facilities which can easily be brought to site and also removed after life of mine. For the change house and ablution facility a septic tank system will be implemented which is temporary of nature and can also be decommissioned easily. The septic tank system will ensure a 'honey-sucker' type sewage removal vehicle can remove and dispose of sewage at an appropriate facility off site. This ensures no major construction and approval is required for a full scale sewage treatment facility. Mobile chemical toilets will also be used where necessary and supplied by an approved contractor whom 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. The current expectation is that 50 employees will require 45liter per person per day (litre pp/day) amounting to 2 460 litres per day.

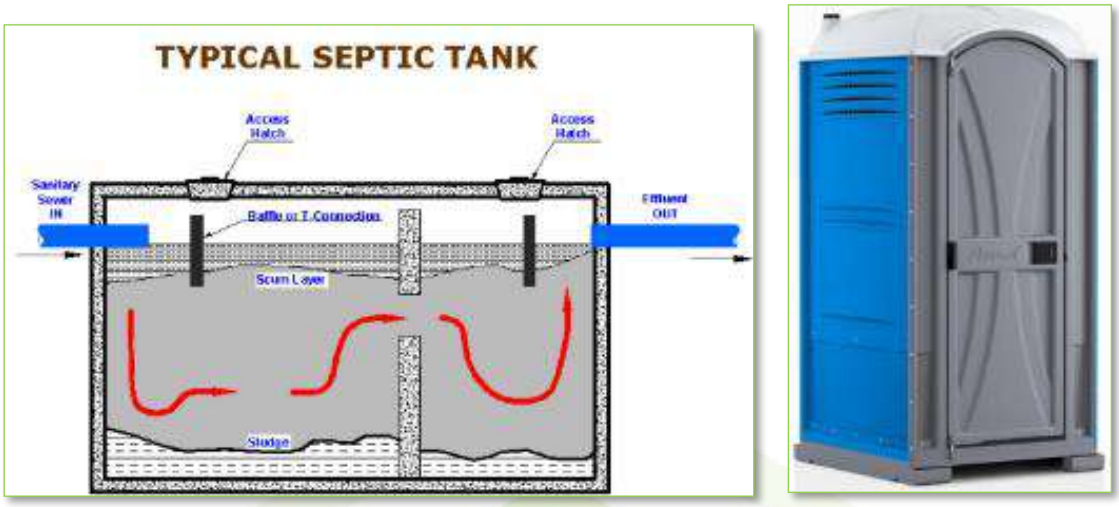

Figure 64: Typical septic tank cross section and chemical toilet illustration

MOBILE FUEL STORAGE

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

Figure 65: Typical mobile fuel storage trailer with bunded tray

POLLUTION CONTROL FACILITY/DAM (EVAPORATION AND DUST SUPPRESSION USAGES)

Water is typically the prime environmental medium (besides air) that is affected by mining activities. Mining adversely affects water quality and poses a significant risk to South Africa's water resources. Mining operations can further substantially alter the hydrological and topographical characteristics of the mining areas and subsequently affect the surface runoff, soil moisture, evapo-transpiration and groundwater behaviour. Failure to manage impacts on water resources (surface and groundwater) in an acceptable manner throughout the life-of-mine and post-closure, on both a local and regional scale, will result in the mining industry finding it increasingly difficult to obtain community and government support for existing and future projects. Consequently, sound management practices to prevent or minimise water pollution are fundamental for mining operations to be sustainable.

Pro-active management of environmental impacts is required from the outset of mining activities. Internationally, principles of sustainable environmental management have developed rapidly in the past few years. Locally the Department of Water Affairs (DWA) and the mining industry have made major strides together in developing principles and approaches for the effective management of water within the industry. This has largely been achieved through the establishment of joint structures where problems have been discussed and addressed through co-operation.

The National Water Act (Act 36 of 1998) requires that the dirty water originating from the mining operations be kept separate from the clean water systems outside and on top of the mining area. Therefore, in-pit water storage cannot be considered for this application and the additional requirements of the NWA will also need to be complied with. Data generated during the geohydrological investigation as part of the Water Use License Application phase will guide the civil engineering team to accurately size and design the pollution control facilities, in this case lined dams above ground, to be used as evaporation dams and also for water abstraction for dust suppression carts on the mine.

The main concern regarding coal mining is the correct treatment and disposal of water. Sufficient provision will be made in the form of trenches for surface water runoff diversion away from the mining area, to ensure clean and dirty water separation takes place. This way contamination of water can be minimised. Water that has been contaminated and in-pit ingress water will be pumped to above ground pollution control dams which will be lined to ensure no ground water infiltration can take place. The pollution control dam(s) will be constructed, fenced and notices erected to warn the public with regards to safety, at the proposed mining area for the storage of dirty water. The pollution control dam will be designed by a registered professional civil engineer and have capacity to handle all dirty water emanating from the dirty water areas on the mining area. An integrated Water Use License Application (IWULA) covering the mine related water uses will be submitted to the Department Water Affairs.

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

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

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

The design, operation and closure of PCDs are important aspects in the successful operation of a mine, given the inherent safety and environmental risks posed by structural failure, spillage or overtopping of these facilities. It is thus important that practitioners within this field have a good understanding of the management of water, surface and groundwater, when designing and/or operating PCDs. To this end, the Department: Water and Sanitation (DWS) have prepared an activity-related Best Practice Guideline to focus on mine water PCDs which will be adhered to during the design and construction of the pollution control dam(s).

Best practice for mine water PCDs is developed from a combination of the following requirements:

- Legislative requirements;
- Industry norms and generally accepted good practices;
- Technically and environmentally sound design practices;
- Life cycle planning for the PCD;
- Management of hazards and risks;
- Effective water resources management, both for the mine site and within the regional Catchment Management Plan, and
- Other factors, such as site specific conditions.

Effective design, operation, management and closure of PCDs are ensured through adherence to the above requirements. The image below is an illustration of the typical pollution control dam that will be constructed.

Figure 66: Lined pollution control dam (PCD) illustration

Best Practice water management for PCDs will be based on the following general principles:

- All PCDs will comply with the legal and regulatory conditions within South Africa;
- Worst-case conservative assumptions will be made in instances where the quality of water to be contained within the PCD cannot be established with certainty;
- PCDs are to be sited, sized and operated to maximise the opportunities for water reuse and reclamation and to minimise the impacts on the water resource;
- Designs will adhere to the generally accepted principles of sustainable development and Best Practice Environmental Option (BPEO), as defined in section 2 of NEMA, by integrating social, economic and environmental factors during the planning and implementation and closure phases;
- Technical studies and the design of PCDs will be undertaken by suitably qualified personnel (registered civil engineers);
- The full life cycle of the PCD will be considered in the design, operation and closure of PCDs;
- Designs will adopt a holistic approach, including:
    - Sustainability;
    - Full life cycle of the PCD;
    - Water quantity and quality, and
    - Surface water and groundwater.

The siting of pollution control dams is critical in order that it maximizes the containment of all polluted water. The pollution control dam design specifications are as set out below. It is a requirement that pollution control dams do not leach any of the polluted contents into the groundwater and is therefore required to be lined in order to limit seepage. It is proposed that a 1,5 mm thick HDPE lining be used to line the dam basin. The lining will be covered by a 200 mm thick soil backfill.

Clean And Dirty Water Separation

The clean and dirty water separation on the mine has been discussed to an extent under relevant sections where applicable, although, a detailed surface water management plan will be drawn up as part of the Water Use License Application 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.

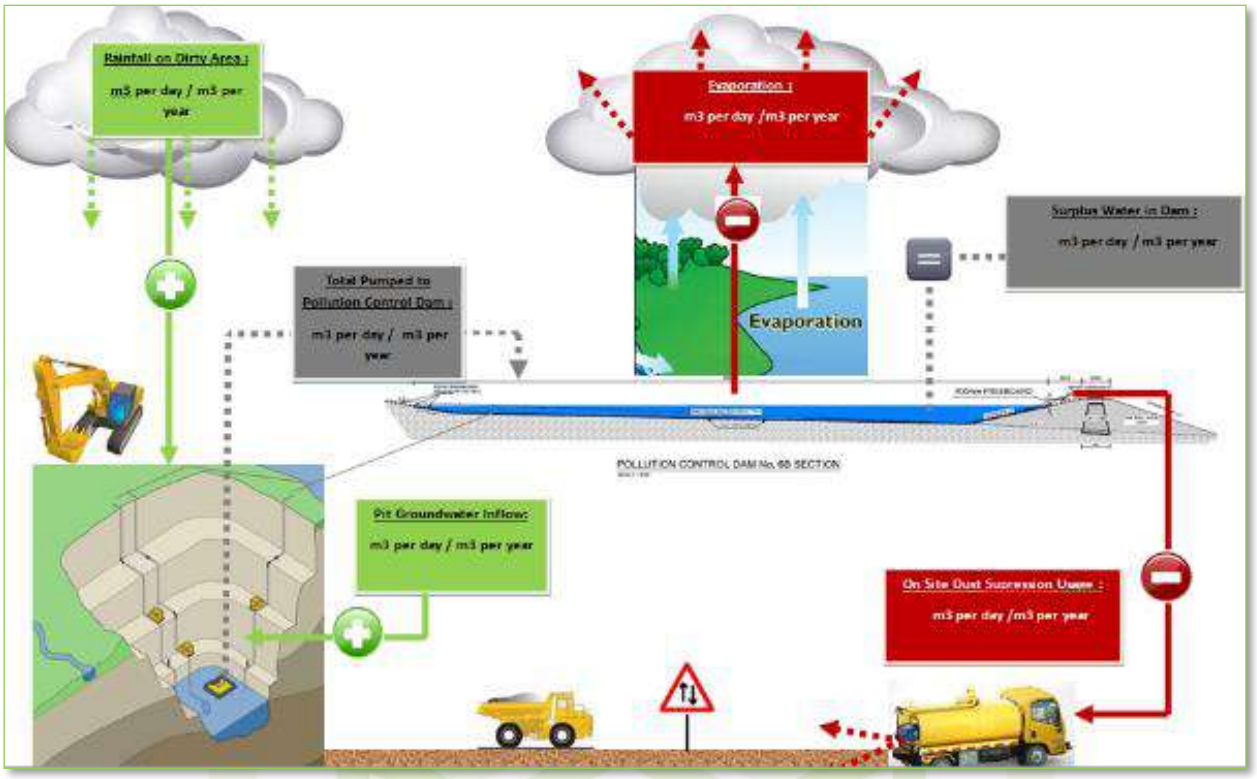

Figure 67: Typical water balance considerations during the design of a clean and dirty water separation system

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

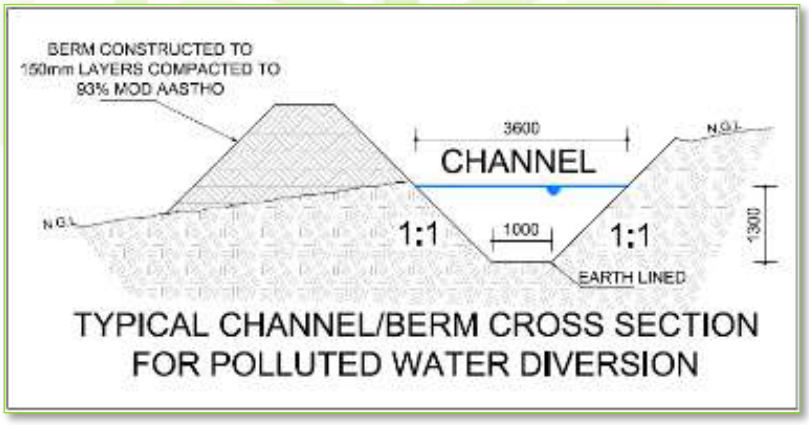

Figure 68: Typical channel/berm cross section for polluted water diversion

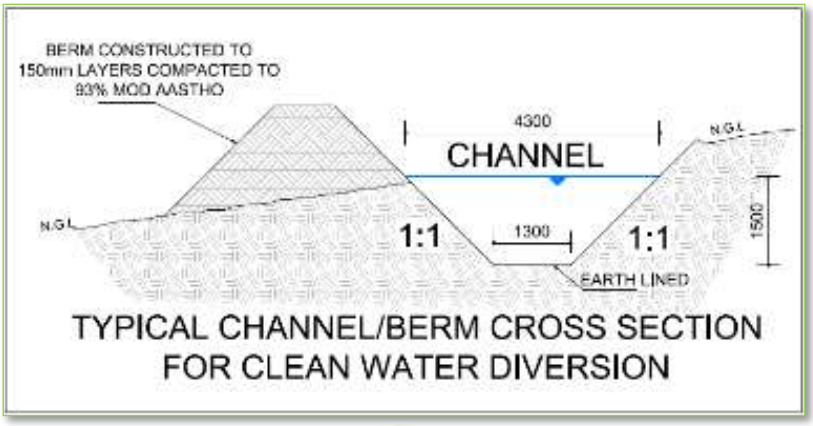

Figure 69: Typical channel/berm cross section for clean water diversion

FENCING

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

Figure 70: Typical mine fence signage

STAFF AND VISITORS PARKING

Designated parking areas will be constructed by compaction of the subsoil after removal, storage and preservation of the valuable layer of topsoil. Uncovered parking areas for mine fleet vehicles will be constructed in a separate area to the staff and visitors parking as a safety measure as the mine fleet vehicles are very large and pose a safety hazard. The staff and visitors parking will be separate from the latter and possibly covered. Storm water management control around these areas will be implemented while the necessary signage will be erected to ensure optimal safety while reverse parking will be implemented at all parking bays. The necessary waste receptacles as well as oil spill kits will be provided at these sites in case of accidental spillage or leakage of hydrocarbon fuel/oil/greases from the vehicles.

DRILLING AND BLASTING

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

standards. Blasts are designed and managed to minimise the risk of exceeding these limits, and to minimise impacts they have on the community, surrounding structures and environment.

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

The risks associated with blasting have been identified and include blast and potential fly-rock. There is a limited risk of air blast due to mining activities resulting in property damage. Blasting controls will include monitoring of blast design, powder factors and stemming levels to minimise the effects of air blast and ground vibrations. The mining area will be evacuated prior to blasting to a radius of >500m while the adjacent property owners will also be informed accordingly prior to blasting events. Eskom has indicated that they also need to be informed well in advance of blasting events as several power lines transect the mining footprint that need to be protected.

A blast management plan will be implemented with the objectives of;

- Ensuring all relevant statutory requirements and company Policies and Standards are met;
- Managing and minimising the impact of blasting from mining operations on the environment and nearby residences;
- Maintaining an effective response mechanism to deal with issues and complaints; and
- Ensuring the results of blast monitoring comply with applicable criteria.

Topsoil, Subsoil, Overburden, Discard And ROM Stockpiles

Positions of the topsoil, subsoil and overburden stockpiles have been indicated on the mine plan. All topsoil, subsoil and overburden material will be removed during the mining operation and stockpiled separately for the purpose of backfill rehabilitation as discussed earlier. The stripping, handling and preservation of topsoil have also been discussed earlier in this report as a separate chapter due to the importance of topsoil for rehabilitation purposes. The topsoil stockpiles will not exceed a height of six meters which is high enough to reduce leaching impacts of stockpiled topsoil. The subsoil and overburden stockpiles will however exceed this height.

Topsoil will be kept separate from other stockpiles and shall not be used for construction purposes or for maintenance of the access roads. The topsoil shall be adequately protected from being blown away by wind or eroded by the force of water. The subsoil and overburden stockpile areas will cover an area of approximately 2 ha, of which the topsoil will be stripped and stockpiled separately. The hard overburden stockpiles will contain approximately 50 m^3 (bulking factor of 1.1) of blasted overburden material.

Stockpiles may be used in some instances to provide visual and noise barriers between the mining operations and neighbouring land users. These stockpiles will be constructed from either overburden or from soil and will be in place for the life of mine and will be top-soiled and grassed immediately after their construction. Topsoil removal will take place by means of excavators and hauled with Articulate Dump Trucks (ADT's).

The ROM stockpiling area will be constructed to cover an area of approximately 1ha and will not contain more than 10 000 tons of ROM coal at one period. The stockpile will also not exceed a height of 12 m. The stockpile will be used to load coal from the mining area as well as to cater for any ceases in production resulting from breakdown or disruption of workings. Dirty water emanating from this area will be diverted to the pollution control dam area.

A weighbridge will be constructed adjacent to the ROM coal stockpile area on a concrete slab footprint. The exact design will be made available once the external service providers have submitted their designs and a decision have been made regarding the procurement of a weighbridge. Below, cross sections of three typical weighbridge designs have been provided for clarification purposes. The impacts associated with these three structures are very closely related and would not significantly change the impact rating or influence the final outcome of the EIA which ever design is implemented.

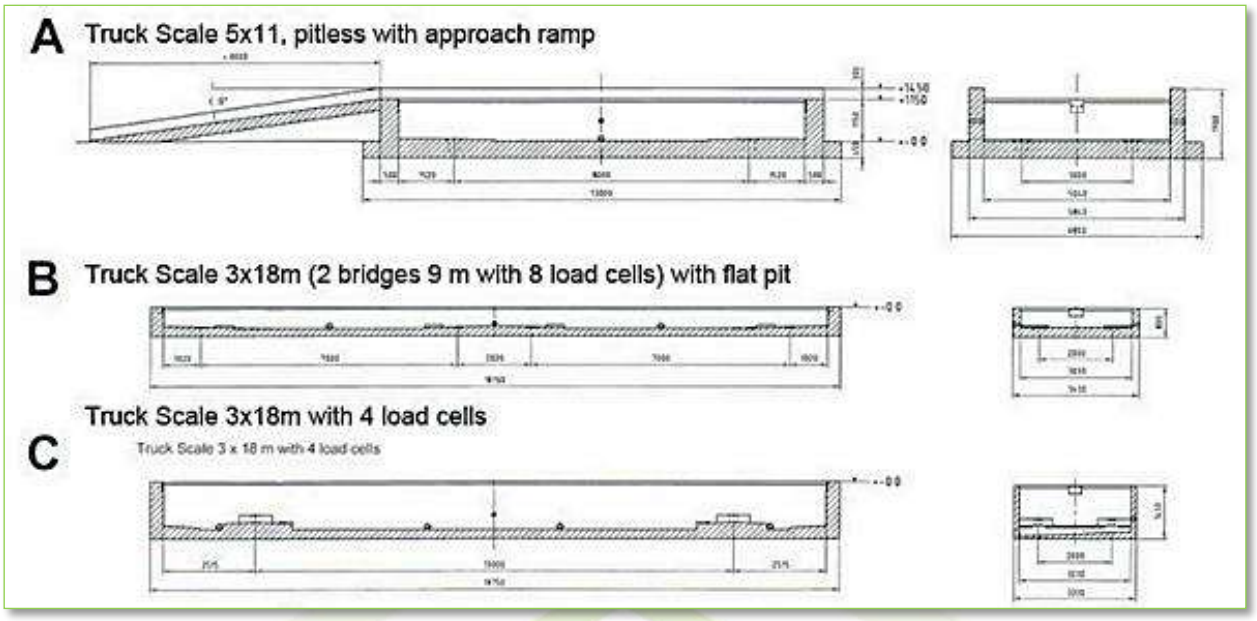

Figure 71: Three potential alternative weighbridge designs and cross sections

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. The overall aim of the project is to keep the carbon footprint of the entire project as small as possible. This will include the use of "green" products as far as possible as well as the reclamation of all building rubble during the construction phase.

Several waste streams are likely to originate from the activities associated with day to day activities in the workplace. Some of these waste streams may not be hazardous, but the majority may contain a component(s) that may need special treatment. The nature of these waste streams may also vary due to composition and physical form. In order to make informed decisions on determining the appropriate waste management options to handle, treat and dispose of waste, the different waste streams must be identified in terms of hazardous and non-hazardous wastes.

Waste streams can be categorised into 6 (six) different streams, based on similar health and environmental concerns namely:

- ***Inorganic wastes*** – acids, alkalis, cyanide wastes, heavy metal sludge's and solutions, asbestos wastes and other solid residues.
- ***Oily wastes*** – primarily from the processing, storage and use of mineral oils.
- ***Organic wastes*** – halogenated solvents residues, non-halogenated solvent residues, polycarbon based (PCB) wastes, paint and resin wastes.
- ***Putrescible Organic Waste*** – wastes from production of edible oils, slaughter houses, tanneries and other *animal based products.*
- ***High Volume/Low Hazard Wastes*** – waste based on their intrinsic properties present relatively low hazards but may pose problems due to high volumes such as fly ash from power plants.
- ***Miscellaneous Wastes*** – infectious waste from diseased human/animal tissue, redundant chemicals, laboratory wastes and explosive wastes from manufacturing operations or redundant munitions.

The following shall apply to the temporary storage of waste at source:

- The employer shall provide adequate and appropriate containers/receptacles for the temporary storage of waste at source;
- Adequate containers must be available to store different types of waste separately to allow for recycling and disposal per the integrated waste management plan;
- Dedicated storage areas for various types of waste must be allocated and clearly demarcated;
- Waste collected at source shall be collected on a daily basis;
- Waste must be stored in such a manner that it can be safely accessed and loaded;
- Should waste be stored in containers, drums or skips care must be taken that:
  - Waste types (special vs. controlled vs. general waste) are not mixed.
  - Waste is not kept in a corroded or worn container.
  - The container is secure so as to prevent accidental spillage or leakage.
  - All waste skips and containers are labelled with their contents.
  - Skips or containers do not overflow.
  - Skips for special waste is always covered.
  - Skips for controlled waste is covered skips wherever possible.
- Waste must be kept in such a way as to prevent it falling while in storage or while it is being transported;
- Waste must be protected from scavenging by people and animals;
- Do not dispose of (burn, bury or treat) waste on site;
- Collection of waste must be scheduled and the site/location manager must be notified beforehand of collection times and type of waste to be collected; and
- Implement dust suppression measures, such as wetting of access routes and accumulated controller waste.

1.3 COMPOSITE MAP

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

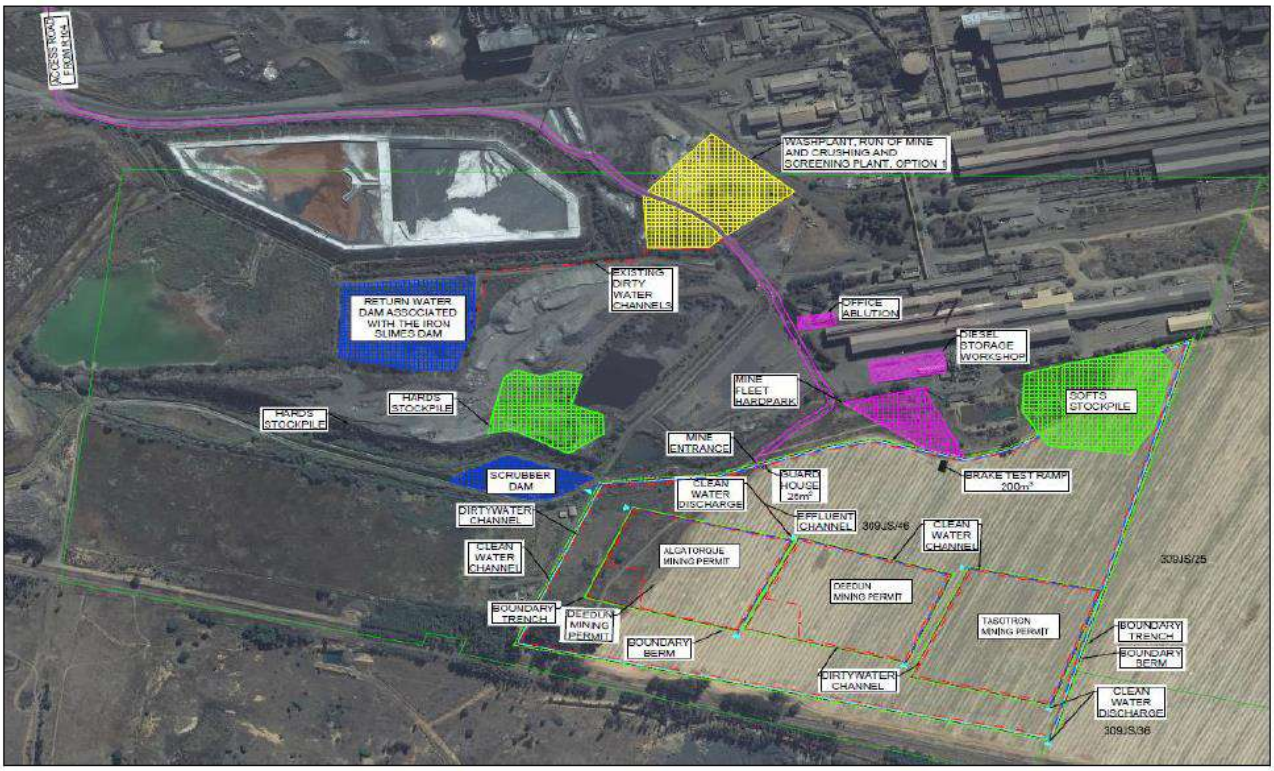

Figure 72: Conceptual site proposed layout

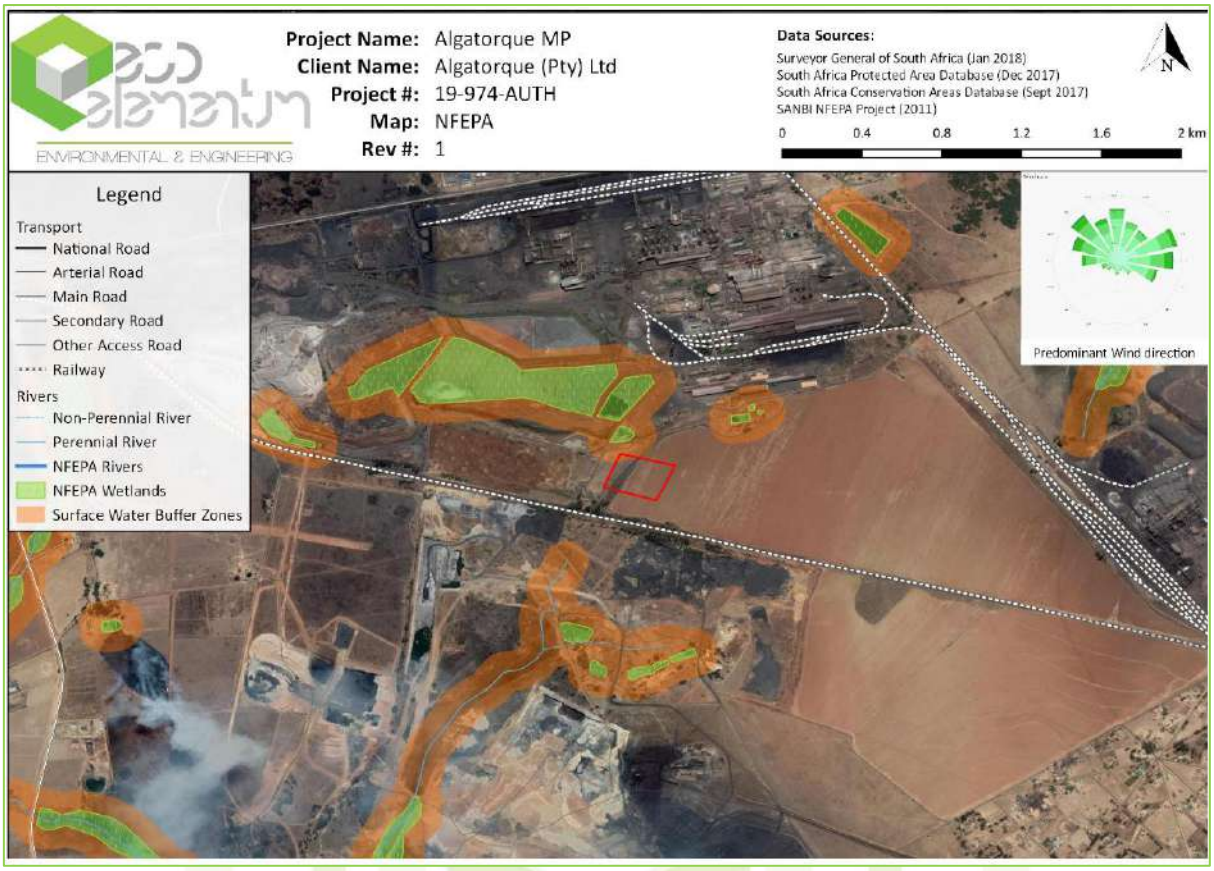

Figure 73: Sensitive Receptors Map

1.4 Description Of Impact Management Objectives Including Management Statements

i. **Determination of closure objectives.** (ensure that the closure objectives are informed by the type of environment described)

The closure objective allows for the site to be rehabilitated back to the original status of the site. This will include:

1) Ensuring all pollution generating activities are eliminated

- Ensuring all infrastructure is removed from site;
- Ensuring that the existing land use can continue; and
- Ensuring that the site is safe for humans and animals.

Vegetation establishment is monitored after the first rain to ensure sustainability in the rehabilitation efforts.

ii. 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 a maximum of 200 days. This amounts to a total maximum of 100 000 m^3.

Water will be provided by Highveld steel, this is estimated at 5 litres per person/day.

iii. Has a water use licence has been applied for?

Yes, a water use licence or water use registration will be applied for. On acceptance of the Mining permit a Water Use License Application will be lodged with the DWS.

An identified watercourse will be impacted by the activity and a 100 m buffer has been created around all watercourses to limit the need for 21(c) or 21(i) water use licences or registration. More studies will still be conducted around the unchannelled valley bottom wetland that was identified on the western side of the proposed site to classify and rank it.

iv. Impacts to be mitigated in their respective phases

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

Objectives

This section provides for the environmental management of all mining activities to be undertaken in the mining area. The objective of this section is to detail actions required to address the potential impacts resulting from the identified activities to be undertaken during the establishment, operation and rehabilitation of operational sites within the Mining permit area. This section elaborates on the implementation of the mitigation measures documented in the detailed impact assessment.

Environmental Impacts

The aim of this section is to reduce the significance of negative impacts and enhance positive impacts as far as practicably possible. The overall objectives are thus to:

- Minimize disturbance on the physical environment including the protection of biodiversity, soils, surface water and groundwater during mining operations;
- Minimize disturbance to the ecological environment and prevent disturbance to sensitive sites;
- prevent disturbance of sites of cultural and historical importance;
- Minimize disturbance to current land uses and neighbouring activities;
- Provide for a forum for consultation with land owners and affected parties; and
- Facilitate socio-economic development where practicable.

Rehabilitation

Mining activities are to be undertaken in a manner which facilitates site rehabilitation and the restoration of pre-disturbance land capabilities. The primary objectives for rehabilitation include the:

- Removal of all infrastructure and material introduced to site;
- Removal of all wastes and their appropriate disposal;

- Promotion of the rapid re-establishment of natural vegetation and the restoration of site ecology;
- Facilitation of the re-establishment of the land use and land capability to as close as reasonably possible to the original conditions.

Action Plan

The various actions that need to be implemented, to ensure that the environmental objectives are met, are detailed in this section. The actions are aimed at preventing or mitigating environmental impacts and implementing the rehabilitation plan. The management actions are stated in a manner that ensures that they can be audited during the performance assessment programme.

Time Schedule

Time-frames detail the implementation schedule of management actions. The successful implementation and commencement within the timeframes is to be monitored as part of the performance assessment programme.

Requirements for Implementation

Additional measures that will need to be put in place to allow for the successful implementation of the action plan are listed where relevant. The table below presents the actions that need to be implemented to address the potential impacts resulting from the identified activities to be undertaken during the establishment, operation and rehabilitation of mining activities within the mining permit area. The management actions are stated in a manner that ensures that they can be audited during the performance assessment programme. Once approved by the relevant authorities, the provisions of the EMP are legally binding on the project applicant and all its contractors and suppliers.

Table 31: Impacts to be mitigated in their respective phases

ACTIVITIES	PHASE	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment, storage, sample storage, site office, access route, etc. E.g. For mining - excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.	(Of operation in which activity will take place. State; Planning and design, Pre-construction, Construction, Operational, Rehabilitation, Closure, Post closure.	(Volumes, tonnages and hectares or m^2)	(Describe how each of the recommendations herein will remedy the cause of pollution or degradation and migration of pollutants).	(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by competent authorities).	Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. With regards to Rehabilitation, therefore state either:-... Upon cessation of the individual activity or. Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.
Construction of 10 m wide Haul Road.	Construction	4.93 ha	• Dust suppression. • Minimization of vehicle movement. • Monitoring of dust fall to determine if measures are effective.	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded.	•During construction.
			• Restrict the disturbed area. • Restrict spillage from haulage vehicles. • Removal of all utilisable soil and storage of the same. • Implement of storm water management measures. • Treat contaminated soils.	Meet rehabilitation standards/ objectives.	During construction.

			• Vegetating soil stockpiles. • Control alien invasive plant species.	Meet rehabilitation standards / objectives.	During construction.
			• Avoid leaving any building material or waste on site.	Meet rehabilitation standards / objectives.	During construction.
			Report and evaluate any archaeological or heritage features found.	Impact avoided.	During construction.
			Enforce HSEC management measures.	Objectives of Social & Labour Plan.	During construction.
Construction of 10 m wide Void Road.		1.76 ha	• Dust suppression. • Minimization of vehicle movement. • Monitoring of dustfall to determine if measures are effective.	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded.	During construction.
			• Restrict the disturbed area. • Restrict spillage from haulage vehicles. • Removal of all utilisable soil and storage of the same. • Implement of storm water management measures. • Treat contaminated soils.	Meet rehabilitation standards / objectives.	During construction.
			• Vegetating soil stockpiles. • Control alien invasive plant species.	Meet rehabilitation standards / objectives.	During construction.
			Avoid leaving any building material or waste on site.	Meet rehabilitation standards / objectives.	During construction.

			Report and evaluate any archaeological or heritage features found.	Impact avoided.	During construction.
			Enforce HSEC management measures.	Objectives of Social & Labour Plan.	During construction.
Clearing of vegetation within Topsoil Stockpile footprint.		4.93 ha	• Dust suppression. • Minimization of vehicle movement. • Monitoring of dustfall to determine if measures are effective.	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded.	During construction.
			• Restrict the disturbed area, • Restrict spillage from haulage vehicles, • Removal of all utilisable soil and storage of the same, • Implement of storm water management measures, • Treat contaminated soils.	Meet rehabilitation standards / objectives.	During construction.
			• Vegetating soil stockpiles. • Control alien invasive plant species.	Meet rehabilitation standards / objectives.	During construction.
			Avoid leaving any building material or waste on site.	Meet rehabilitation standards / objectives.	During construction.
			Report and evaluate any archaeological or heritage features found.	Impact avoided.	During construction.
			Enforce HSE management measures.	Objectives of Social & Labour Plan.	During construction.

Clearing of vegetation within the footprint of the proposed mini-pit ramps.		4.93 ha	• Dust suppression. • Minimization of vehicle movement. • Monitoring of dust fall to determine if measures are effective.	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded.	During construction.
			• Restrict the disturbed area. • Restrict spillage from haulage vehicles. • Removal of all utilisable soil and storage of the same. • Implement of storm water management measures. • Treat contaminated soils.	Meet rehabilitation standards / objectives.	During construction.
			• Vegetating soil stockpiles. • Control alien invasive plant species.	Meet rehabilitation standards / objectives.	During construction.
			Avoid leaving any building material or waste on site.	Meet rehabilitation standards / objectives.	During construction.
			Report and evaluate any archaeological or heritage features found.	Impact avoided.	During construction.
			Enforce HSEC management measures.	Objectives of Social & Labour Plan.	During construction.
Decommissioning and rehabilitation of the mining site Access roads.	Rehabilitation	4.93 ha	• All infrastructure need to be removed from the site; • All waste and spillage need to be cleaned and disposed of appropriately; • PCD water should be reused or allowed to evaporate	Rehabilitation standards and objectives.	Rehabilitation.

			plastic from PCD need to be removed; • Chemical toilets need to be cleaned before it can be moved to the following site; • Rehabilitation activities must be monitored to ensure that the pre-mining drainage pattern is emulated and that vegetation establishment is successful; • The backfilled areas should be vegetated as soon as possible to prevent dust and siltation of the water bodies; • Monitor surface water resources up and downstream of the Project area to identify potential contamination and residual impacts; and • Where rehabilitation (grass seeding of topsoil cover) is not effective, the associated soil erosion must be mitigated by installing silt traps in affected areas. • Vegetate disturbed and rehabilitated area with indigenous vegetation; • Monitor vegetation establishment and implement erosion control measures, if required; • Alien invasive vegetation to be identified and removed throughout the LoM; and		

			• Establish and implement an Alien Invasive Management Programme.		

Table 32: Impact Management outcomes

ACTIVITY	POTENTIAL IMPACTS	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
(Whether listed or not listed)	(E.g. dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution, etc...)		In which impact is anticipated	(modify, remedy, control, or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc.) E.g. •Modify through alternative method. •Control through noise control. •Control through monitoring and management. •Remedy through rehabilitation.	(Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.
(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...)			(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)		
Construction of a new section of 46 m wide Haul Road and a 10 m wide Void road	Dust pollution.	Air quality	Construction	Control through dust suppression Control through minimisation of vehicle movement Control through monitoring of dust fall to determine if measures are effective.	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded.
	Soil erosion, compaction and contamination.	Soil		• Prevent through restricting the disturbed area. • Prevent through restricting spillage from haulage vehicles. • Control through removal of all utilisable soil and storage of the same. • Control through implementation of storm water management measures. • Remedy through treatment of contaminated soils.	Rehabilitation standards / objectives

	Loss of vegetation. Invasion by alien invasive species.	Vegetation		• Modify by vegetating soil stockpiles. • Control though alien invasive eradication programme. • Alien invasive vegetation to be identified and removed throughout the LoM. • Ensure site clearing is restricted to the footprint of the designated areas to limit the degradation and destruction of natural habitats; • Vegetate open and exposed areas to prevent soil erosion and the establishment of alien invasive vegetation; • Restrict access and avoid areas of identified faunal and floral SSC, that are adjacent to the mining activities; • Floral and faunal SSC within the mining activities must be rescued and relocated; • Restrict access and avoid sensitive landscapes, such as wetlands and ridges, that are adjacent to the mining operations; • Topsoil that will be used for rehabilitation within one year must be stockpiled according to the Rehabilitation Plan. • Compaction of stockpiled topsoil must be avoided to ensure the seed bank is viable; • Alien invasive vegetation to be identified and removed throughout the LoM;	Rehabilitation standards / objectives.
	Visual impact	Visual receptors		Avoid / prevent leaving any building material or waste on site.	Rehabilitation standards / objectives.
	Heritage	Archaeological or heritage features.		Prevent through reporting and evaluation of any archaeological or heritage features found.	Impact avoided.
	Social impact.	Noise and visual. Health, safety and security.		• Control through appropriate management measures; • Prevent through HSE management measures.	Objectives of Social & Labour plan

Clearing of vegetation within the footprint of the topsoil stockpile and the proposed mini-pit ramps.	Dust pollution.	Air quality.	Construction	• Control through dust suppression. • Control through minimisation of vehicle movement. • Control through monitoring of dust fall to determine if measures are effective.	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded.
	Soil erosion, compaction and contamination.	Soil		• Prevent through restricting the disturbed area. • Prevent through restricting spillage from haulage vehicles. • Control through removal of all utilisable soil and storage of the same. • Control through implementation of storm water management measures. • Remedy through treatment of contaminated soils.	Rehabilitation standards / objectives.
	Loss of vegetation. Invasion by alien invasive species.	Vegetation		• Control through restricting the footprint to be cleared. • Control though alien invasive eradication programme. • Modify by vegetating soil stockpiles. • Control though alien invasive eradication programme. • Alien invasive vegetation to be identified and removed throughout the LoM. • Ensure site clearing is restricted to the footprint of the designated areas to limit the degradation and destruction of natural habitats; • Vegetate open and exposed areas to prevent soil erosion and the establishment of alien invasive vegetation; • Restrict access and avoid areas of identified faunal and floral SSC, that are adjacent to the mining activities; • Floral and faunal SSC within the mining activities must be rescued and relocated; • Restrict access and avoid sensitive landscapes, such as wetlands and ridges, that are adjacent to the mining operations;	Rehabilitation standards / objectives

				• Topsoil that will be used for rehabilitation within one year must be stockpiled according to the Rehabilitation Plan. • Compaction of stockpiled topsoil must be avoided to ensure the seed bank is viable; • Alien invasive vegetation to be identified and removed throughout the LoM.	
	Visual impact	Visual receptors		Avoid / prevent leaving any building material or waste on site.	Rehabilitation standards / objectives.
	Heritage	Archaeological or heritage features.		Prevent through reporting and evaluation of any archaeological or heritage features found.	Impact avoided
	Social impact	Noise and visual. Health, safety and security.		• Control through appropriate management measures; • Prevent through HSE management measures.	Objectives of Social & Labour plan
Hauling and transport of coal during operations.	Dust pollution	Air quality	Operational	• Control through dust suppression. • Control through minimisation of vehicle movement. • Control through monitoring of dust fall to determine if measures are effective.	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded.
	Soil erosion, compaction and contamination.	Soil		• Prevent through restricting the disturbed area. • Prevent through restricting spillage from haulage vehicles. • Control through removal of all utilisable soil and storage of the same. • Control through implementation of storm water management measures. • Remedy through treatment of contaminated soils.	Rehabilitation standards / objectives.

Table 33: Potential Impact Mitigation Type

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Whether listed or not listed				
(E.g. Excavations, blasting, stockpiles, discard dumps or dams, loading hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors etc...)	(E.g. Dust, noise, drainage, surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution, etc…)	(modify, remedy, control, or stop) through (e.g. Noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity, etc…)	Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to rehabilitation specifically this must take place at the earliest opportunity. With regard to Rehabilitation, therefore state either: Upon cessation of the individual activity or Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.	(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by competent authorities).
Construction of a new section of 46 m wide Haul Road and a 10 m wide Void road.	Dust pollution.	• Control through dust suppression. • Control through minimisation of vehicle movement. • Control through monitoring of dust fall to determine if measures are effective.	Construction.	Conduct dust suppression techniques to ensure that applicable standards for PM10 and PM2.5 are not exceeded.
	Soil erosion, compaction and contamination.	• Prevent through restricting the disturbed area. • Prevent through restricting spillage from haulage vehicles. • Control through removal of all utilisable soil and storage of the same. • Control through implementation of stormwater management measures. • Remedy through treatment of contaminated soils.		Rehabilitation standards / objectives.

	Loss of vegetation. Invasion by alien invasive species.	Modify by vegetating soil stockpiles. Control though alien invasive eradication programme.		Rehabilitation standards / objectives.
	Visual impact.	Avoid / prevent leaving any building material or waste on site.		Rehabilitation standards / objectives.
	Heritage.	Prevent through reporting and evaluation of an archaeological or heritage features found.		Impact avoided.
	Social impact.	• Control through appropriate management measures; • Prevent through HSEC management measures.		Objectives of Social & Labour Plan.
Clearing of vegetation within the footprint of the topsoil stockpile and the proposed mini-pit ramps	Dust pollution.	• Control through dust suppression. • Control through minimisation of vehicle movement. • Control through monitoring of dustfall to determine if measures are effective.	Construction	Conduct dust suppression techniques to ensure that applicable standards for PM1 and PM2.5 are not exceeded.
	Soil erosion, compaction and contamination.	• Prevent through restricting the disturbed area. • Prevent through restricting spillage from haulage vehicles. • Control through removal of all utilisable soil and storage of the same. • Control through implementation of storm water management measures. • Remedy through treatment of contaminated soils.		Rehabilitation standards/ objectives.
	Loss of vegetation, Invasion by alien invasive species.	• Modify by vegetating soil stockpiles. • Control though alien invasive eradication programme. • Alien invasive vegetation to be identified and removed throughout the LoM.		Rehabilitation standards / objectives

		• Ensure site clearing is restricted to the footprint of the designated areas to limit the degradation and destruction of natural habitats; • Modify - Vegetate open and exposed areas to prevent soil erosion and the establishment of alien invasive vegetation; • Restrict access and avoid areas of identified faunal and floral SSC, that are adjacent to the mining activities; • Floral and faunal SSC within the mining activities must be rescued and relocated; • Restrict access and avoid sensitive landscapes, such as wetlands and ridges, that are adjacent to the mining operations; • Topsoil that will be used for rehabilitation within one year must be stockpiled according to the Rehabilitation Plan • Compaction of stockpiled topsoil must be avoided to ensure the seed bank is viable; • Alien invasive vegetation to be identified and removed throughout the LoM.		
	Visual impact	Avoid/prevent leaving any building material/waste on site.		Rehabilitation standards / objectives.
	Heritage.	Prevent through reporting and evaluation of any archaeological or heritage features found.		Impact avoided.
	Social impact.	• Control through appropriate management measures; • Prevent through HSE management measures.		Objectives of Social & Labour Plan.
Hauling and transport of coal during operations	Dust pollution	• Control through dust suppression. • Control through minimisation of vehicle movement. • Control through monitoring of dustfall to determine if measures are effective.	Operation	Conduct dust suppression techniques to ensure that applicable standards for PM1 and PM2.5 are not exceeded.

	Soil erosion, compaction and contamination.	• Prevent through restricting the disturbed area. • Prevent through restricting spillage from haulage vehicles. • Control through removal of all utilisable soil and storage of the same. • Control through implementation of storm water management measures. • Remedy through treatment of contaminated soils.		Rehabilitation standards / objectives.

v. Financial Provision

1) Determination of the amount of Financial Provision.

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

The project closure and rehabilitation vision is founded on the following principles:

- Sustainable exploitation of natural resources without limiting the ability of future generations to live off the same land.
- Limiting to the greatest extent possible, the disruption of natural ecosystems, and where necessary and possible, restoring the environment to its original state (baseline environment) after the cessation of activities. Alternatively, to restore all land to a status and land-use agreed upon between Algatorque (Pty) Ltd and the relevant authorities, communities and other stakeholders.
- To transfer all useful infrastructure to local authorities and communities should they be required by such authorities or communities.
- To ensure that the safety of people and animals is not compromised at any stage during and after any activities.

The closure objective allows for the site to be rehabilitated back to the original status of the site. This will include:

- Ensuring all pollution generating activities are eliminated.
- Ensuring all infrastructure is removed from site.
- Ensuring that the existing land use can continue.
- Ensuring that the site is safe for humans and animals.

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

The basic assessment report and environmental management programme will be provided to IAPs for review and comment for a period of 30 days. The objective to rehabilitate the land that has been disturbed will be communicated to IAP's during the public consultation process. Please refer to Annexure C for more details.

c. 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.

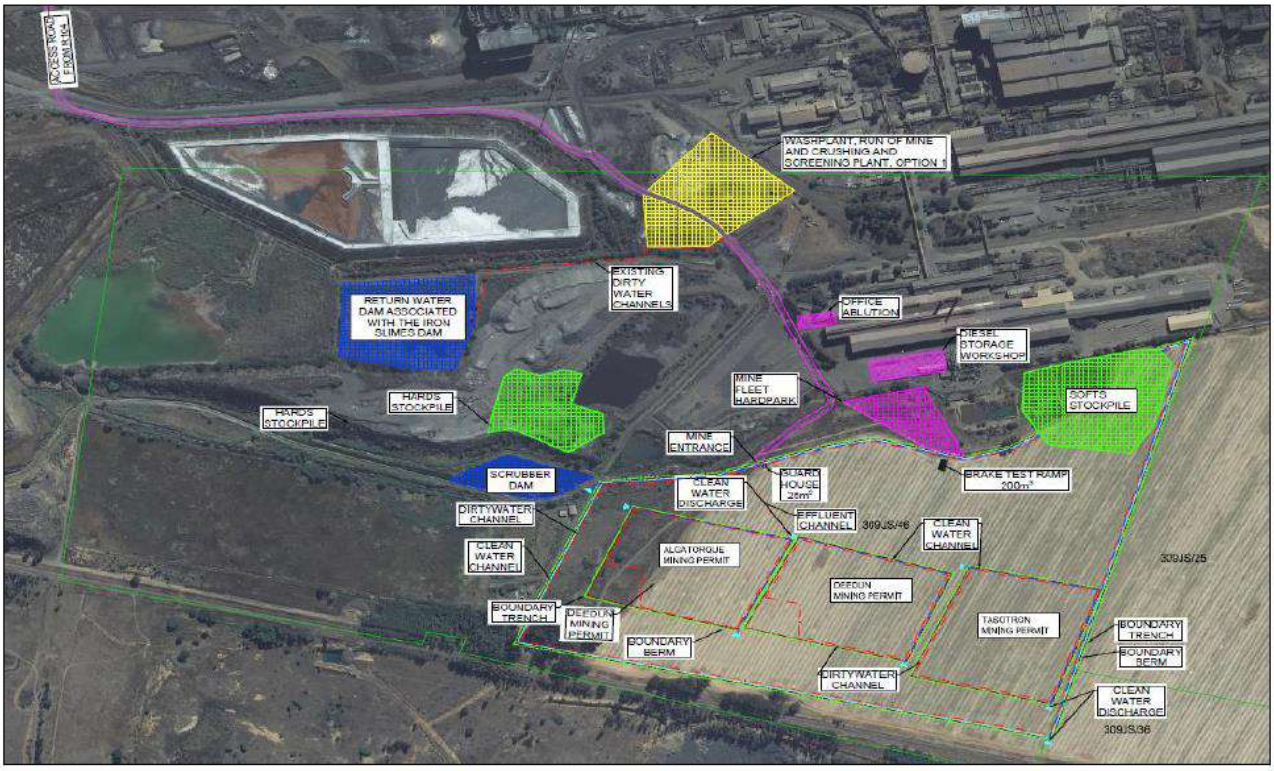

Figure 74: Conceptual mining permit plan and roll over rehab

d. 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 removal of infrastructure, capping of boreholes, closing of trenches and vegetating of disturbed areas (where not within cultivated lands).

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

The total provision amounts to the number of holes requiring rehabilitation at any given moment. This ensures that should the project application become insolvent prematurely the costs of rehabilitation can be recovered. Existing roads will be used as far as possible and it is not possible to identify any new access roads at this stage as its route will be determined in conjunction with the landowner and activities on the property at that time. Other infrastructure, offices or housing, will be present within the mining area and all employees will be housed in nearby towns. The quantum as calculated using the Department's guideline is provided in the table below:

Table 34: Closure Quantum

CALCULATION OF THE MINE CLOSURE QUANTUM								
Mine: Algatorque (Pty) Ltd - Elandsfontein MP Project					Province: Mpumalanga			
Evaluators: Eco Elementum (Pty) Ltd					Date: September 2020			
General Information	Risk Class	High (A)						
	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
		STEP 4.3	STEP 4.5		STEP 4.3	STEP 4.4		
1	Dismantling of processing plant and structures	R 13,46	0,00	m3	1,00	1,00	R 0,00	Mobile Plant to be used
2(A)	Demolition of steel buildings and structures	R 187,48	300,00	m2	1,00	1,00	R 56 243,43	Weighbridge
2(B)	Demolition of reinforced concrete buildings and structures	R 276,28	100,00	m2	1,00	1,00	R 27 628,35	Concrete silt trap
3	Rehabilitation of access roads	R 33,55	6000,00	m2	1,00	1,00	R 201 292,28	1000 m x 6 m Mainly existing access roads
4(A)	Demolition and rehabilitation of electrified railway lines	R 325,62	0,00	m	1,00	1,00	R 0,00	No railway lines to be installed
4(B)	Demolition and rehabilitation of non-electrified railway lines	R 177,61	0,00	m	1,00	1,00	R 0,00	
5	Demolition of housing and facilities	R 374,96	0,00	m2	1,00	1,00	R 0,00	Mobile offices and facilities to be used
6	Opencast rehabilitation including final voids and ramps	R 190 832,98	1,50	ha	0,52	1,00	R 148 849,72	3x cuts open @ 100 mx30 m = 3x100 mx30 m
7	Sealing of shafts, adits and inclines	R 100,65	0,00	m3	1,00	1,00	R 0,00	n/a
8(A)	Rehabilitation of overburden and spoils	R 131 037,33	0,00	ha	1,00	1,00	R 0,00	No final overburden and spoils. Concurrent rollover rehab.
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	R 163 204,63	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 474 023,59	0,32	ha	0,80	1,00	R 121 350,04	Pollution Control Dam Footprint as per Civil designs
9	Rehabilitation of subsided areas	R 109 724,03	0,00	ha	1,00	1,00	R 0,00	n/a
10	General surface rehabilitation, including grassing of denuded areas	R 15 985,00	4,93	ha	1,00	1,00	R 78 806,05	Entire 4,65 ha Mining Permit footprint
11	River diversions	R 103 803,67	0,00	ha	1,00	1,00	R 0,00	No watercourses on site
12	Fencing	R 118,41	250,00	m	1,00	1,00	R 29 601,81	Fence around mining complex - boundary to be trenched
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required)	R 39 469,08	4,93	ha	0,67	1,00	R 130 370,30	Entire 4,65 ha Mining Permit footprint

14	2 to 3 years of maintenance and after care	R 13 814,18	4,93	ha	1,00	1,00	R 68 103,89	Entire 4,65 ha Mining Permit footprint
15	Specialist study	R 0,00	0,00	Units	1,00	1,00	R 54 689,76	Final Rehabilitation, Decommissioning and Mine Closure Plan

			Subtotal (1 to 15 above)	**R 916 935,64**
	Subtotal 1	**Weighting Factor 2**	**1,05**	**R 962 782,42**
1	**Preliminary and General**	**12% of Subtotal 1 if less than R100mil**		**R 115 533,89**
		6% of Sub Total 1 if more than R100mil		
2	**Contingency**	**10% of Sub Total 1**		**R 96 278,24**
		Subtotal 2 (Subtotal 1 plus sum of management and contingency)		**R 211 812,13**
		Subtotal 3		**R 1 174 594,55**
		GRAND TOTAL (Subtotal 3 plus 15% VAT)		**R 1 350 783,73**

f. Confirm that the financial provision will be provided as determined.

The applicant, Algatorque (Pty) Ltd, hereby commits to undertaking to provide the calculated amount of R1 350 783.73 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. 39446 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 and performance assessment against the environmental management programme and reporting thereon, including

a. Monitoring of Impact Management Actions
b. Monitoring and reporting frequency
c. Responsible persons
d. Time period for implementing impact management actions
e. Mechanism for monitoring compliance

Table 35: Monitoring compliance

Activities	Impacts Requiring Monitoring programmes	Functional requirements for Monitoring	Roles and responsibilities (For the Execution of the monitoring programme)	Monitoring and reporting Frequency and Time Periods for Implementing Impact Management Actions
All activities throughout the LoM	Dust generation.	The monitoring of dust deposition rates will commence before, during and after closure of the mining activities to obtain a baseline and monthly monitoring averages. It is recommended that particulate monitoring of ambient PM10 and PM2.5 be initiated alongside the dust deposition network.	• Environmental Manager • Environmental Control Officer • Air Quality Specialist	Gravimetrical fallout dust and Pm10 monitoring will take place. Dust buckets will then have to be monitored every month, with a Report compiled every month. Should the Reports indicate that the NEM: AQA legal limits are exceeded, additional mitigation measures must be implemented.
	Loss of soil resources and land capability.	• Inspection of stripping depths and separation of topsoil and subsoil during stockpiling. • Inspection of stockpiles to manage and prevent erosion; • Inspection of rehabilitated areas to ensure that the surface is free-draining; • Random inspections of soil thickness on rehabilitated areas; and • Fertility and acidic analysis and amelioration procedures prior to vegetation establishment.	• Mine Manager • Environmental Manager; • Environmental Control Officer • Soil Specialist.	Inspection of stripping depths must be ongoing during site clearance activities and stockpiling to ensure that soils are stored separately. Stockpiles should be monitored on a monthly basis to manage potential soil erosion. The testing and analysis for macro nutrients and pH must be sampled on an annual basis and results kept to plan for rehabilitation. The rehabilitation activities must be monitored and random samples selected for to test for soil thickness. The land must be shaped and sampled and remediation techniques implemented, if necessary, prior to vegetation establishment.

	Loss of sensitive receptors.	• Faunal and Floral SSC in the Project area, but not within the directly disturbed mine areas, should be monitored; and • Alien invasive vegetation must be controlled on a monthly basis.	• Environmental Manager; • Environmental Control Officer	Monitoring must take place at least on a Biannual basis and especially during the wet season. Results of the monitoring must be recorded and compared to previous years' results to keep track of the populations of the faunal and floral species. As per the requirements of the Water Use License
	Contamination to surface water resources.	• The following constituents must be tested for: • Aluminium and iron; • Sodium, calcium, sulphate, chloride and potassium. • Manganese, magnesium and fluoride; • Nitrate and ammonium; and • pH, electrical conductivity and TDS.	• Environmental Manager; • Environmental Control Officer	Surface water monitoring must take place from the onset of the Construction Phase, throughout the LoM and for a period of 5 years following closure. Sampling must be undertaken on a monthly basis during the Construction Phase, as well as during the initial stages of the Operational Phase. Should the water sampling indicate that there are no impacts to the surface water quality, sampling can be reduced to a quarterly basis. All sampling results must be recorded to track potential quality changes or deterioration.
	Ambient noise impact due to mining operations.	• Identification of sensitive receptor • Noise levels must be measured for a period of 30 min at each sampling point with a standard noise meter.	• Environmental Manager; • Environmental Control Officer	Ambient noise monitoring must take place monthly during the Construction Phase and quarterly during the Operational Phase. All the results must be recorded to determine pre and post-development ambient noise quality levels in the environment.

f. Indicate the frequency of the submission of the performance assessment/ environmental audit report.

A performance assessment/ Environmental audit will be undertaken as stipulated in the Environmental Authorisation or per annum and in rehabilitation which should include the assessment of the financial provision. The performance assessment will be conducted by an external consultant throughout the life of mine 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.

g. Environmental Awareness Plan

1) 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 mining permit project.

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

Employees should be provided with environmental awareness training before mining 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 EMPr. 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 EMPr;
- Ensuring that there is a spare copy of the approved EMPr 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 EMPr;
- 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 be constantly be aware of and observant of especially the following:

- Biodiversity – protected species;
- 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.

2) 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 EMPr and also conditions of the EA. In this way the prospecting team will be provided the knowledge required to conduct the prospecting activities without resulting in environmental non-compliance, the liability of which would lie with Algatorque (Pty) Ltd. Secondly, informing the prospecting team of the EMPr 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 prospecting team and the site manager reporting all environmental issues to the Environmental Manager and the all social issues to the General Manager.

a. Specific information required by the Competent Authority

(Among others, confirm that the financial provision will be reviewed annually).

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

- The financial provision will be reviewed annually

3) UNDERTAKING

The EAP herewith confirms:

a. the correctness of the information provided in the reports ☐

b. the inclusion of comments and inputs from stakeholders and I&APs ; ☐

c. the inclusion of inputs and recommendations from the specialist reports where relevant; ☐and

d. that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected Parties are correctly reflected herein. ☐

Signature of the environmental assessment practitioner:

Name of company:

Date:

-END-

ANNEXURE A: CV

ANNEXURE B: PUBLIC PARTICIPATION REPORT

ANNEXURE C: CONCEPTUAL MASTER PLAN

ANNEXURE D: SPECIALIST STUDIES