ENVIRONMENTAL & ENGINEERING

DRAFT REPORT

ROODEPOORT COAL (PTY) LTD – ROODEPOORT COLLIERY

DMR Reference Number: MP 30/5/1/2/2/10338 MR

INTEGRATED ENVIRONMENTAL AUTHORISATIONS – DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

REPORT REF: 21-1545-AUTH ROODEPOORT EA & IWULA

(ENVIRONMENTAL AUTHORISATIONS FOR MINING OF COAL ON PORTION 15 OF THE FARM ROODEPOORT 40 IS)

VERSION AA

30 Sept 2022

DOCUMENT AND QUALITY CONTROL

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BB – draft	29/10/2021	Jane Mahaba		Technical Review
CC– draft	02/11/2021			Final Review
DD-draft	02/11/2021	Leoni le Roux		Quality Review
Approved for Distribution:				
0.0	03/11/2021	Vernon Siemelink		Final report

QUALITY CONTROL BY:

Nature of Signoff:	Responsible Person:	Role / Responsibility	Qualification
Author	Riana Panaino	Senior Environmental Assessment Practitioner	BSc Hons Biodiversity and Conservation SACNASP – Professional Natural Scientist (117170) EAPASA – Registered EAP (2021/4135)
Quality Reviewer	Leoni le Roux	Administrator	Professional Secretary and Personal Assistant
Reviewer	Jane Mahaba	Senior Environmental Assessment Practitioner	BSc Animal Plant and Environmental Sciences SACNASP – Cert.Nat.Sci 119631 EAPASA – Reg. EAP 2019/1551

Disclaimer

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

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

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

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DECLARATION OF INDEPENDANCE

I, Riana Panaino, 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.

30 Sept 2022

_____ _____

Signature **Date**

Mrs. Riana Panaino
BSc Hons Biodiversity and Conservation
IAIA Member
Pr.Sci.Nat
Registered EAP

EXECUTIVE SUMMARY

PROJECT BACKGROUND AND PROCESS

ITEM	DETAIL
Type of mineral	Coal
Mining method	Opencast Strip Mining
Depth of the mineral below surface	25 to 60 Meters (2 Seam, 1 Seam)
Geological formation	Vryheid Formation (Ecca)
Life of mine	4 Years
Production rate	80 000t per month ROM
Saleable Product	48 000t per month
Target Market	Export and Local

LEGAL REQUIREMENTS

The intention to undertake mining activities requires an application for a Section 102 amendment in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA). An application for Environmental Authorisation (EA) was submitted simultaneously, as per the requirements of the National Environmental Management Act, Act No. 107 of 1998 (NEMA) and the NEM: Waste Act, Act No. 59 of 2008 (NEM:WA); read with the requirements of the MPRDA.

In terms of the NEMA and other applicable laws, it is required that the environmental and social impacts associated with mining activities be assessed to identify any potential negative and / or positive consequences as result thereof. Following which measures must be proposed to avoid or minimise these impacts.

IMPACT ASSESSMENT SUMMARY

Activity	Aspect	Impact	+/-	SBM	+/-	SAM
Ecological Impacts (Wetland, Aquatic Terrestrial)						
Infrastructure, Work Revetments, New access routes, Site clearing for opencast area, Placement of cleared topsoil into allocated stockpiles, Use of heavy machinery	Erosion and sedimentation	Flow alterations	Negative	Med	Negative	Med
Increased traffic, Use of heavy machinery, Bank Erosion	Erosion and sedimentation	Flow alterations	Negative	High	Negative	Med-High
Use of heavy machinery	Accidental spillages of chemicals, cements, oils, etc.	Pollution of watercourse	Negative	Med	Negative	Med
Increased traffic, Increased road runoff during rainfall events	accidental spills of hydrocarbon materials Hazardous materials entering the watercourses	Pollution of watercourse	Negative	High	Negative	Med-High
Hardened surfaces	Increased runoff, Increased traffic	Spread of alien invasive vegetation	Negative	Med-High	Negative	Med
Groundwater						
Box Cut	Dewatering.	Decrease in water level from the point where development is lower than the water level.	Negative	Med-High	Negative	Med-High
Opencast mining	Dewatering	The water infiltrating the voids will be removed for safe mining, causing a decrease in the water level.	Negative	High	Negative	High
Surface Water						

Activity	Aspect	Impact	+/-	SBM	+/-	SAM
Construction activities	Vegetation clearance and site establishment	Sedimentation and pollution of the Watercourse	Negative	Med-High	Negative	Med
Dewatering	Water level drawdown	Reduction in Baseflow	Negative	Med-High	Negative	Med-High
Operational Activities	Hydrocarbon spills Dirty Water release Sediment runoff	Water quality deterioration	Negative	High	Negative	Med
Air Quality						
Mining	Haul trucks moving on the Haul Road	Fugitive particulate matter emissions including Dust and PM10 from vehicles moving on the Haul road	Negative	Med-High	Negative	Med-High
Mining	Commercial trucks moving on the Access Road	Fugitive particulate matter emissions including Dust and PM10 from vehicles moving on the Access road	Negative	Med-High	Negative	Med-High
Soils, Land Use, Land Capability and hydropedology						
Site Preparation	Soil stripping	Loss of topsoil	Negative	High	Negative	Med-High
Site Preparation	Vehicles and equipment, vegetation removal and earthworks.	Erosion and Sedimentation	Negative	Med-High	Negative	Med
Site Preparation	Vegetation Removal	Change in Land Use	Negative	Med-High	Negative	Med-High
Site Preparation	Vehicles and equipment, vegetation removal and earthworks.	Change in Land Capability	Negative	Med-High	Negative	Med-High
Ongoing mine management	Continued soil stripping	Loss of Topsoil	Negative	High	Negative	Med
Social Economic						
Establishment of underground mine	Mining	Employment opportunities	Positive	Med-High	Positive	High
Supplier acquisition	Direct and indirect appointment of local suppliers	Multiplier effect on the local economy	Positive	Med-High	Positive	High
Mining operation	Community development	Social upliftment	Positive	Med-High	Negative	High
Mining operations	Mine area access restrictions	Change in access and movement to resident and livestock	Negative	High	Negative	Med
Mine establishment	Change in land use	LOSS OF AND/OR DAMAGE TO AGRICULTURAL LAND AND INFRASTRUCTURE	Negative	High	Negative	Med
Mine establishment	Influx of job seekers	INCREASED PRESSURE ON MUNICIPAL SERVICES	Negative	High	Negative	Med
Mine establishment	Mine operations	Increased Nuisance Factors and Changed Sense of Place	Negative	Med	Negative	Med
Roll Over Mining	Influx of workers and job seekers	Increased social pathologies	Negative	High	Negative	Med
Mine closure	DEPENDENCY ON MINE FOR SUSTAINING LOCAL ECONOMY	Job losses	Negative	High	Negative	Med

SUMMARY OF COMMENTS RECEIVED

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
AFFECTED PARTIES				
Landowner/s	x			
MANHATTAN SYNDICATE LTD (Phillip Mtshweni)	x		No comment received to date	
Landowners or lawful occupiers on adjacent properties				
No comments received to date				
Municipal councillor				
Municipality	x			
eMalahleni Local Municipality	x	19/10/2021	Mr Malele Riba requested to be registered as a Commenting Authority.	Mr Riba has been added as the contact person at the LM, and a copy of the DSR was sent to him.
Organs of state (Responsible for infrastructure that may be	x			

affected Roads Department, Eskom, Telkom, DWA)				
Transnet (Thami Hadebe)	x	11/10/2021	Your wayleave application with reference 21-1545-AUTH (MP 30/5/1/2/2/10338 MR) dated 08 October 2021 has reference. Transnet Pipelines, a division of Transnet SOC Limited, is not affected by the proposal. Your awareness of the existence of Transnet's pipeline servitudes and concern for their integrity is highly appreciated. This authorisation shall be valid for 48 months from the date - 11 October 2021.	Comment noted and taken into consideration.
Communities				
NA				
Dept. Land Affairs	x			
No comments received to date				
Traditional Leaders				
N/A				
Dept. Environmental Affairs	x			
No comments received to date				
Other Competent Authorities affected	x			
Mpumalanga Tourism and Parks Agency	x	05/11/2021	The sensitivity of the above farm was assessed using the Mpumalanga Biodiversity Sector Plan (MBSP; MTPA 2014). This sensitivity is assessed in terms of Terrestrial and Freshwater Assessments, In terms of the MBSP based terrestrial biodiversity assessment (Figure I), and freshwater biodiversity assessment (Figure 2) there are sensitive areas should be avoided. The MTPA has no objection to this application but has the following concerns: 1, The MTPA requires that an Ecological study is done. A site inspection and surveys during the growing season. 2, A botanical survey is required for the proposed mining site and immediate adjacent natural areas. All the species of conservation concern (Protected plants) should be marked for rescued purposes. 3. A thorough mitigation plan and rehabilitation plan designed to prevent AMD entering the natural system as well as the prevention of the re-colonization by exotic vegetation should be implemented. The rehabilitation plan should not only focus on the landscaping of the mined area but also on bioremediation of the soils in order for future post mining use. 4.An Active water purification system must be investigated and must address the possible pollution through AMD decanting, underground pollution plume, storm water pollution from discard dumps, overflow from pollution control facilities and leachates. Clean water must be provided back into the natural system. MBSP Terrestrial Biodiversity Assessment: 1.CBA Optimal area should be avoided by opencast mining. 2. Other natural areas- Ecological study required. MBSP Freshwater Assessment: 1. CBA wetlands. Delineation with a 100-meter buffer to be avoided. 2. ONA: An ecological study is required.	During the EIA phase an Ecological Assessment will be undertaken by a SACNASP registered Ecologist, and will include both terrestrial and aquatic assessments. The comments will be taken into consideration by the specialist.
OTHER AFFECTED PARTIES				

No comments received to date			
INTERESTED PARTIES			
Cobus Burger	10/10/2021	In response to the BID document: Appreciate the feedback! just for my understanding what must we do with this form must we complete it?	If you wish to register as an interested and affected party for this project please complete the form at the back of the BID. If you wish to be removed from the database for this project, please let me know, and I will do so.
Gmamba Enterprise (PTY) LTD	12/10/2021	We are an SMME based in Emalahleni Our best interest is to empower youth in terms of jobs and skills opportunities we our we interested to be part of the local beneficiary	I have registered you as an interested and Affected Party.

REASONED OPINION

The project can be recommended for approval with conditions contained in this report due to the following reasons:

- The mining industry is identified as one of the key components toward Rapid Economic Growth in order to reduce poverty and minimise unemployment Growth (State of the Nation Address, 2019). This project will create employment for at least another 4 years.
- The mining sector contributes significantly to the GDP (22% of the provincial economy).
- The area ear marked for mining has been disturbed previously and sensitive areas will be avoided.
- The Groundwater and water decant is of very poor quality as a baseline, and through the rehabilitation and closure objectives, the Groundwater quality can be improved from the current pre-mining state, which will in turn improve the surface water quality where decant is currently taking place.
- The Development of a Storm Water Management Plan will ensure that dirty footprint is controlled and managed to avoid contamination of the Wilge River.
- The recommendations of the specialist studies form the basis of the EMP and allowed for monitoring and management for impacts identified.

Conditions that must be included in the authorisation:

- Adhere to all recommendation and management measures contained in the EMP.
- All relevant permits and authorisation must be obtained prior to construction commencing.
- Adhere to all monitoring requirements.
- A water use license must be obtained prior to any water uses undertaken on site.
- The heritage recommendations are based on the specific project activities and extents as indicated by the figures of this report. Should the proposed surface impact areas be changed, a qualified archaeologist must conduct a pedestrian survey on the new area and amend the report accordingly.
- Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible.
- Since archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the construction phase, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority must be contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).Improved methods of handling the potential decant should be investigated, approved and set in place prior to mine closure.
- All acoustic screening measures must be in place before commissioning the mining activities.

- Any development must occur outside of the recommended 50 m wetland buffer zone.
- No off-road driving, hunting, poaching, or fires should be permitted on the property.
- An Alien Invasive eradication plan should be compiled, approved and implemented.
- A social management plan and social monitoring plan must be developed to manage and monitor the implementation of SLP related measures and recommend corrective measures, where required.
- The site should be monitored for erosion and for spills that could lead to contamination of the environment Signs of erosion and soil contamination should be monitored visually. The vegetative cover and fertility levels of stockpiled soil should also be monitored.
- Ongoing water quality monitoring must take place every month during operational phases; and
- Biomonitoring where/if flow conditions allow for effective sampling analysis must take place bi-annually to determine any trends in ecology and hydrology.
- Once mining commences a proper operational blast design and code of practice must be compiled, implemented, monitored, evaluated and improved.

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Definition of Terms

Audit	a systematic, independent and documented review of operations and practises to ensure that relevant requirements are met. Qualified professionals with relevant auditing experience should conduct audits and, where possible, independent external auditors should also be used.
Borehole	is a narrow shaft bored in the ground, either vertically or horizontally. A borehole may be constructed for many different purposes, including the extraction of water or other liquid (such as petroleum) or gases (such as natural gas), as part of a geotechnical investigation, environmental site assessment, mineral exploration, temperature measurement, as a pilot hole for installing piers or underground utilities, for geothermal installations, or for underground storage of unwanted substances, e.g. in Carbon capture and storage.
Clean Water	clean water is any water that has maintained the chemical, physical, and biological integrity of the waters by preventing point and nonpoint pollution sources.
Compliant	a full achievement of the performance requirement of a particular condition of the license or programme.
Conservation	in relation to a water resource means the efficient use and saving of water, achieved through measures such as water saving devices, water-efficient processes, water demand management and water rationing;
Construction	the time period that corresponds to any event, process, or activity that occurs during the Construction phase (e.g., building of site, buildings, and processing units) of the proposed project. This phase terminates when the project goes into full operation or use.
Corrective Action Plan	an action plan developed by the proponent, contractor, or facility owner and approved by the external auditor that describes how the contractor or facility owner intends to resolve the non-conforming item. The Corrective Action Plan should be specific, measurable, achievable, realistic, and timely.
Director-General	means the Director-General of the Department;
Effluent	is defined by the United States Environmental Protection Agency as "wastewater - treated or untreated - that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters". The Compact Oxford English Dictionary defines effluent as "liquid waste or sewage discharged into a river or the sea". Effluent in the artificial sense is in general considered to be water pollution.
Environmental Audit Report	a summary report prepared after an environmental audit that describes the attributes of the audit and the audit findings and conclusions.
Environmental Authorisation	is an environmental authorisation issued by a state department.
Environmental Component	an attribute or constituent of the environment (i.e., air quality; marine water; waste management; geology, seismicity, soil, and groundwater; marine ecology; terrestrial ecology, noise, traffic, socio-economic) that may be impacted by the proposed project.
Environmental Impact	a positive or negative condition that occurs to an environmental component as a result of the activity of a project or facility. This impact can be directly or indirectly caused by the project's different phases (i.e., Construction, Operation, and Decommissioning).
Environmental Management Plan	An Environmental Management Plan (EMP) can be defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced".
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

AEL	Atmospheric Emissions License in terms of NEM:AQA
AMD	Acid Mine Drainage
ASTM	American Standard for Testing and Materials (followed by protocol number)
BA	Basic Assessment (process or report)
BID	Background Information Documents
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983) as amended
CBD	Central Business District
COP	Codes of Practice
C-Plan	Conservation Plan (specifically Mpumalanga Conservation Plan)
DMC	Dense Medium Circuit (associated with processing plant)
DMR	Department of Mineral Resources
DO	Dissolved Oxygen
DWS	Department of Water Affairs and Sanitation
EA	Environmental Authorisation in terms of NEMA
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989) as amended
EIA	Environmental Impact Assessment (process or report)
EIA Regulation	Environmental Impact Assessment Regulation published under NEMA
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme Report
GDP	Gross Domestic Product
GIS	Geographical Information Systems
GN	General Notice (issued under an Act, providing notice or information)
GNR	General Notice Regulation (issued under an Act, providing instruction)
HSTP	Human Settlement Plan
I&AP	Interested and Affected Parties
IAIA SA	International Association of Impact Assessment South Africa
IDP	Integrated Development Plan
IWUL	Integrated Water Use License
IWULA	Integrated Water Use License Application
IWWMP	Integrated Water and Waste Management Plan
LED	Local Economic Development
LoM	Life of Mine
MHSA	Mine Health and Safety Act (Act 29 of 1996) as amended
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002) as amended
MR	Mining Right in terms of the MPRDA
MRA	Mining Right Application in terms of the MPRDA
NAEIS	National Atmospheric Emissions Inventory System
NEA	National Energy Act, Act 34 of 2008

NEM:AQA	National Environmental Management: Air Quality Act (act 59 of 2008) as amended
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004) as amended
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003) as amended
NEM:WA	National Environmental Management: Waste Act (Act 39 of 2004) as amended
NEMA	National Environmental Management Act (Act 107 of 1998) as amended
NFEPA	National Freshwater Ecological Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999) as amended
NPAES	National Protected Area Expansion Strategy
NWA	National Water Act (Act 35 of 1998) as amended
PCD	Pollution Control Dam
PDA	Potential Development Area (in terms of the SDF)
PES	Present Ecological State (usually followed by category A-F)
PM10/5/2.5	Particulate Matter up to 10/5/2.5 micrometers
POI	Points of Interest
PPP	Public Participation Process
RoD	Record of Decision (for specific application)
RWD	Return Water Dam
RWQO	Resource Water Quality Objectives
SCC	Species of Conservation Concern
S&EIR	Scoping and Environmental Impact Reporting process
S&LP	Social and Labour Plan
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resource Agency
SAMRAD	South African Mineral Resources Administration System
SANBI	South African National Biodiversity Institute
SANS	South African National Standard (followed by standard number)
SASS5	South African Scoring System version 5 (in terms of aquatic invertebrate assessments)
SAWIS	South African Waste Information System
SDF	Spatial Development Framework (specifically LLM)
SEMA	Specific Environmental Management Acts
SMME	Small and Medium and Micro Enterprise
SOP	Standard Operating Procedure
SPLUMA	Spatial Planning and Land Use Management Act (Act No.16 of 2013)
Stats SA	Statistics South Africa
Tph	Tons per hour
WMA	Water Management Area
WML	Waste Management License in terms of NEM:WA

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT ENVIRONMENTAL IMPACT 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:	**Roodepoort Coal (Pty) Ltd**
TEL NO:	**0745489726**
FAX NO:	
POSTAL ADDRESS:	**42 Plumber Street, Witbank, 1035**
PHYSICAL ADDRESS:	**213 Waterkloof , Pretoria, 0181**
FILE REFERENCE NUMBER SAMRAD:	**MP 30/5/1/2/2/10338 MR**

1. IMPORTANT NOTICE

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

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

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

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

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

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

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

c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

d) determine the—-

(i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

(ii) degree to which these impacts—

aa. can be reversed;

bb. may cause irreplaceable loss of resources, and

cc. can be avoided, managed or mitigated;

e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

g) identify suitable measures to manage, avoid or mitigate identified impacts; and

h) identify residual risks that need to be managed and monitored.

PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Details of Applicant

Table 2.1: Applicant Details

Applicant Name:	Roodepoort Coal (Pty) Ltd
Registration No.:	2021 / 777435 / 07
Contact Person:	Mr Douglas Mongwe
Telephone:	012 472 0328
Cell No.	0745489726
Fax:	
E-mail:	douglas@xakwa.com
Postal Address:	PO Box 90512 Garsfontein, Gauteng, 0181
Physical Address:	213 Waterkloof , Pretoria, 0181

3. CONTACT PERSON AND CORRESPONDENCE ADDRESS

3.a DETAILS OF

3.a.i Details of the EAP

Name of the practitioner	Riana Panaino
Tel Number	012 807 0383
Fax Number	086 714 5397
Email Address	riana@ecoe.co.za

3.a.ii Expertise of the EAP.

3.a.ii.1 The qualifications of the EAP

The EAP has an Honours degree in Biodiversity and Conservation, is SACNASP Registered, and has more than 10 years' experience in Environmental Consulting.

3.a.ii.2 Summary of the EAP's past experience.

2008, 2009, 2010

Matla,Mpumalanga, South Africa

Matla Wetland Monitoring and Management Plan for Matla coal mine. Responsibilities included: weekly site visits and reporting of findings during the construction of the Matla river diversion and assisted in compilation of the wetland management plan

2009

Eskom DPSS, Freestate/KwaZulu Natal, South Africa

Assisted in the capture of fish for genetic sampling to map distribution patterns between two different catchments.

2016

Exxaro NBC Project

Project Consultant, coordination, BA and EMP report compilation as well as public consultation of the various aspects on this project.

2016

Exxaro Coal Central Eloff Project, Mpumalanga, South Africa

Project Consultant, coordination and EIA and EMP report compilation as well as public consultation of the various aspects on this project.

2015

Exxaro Belfast Project, Mpumalanga, South Africa

Environmental Control Officer

2015

Exxaro Matla Project, Mpumalanga, South Africa

Project Consultant, coordination and EIA and EMP report compilation as well as public consultation of the various aspects on this project.

2015

Exxaro UCG Project, Limpopo, South Africa

Project Management, coordination and public consultation of the various aspects on this project.

2014

Quantum Crushing and Screening, KwaZulu-Natal, South Africa

Project Management, coordination and BA and EMP report compilation as well as public consultation of the various aspects on this project.

2013

Glencore Rietvly – Northwest, South Africa

Project Management, coordination and BA and EMP report compilation as well as public consultation of the various aspects on this project.

2012

Jacomynspan, Northern Cape, South Africa

Project Management, coordination and EIA and EMP report compilation as well as public consultation of the various aspects on this project.

2012

Bighorn Substation, Northwest, South Africa

Project assistance, coordination and report compilation as well as public consultation of the various aspects on this project.

2012

Otjozondu, Namibia

Environmental Impact Assessment Report Compilation

2012

Leeuwpan, Mpumalanga, South Africa

Project Management, coordination and EIA and EMP report compilation as well as public consultation of the various aspects on this project.

2008

Lonmin Akanani, Limpopo, South Africa

Project assistance, coordination and report compilation of the various studies done on this project.

2012

Schoongezicht, Mpumalanga South Africa

Ecological studies with responsibilities that included wetland input for the IWULA. Wetland delineation, classification and characterisation were done on the wetlands found during this study.

2012

Mooiplaats, Mpumalanga South Africa

Ecological studies with responsibilities that included wetland input for the IWULA. Wetland delineation, classification and characterisation were done on the wetlands found during this study.

2011

Kromdraai Pipeline, Mpumalanga, South Africa

Ecological studies with responsibilities that included wetland input for the project EIA. Wetland delineation, classification and characterisation were done on the wetlands found during this study.

2010

New Vaal Life Expansion, Freestate, South Africa

Ecological studies with responsibilities that included wetland input for the project EIA. Wetland delineation, classification and characterisation were done on the wetlands found during this study.

3.b DESCRIPTION OF THE PROPERTY

Table 3.1: Location of the property

Farm Name:	Roodepoort 40 IS Portion 15
Application area (Ha)	322.5019Ha
Magisterial district:	Nkangala District Municipality, eMalahleni Local Municipality
Distance and direction from nearest town	**Town** **Direction** **Approximate distance by road** Kriel South 10km
21 digit Surveyor General Code for each farm portion	T0IS00000000004000015

Table 3.2: Summary of Surface Right Owners

Farm			Ptn	Owner
Roodepoort	40	IS	15	MANHATTAN SYNDICATE LTD

3.c LOCALITY MAP

(Nearest town, scale not smaller than 1:250000 attached as Annexure 3)

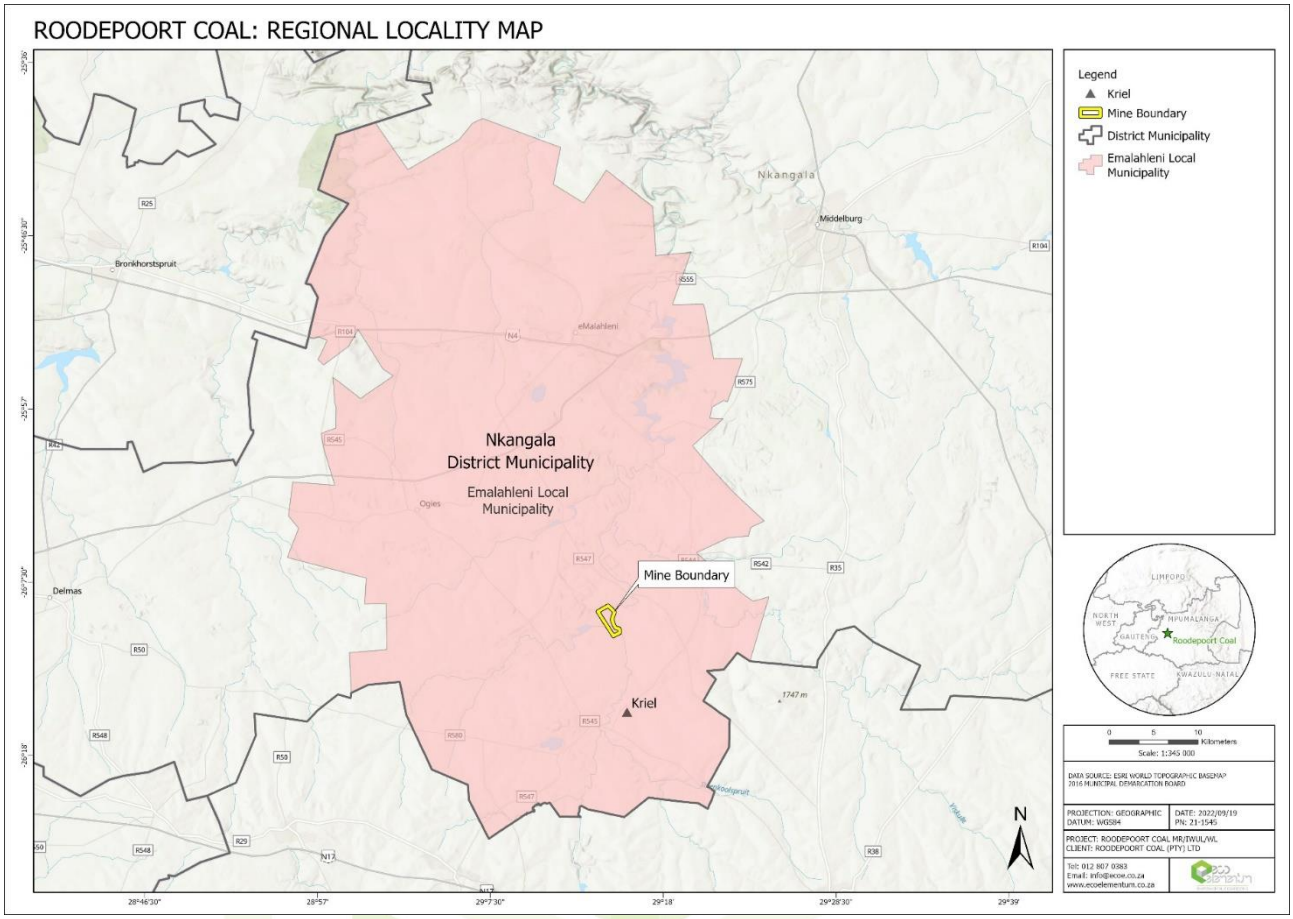

Figure 3.1: Regional Overview

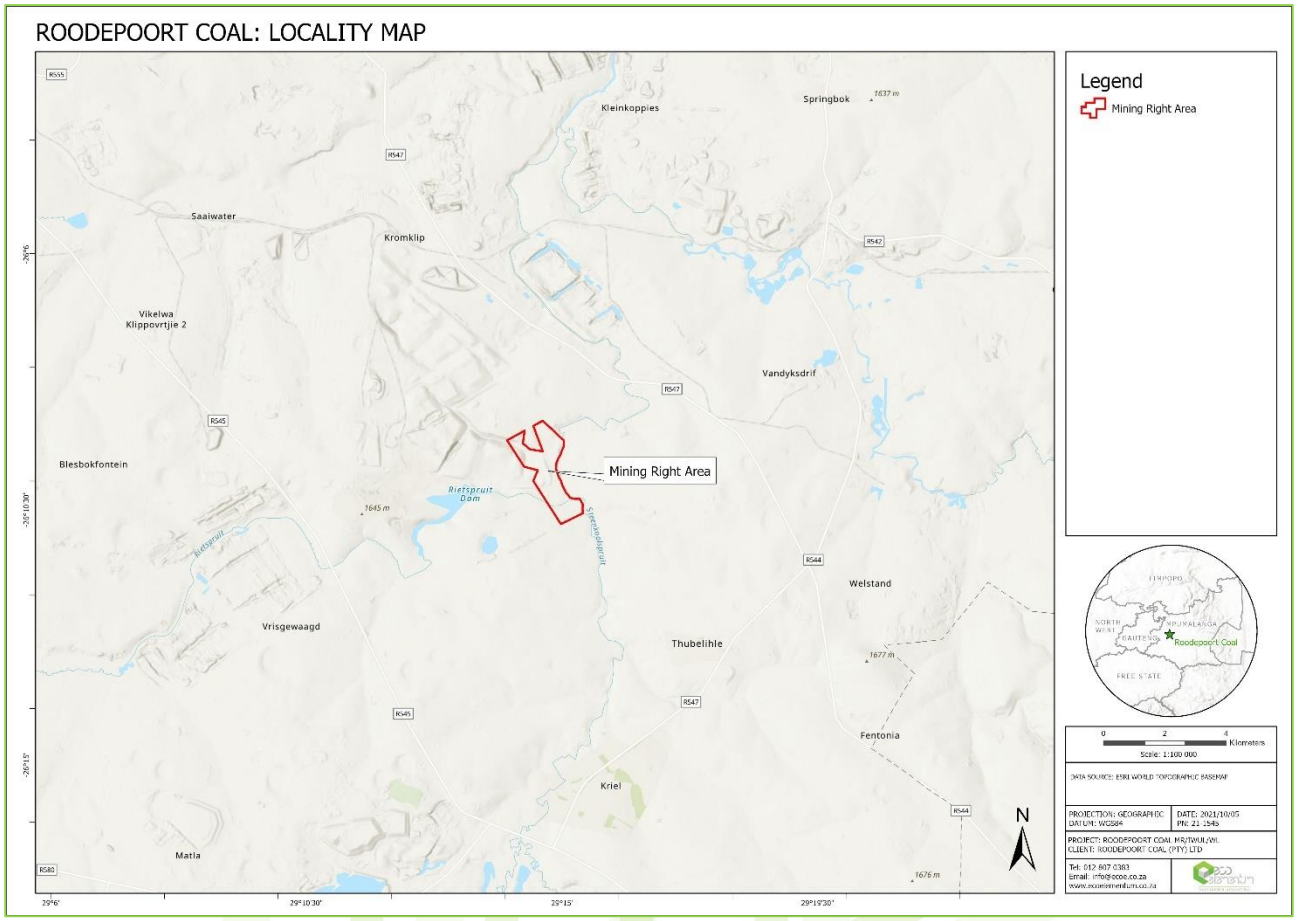

Figure 3.2: Local setting

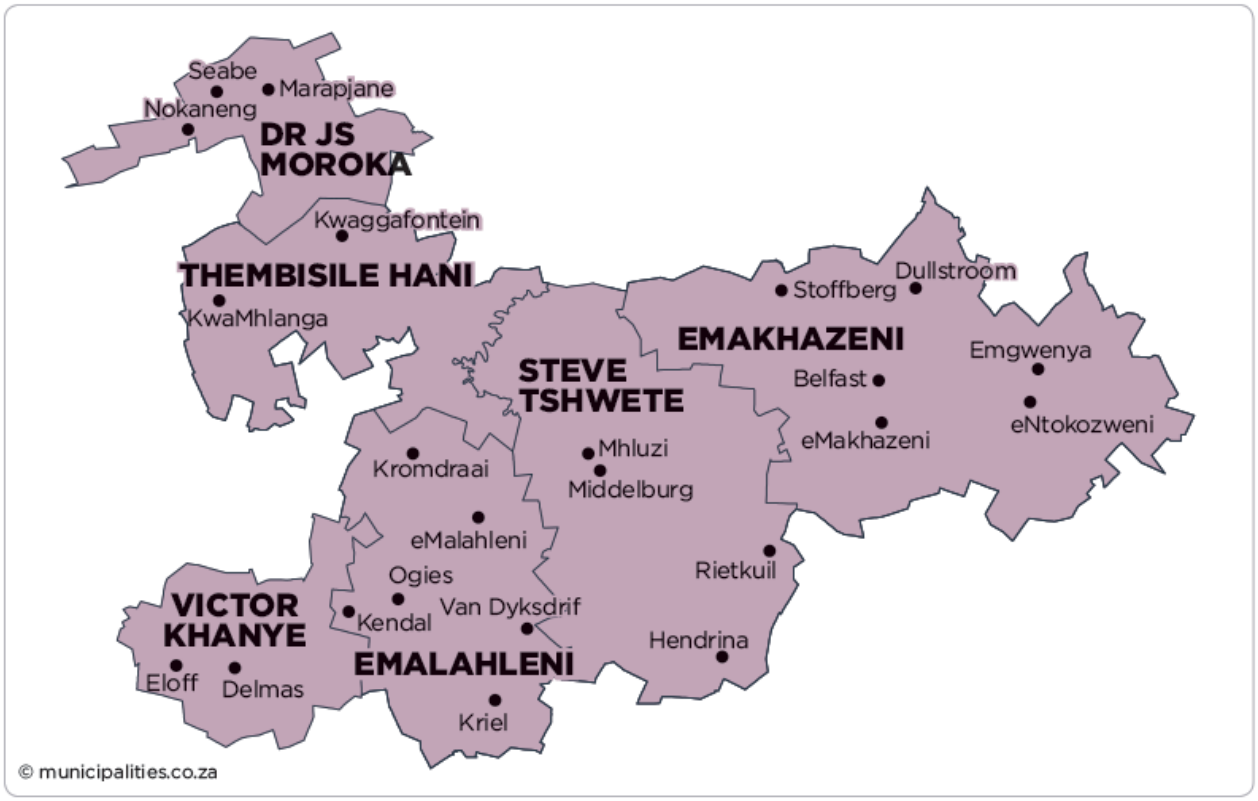

Figure 3.3: Nkangala District Municipality

3.d DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site – please refer to Annexure 4.

Table 3.3: Description of the Overall Activity

ITEM	DETAIL
Type of mineral	Coal
Mining method	Opencast Strip Mining
Depth of the mineral below surface	25 to 60 Meters (2 Seam, 1 Seam)
Geological formation	Vryheid Formation (Ecca)
Life of mine	4 Years
Production rate	80 000t per month ROM
Saleable Product	48 000t per month
Target Market	Export and Local

3.d.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 37 of the MPRDA confirms that the principles set out in the NEMA apply to all prospecting and mining operations and must be carried out in accordance with the generally accepted principles of sustainable development 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 (dated 4 December 2014 as amended in 2017) of NEMA. The proposed mining activity triggers are listed in Table 3.4.

Table 3.4: Listed and Specified Activities

Listing Notice	Activity number	Activity	Description of Activity	Waste Management Authorisation
NEMA Listing 1 **(Basic Assessment)**	**9**	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	Stormwater diversion infrastructure	N/A
NEMA Listing 1 **(Basic Assessment)**	**10**	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	Pipelines for Dirty Water to PCD	N/A
NEMA Listing 1 **(Basic Assessment)**	**12**	The development of- (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;- excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;	The placement of stockpiles and construction of PCD's within 32 metres of a watercourse.	X

Listing Notice	Activity number	Activity	Description of Activity	Waste Management Authorisation
		(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.		
NEMA Listing 1 **(Basic Assessment)**	**14**	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	Storage of hydrocarbons and fuel on site	N/A
NEMA Listing 1 **(Basic Assessment)**	**19**	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	Site clearing that could encroach into wetland boundaries	N/A
NEMA Listing 1 **(Basic Assessment)**	**24**	The development of a road- (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road- (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	Haul roads for the transport of Coal to the plant area Realignment of the provincial road	N/A

Listing Notice	Activity number	Activity	Description of Activity	Waste Management Authorisation
NEMA Listing 2 (Scoping and EIR)	**4**	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	Storage of hydrocarbons and fuel on site	N/A
NEMA Listing 2 (Scoping and EIR)	**6**	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding- (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.	Open pit mining activities will require a Section 21 (g) application in terms of the NWA, for backfilling of carbonaceous material, Stockpiling, and PCD implementation	X
NEMA Listing 2 (Scoping and EIR)	**15**	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding 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.	Vegetation clearance of the new open pit areas.	N/A
NEMA Listing 2 (Scoping and EIR)	**17**	Any activity including the operation of that activity which requires a mining right in terms Section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the Mining Right..	Mining Right in terms of Section 22 of the MPRDA has been applied for.	N/A
NEMA Listing 3 (Basic Assessment)	**4f**	The development of a road wider than 4 metres with a reserve less than 13,5 metres. f. Mpumalanga i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or	Haul roads for the transport of Coal to the plant area that could be cross over sensitive areas.	N/A

Listing Notice	Activity number	Activity	Description of Activity	Waste Management Authorisation
		(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.		
NEMA Listing 3 **(Basic Assessment)**	**10f**	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. f. Mpumalanga i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, where such areas comprise indigenous vegetation; or (hh) Areas within a watercourse or wetland, or within 100 metres of a watercourse or wetland; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	Storage of hydrocarbons and fuel on site than could possibly be within 100m of a wetland.	N/A
NEMWA **Government Notice No. R921**	**Category B**	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity)	Establishment of Overburden Stockpiles	X

Listing Notice	Activity number	Activity	Description of Activity	Waste Management Authorisation
	Activity 10			
NEMWA **Government Notice No. R921**	**Category B** **Activity 11**	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Waste Management Licence required for Overburden and residue Stockpiles.	X

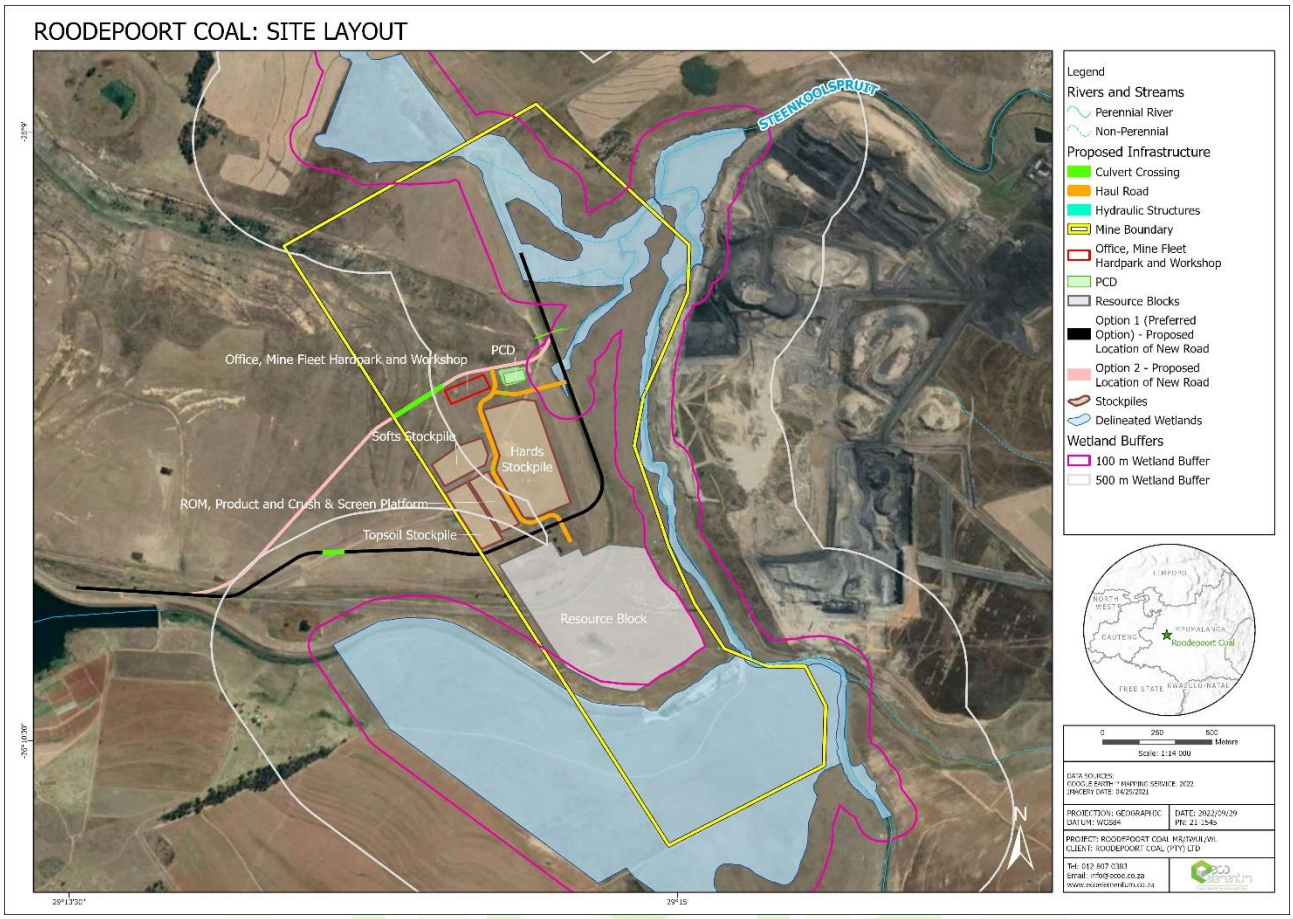

Figure 3.4: Site Layout

3.d.ii Description of The Activities to Be Undertaken

The resource will be mined via both opencast roll over mining as well as underground mining. The following activities will be undertaken on site:

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

Process description

Opencast mining using the truck and shovel lateral sequential rollover mining method will be undertaken. Mining will commence from the initial box cut.

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

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

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

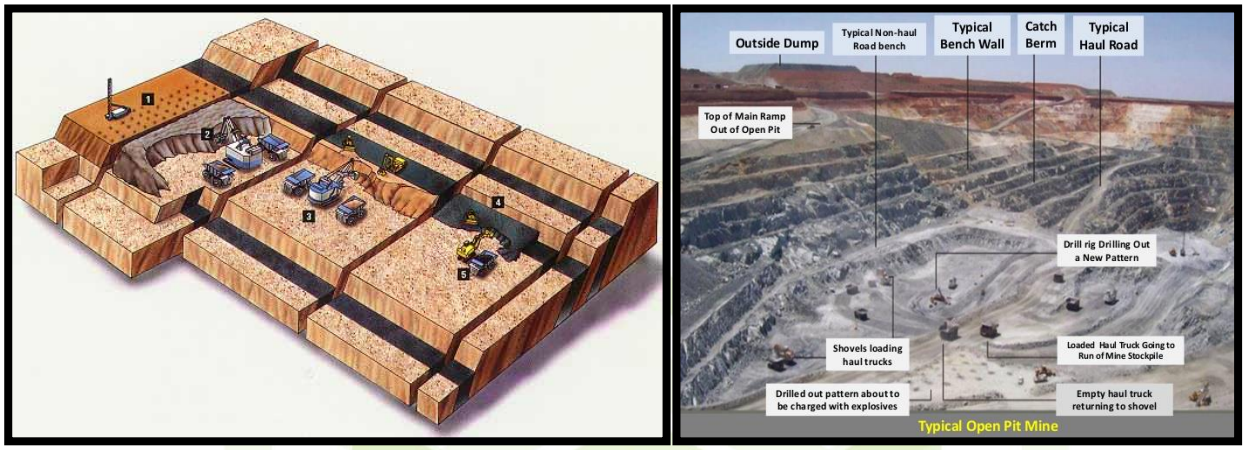

Figure 3.5: Typical Opencast Concurrent Roll Over Rehabilitation Mining Technique

Run of Mine Coal and Coal Beneficiation

Run of Mine Coal will be transported to an off site Coal Wash Plant for beneficiation.

Road Realignment

The provincial road between the R545 and R547 will be realigned in order to optimally mine the available resource. This will also mean active maintenance of the road for haul and public use.

3.e POLICY AND LEGISLATIVE CONTEXT

Table 3.5 outlines the legislation and guidelines that are considered to be applicable to the proposed project; and which were considered at the time of compiling this report.

Table 3.5: Applicable legislation and guidelines

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
National Environmental Management Act (107 of 1998) The NEMA provides the overarching legislation for environmental governance in South Africa, giving effect to Section 24 of the Constitution of the Republic of South Africa. NEMA sets out the fundamental principles of Integrated Environmental Management that must be adhered to in order to ensure sustainable development.	Section 28 of the NEMA includes a far-reaching general "Duty of Care" which stipulates the need to protect the environment from degradation and pollution. In terms of the listed activities, an S&EIR process is required.	An Application for Environmental Authorisation has been made to the DMR.
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) To make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and to provide for matters connected therewith.	Section 22- The project requires a mining right from the DMR.	A mining Right Application was lodged with the DMR.
NEMA Environmental Impact Assessment (EIA) Regulations, 2014 (as amended).	In terms of the listed activities, an S&EIR process is required. The process will be followed in terms of the "one environmental system"	An Application for Environmental Authorisation has been made to the DMR.
The South African Constitution In terms of Section 24, of the Constitution of the Republic of South Africa (108 of 1996), everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while prompting justifiable economic and social development.	Applied at potential impacts identification as well as mitigation measures and public participation.	An open and participatory public participation process will be followed. An EMP and awareness plan will be designed according to the issues raised during this process.
National Environmental Management: Biodiversity Act, 2004 The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM:BA) provides for listing of threatened or protected species.	The fauna and flora prevailing in the proposed project site will be handled in terms of this Act and relevant ecological studies have already been initiated.	The mining footprint will be guided by the results of the ecological studies where possible. Permits will be applied for where and when necessary, should any red data species be relocated.
National Environmental Management: Waste Act The objectives of NEM:WA involve the protection of health, wellbeing and the environment by providing reasonable measures for the minimization of natural resource consumption, avoiding and minimizing the generation of	In terms of the list of Section 19 waste management activities, an S&EIR process is required. The process is part of the "one environmental system".	In terms of GN718 of 2009, under NEMWA, various Category B waste management activities are applicable to the

waste, reducing, recycling and recovering waste, and treating and safely disposal of waste as a last resort. In terms of the NEMWA, all waste management activities must be licensed. A distinction is made between Category A waste management activities, which require a basic assessment, and Category B activities, which require a full EIA, and Category C waste management activities which do not require a waste management license but compliance with relevant requirements or standards. According to Section 44 of the Act, the licensing procedure must be integrated with an EIA process in accordance with the Regulations GNR 982.	GNR 633 includes the establishment or reclamation of a residue stockpile or residue deposit, resulting from prospecting or mining activities as a listed activity.	proposed mining operation. The impacts and associated management and/or mitigation measures will be included in the EIA phase of the project.
National Heritage Resources Act (Act No. 25 of 1999) The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999) (NHRA). The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA).	A Heritage and Paleontological study has been initiated to identify and assess the project in terms of heritage and paleontological resources. This is mandatory in terms of Section 38 of the NHRA.	The Heritage Report will be uploaded on the SAHRIS website for comment and the development guided by any findings of the Report.
National Water Act (Act No. 36 of 1998) The NWA is the primary regulatory legislation, controlling and managing the use of water resources as well as the pollution thereof. This act provides for fundamental reformation of legislation relating to water resource use. GN 704- Regulations on use of water for mining and related activities aimed at the protection of water resources.	An IWUL amendment will be submitted to DWS for consideration for the following Section 21 water uses including: (a) abstraction from a borehole. (c) and (i) mining activities within 500 m from a wetland. (g) dust suppression, coal stockpiling, mine residue stockpiling and dirty water dams. (j) abstraction from the open pit	The DWS will provide comment and an application will be lodged for their review prior to the undertaking of any water use activities on site. Management Principles will be applied to the mining operations as per GN704.
National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004); and applicable Regulations, Standards and Notices published in terms of NEMAQA The promulgation of this Act 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).	Dust monitoring on site during operations	As part of the EMP dust suppression methods will be used.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996); The Mine Health and Safety Act (Act No. 29 of 1996) (MHSA) aims to provide for protection of the health and safety of all employees and other personnel at the mines of South Africa.	Health and Safety Policy of mine to be guided by this Act.	Risk Impact Assessment to be conducted.
Mpumalanga Spatial Development Framework (SDF)	Used to identify the municipality's long term spatial development plans. SDF to be considered in terms of the need and desirability.	The SDF should be consulted as part of the Socio-Economic Study's Scope of Work.
National Development Plan (2012) The National Development Plan outlines what we should do to eradicate poverty, increase employment and reduce	Used to identify project Need and Desirability and alignment with National Policy.	To form part of the project background and socio-economic evaluation.

inequality by 2030. The Plan has the target of developing people's capabilities to be to improve their lives through education and skills development, health care, better access to public transport, jobs, social protection, rising income, housing and basic services, and safety.		
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000) (PAIA) PAIA recognises that everyone has a right of access to any information held by the state and by another person when that information is required to exercise or protect any right.	The S&EIR process is aligned with the PAIA and therefore fair and open public participation is undertaken.	NEMA Public Participation Process will be followed as per the 2014 EIA Guidelines.
Conservation of Agricultural Resources Act (act no. 43 of 1983) (CARA) CARA provides for control over the utilization of the natural agricultural resources in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.	Principles of the Act to be included in the relevant specialist's Scope of Work.	Mine Closure and Rehabilitation strategy to be informed by CARA and stakeholder engagement process.

Legal Requirements

The intent to mine requires the various applications and subsequent approvals prior to commencement. Refer to **Table** 3.4 **and** Table 3.5 in the previous sections. To this effect, an integrated environmental application process was followed by means of S&EIR. A S&EIR process typically has three phases as illustrated by Figure 3.6 below. The report is the final step in the environmental assessment phase, before authorisation can take place.

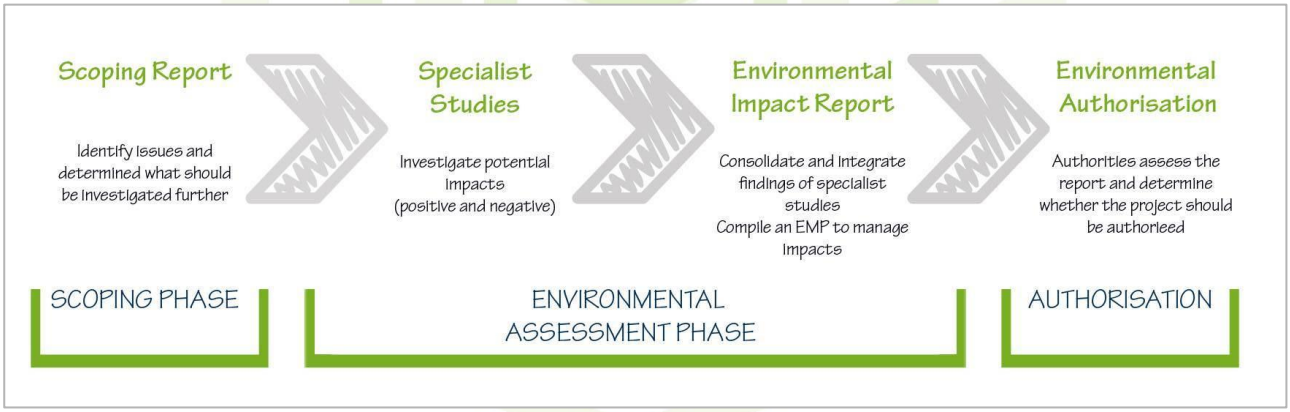

Figure 3.6: S&EIR flow diagram

3.f NEED AND DESIRABILITY OF THE PROPOSED PROJECT

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

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

In 2019 StatSA provided a report detailing the mineral production, finances, employment, exports and imports statistics for South Africa. The results of the census conducted confirmed that the South African Mining Industry is a critical pillar of our economy, with R527,5 billion in total sales generated in 2019. Of this R527,5 billion, 61% (R323,8 billion) was sourced from outside the country through exports. Coal dominates production in South African, covering about 75% of the total mass of all minerals produced. In 2019, 306 million metric tons of coal was produced. Almost two-thirds of mining sales are from abroad, with 39% of coal produced being exported.

The extracting and processing of minerals requires a great deal of machinery and workforce. The South African mining industry employed 514 859 individuals in 2019, with 39% employed in the platinum group metals sector, 21% in the coal sector and 20% employed in the gold sector. Recent statistics note that mining in South Africa still directly employs over half a million people post-covid.

At the 4th South African Investment Conference in 2022, investments of approximately R46 billion was pledged towards mining and mineral beneficiation, showing investor confidence in South Africa's mining potential and operations.

The mining industry is identified as one of the key components toward Rapid Economic Growth in order to reduce poverty and minimise unemployment Growth (State of the Nation Address, 2019). The key issues include:

- The need for a strong capable state;
- Cost reduction for businesses and consumers;
- The need for reindustrialisation and a revitalised mining sector;
- Faster growth in tourism;
- Improved infrastructure;
- Better support for small businesses; and
- Marked reduction in unemployment.

Mining's contribution to provincial GDP (2020) is 25.9% and the sector employs 53 000 people. The activity of mining has numerous social and economic benefits in local, regional and national context. These include:

- Job creation.
- Skills development.
- SMME development.
- Local economic development.
- Contribution to local and national tax income (royalties, companies' tax etc.).
- Contribution to the national gross domestic product, and
- Future business opportunities.

The production of goods, supply of services or construction of infrastructure results in expenditure within a regional economy which has knock-on effects and results in additional expenditure which contributes to the regional economy.

The coal that will be mined at Roodepoort will primarily be for Eskom supply. The project area is ideally situated to the major power stations. The distances to the major power stations in the area are as follow:

- Kendal Power Station = 42km;
- Kusile Power Station = 53km;
- Matla Power Station = 24km;
- Kriel Power Station = 17km; and
- Duvha Power Station = 36km.

3.g MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE INCLUDING A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE.

Refer to Appendix 4 where the final layout plan is provided in terms of the motivation provided below.

3.g.i Details of the development footprint alternatives considered.

a) The Property or Location

The site location is limited to the Current Mining Right Area, which is constrained by the location of other mining houses. The resource location and sensitive areas further restricts the infrastructure layout. The applicant has conducted extensive exploration and the current area provides the ideal and optimum coal resources, therefore no alternative sites were considered.

b) The Type of Activity to Be Undertaken

Opencast roll-over mining is seen as the most efficient way to undertake concurrent rehabilitation as mining progresses, therefore also reducing the cost required for rehabilitation after cessation of mining activities. Underground mining was not considered due to the deeper seams already being removed by previous underground mining activities.

c) The Design or Layout of the Activity

The infrastructure and mining layout is constrained by the mining right boundary and the location of other mining houses. The resource location and sensitive areas on the site further restrict the layout options.

Two (2) layouts were considered:

- The first layout (Figure 3.7) included a road realignment with a slightly lower curvature that the original road, with a Mining Block to the North of the proposed Mining Right area. This option sterilised an additional resource that could potentially be mine in the future due to the location of the road realignment, and also would have excessive influx of groundwater from the old mined out areas into the open pit, which would be very costly to manage.

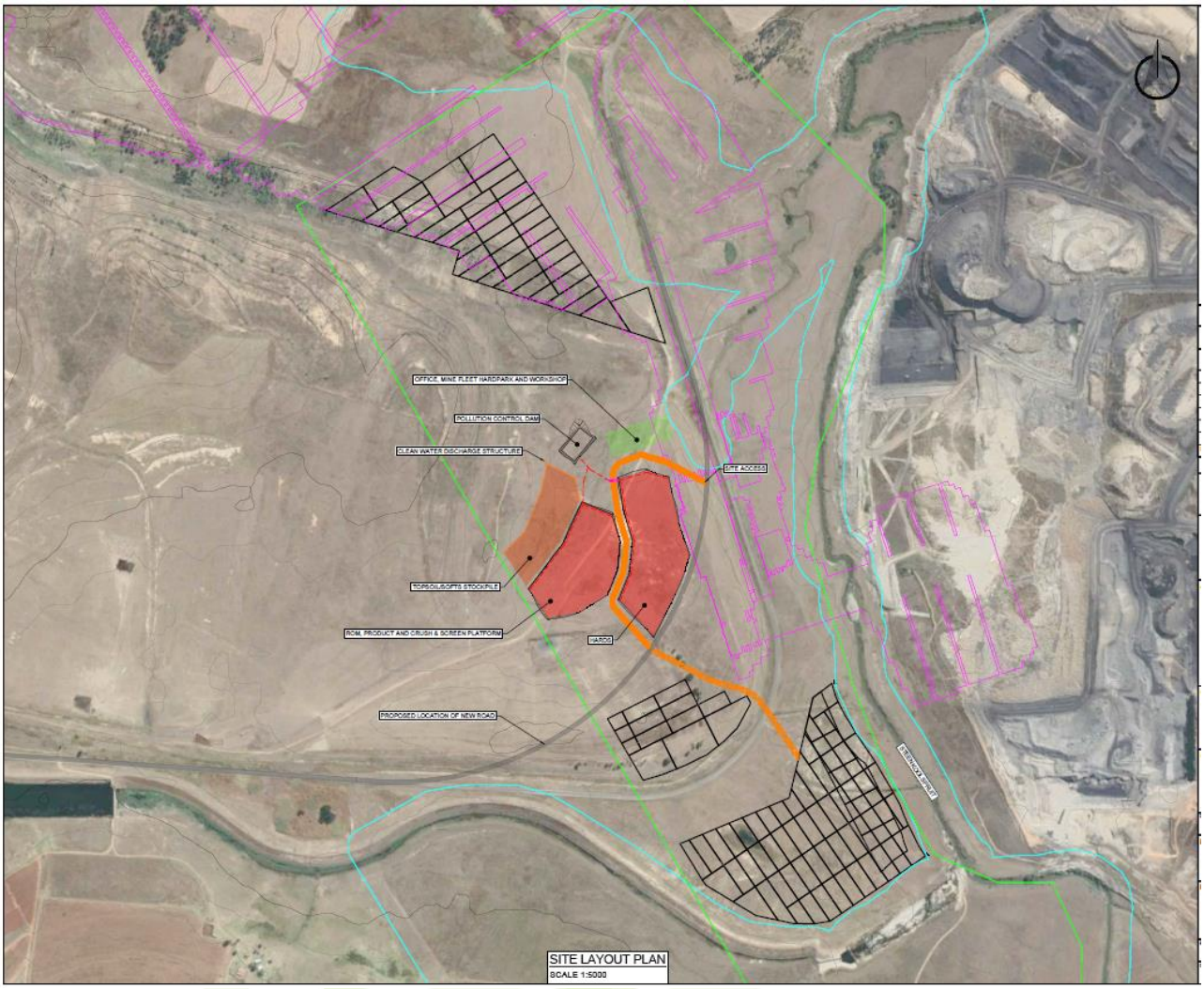

Figure 3.7: Alternative option

- The second option (Figure 3.8), which is the preferred option, had a road realignment that ensured no sterilization of future resources, and also excluded the Northern Pit, as a more financially viable option.

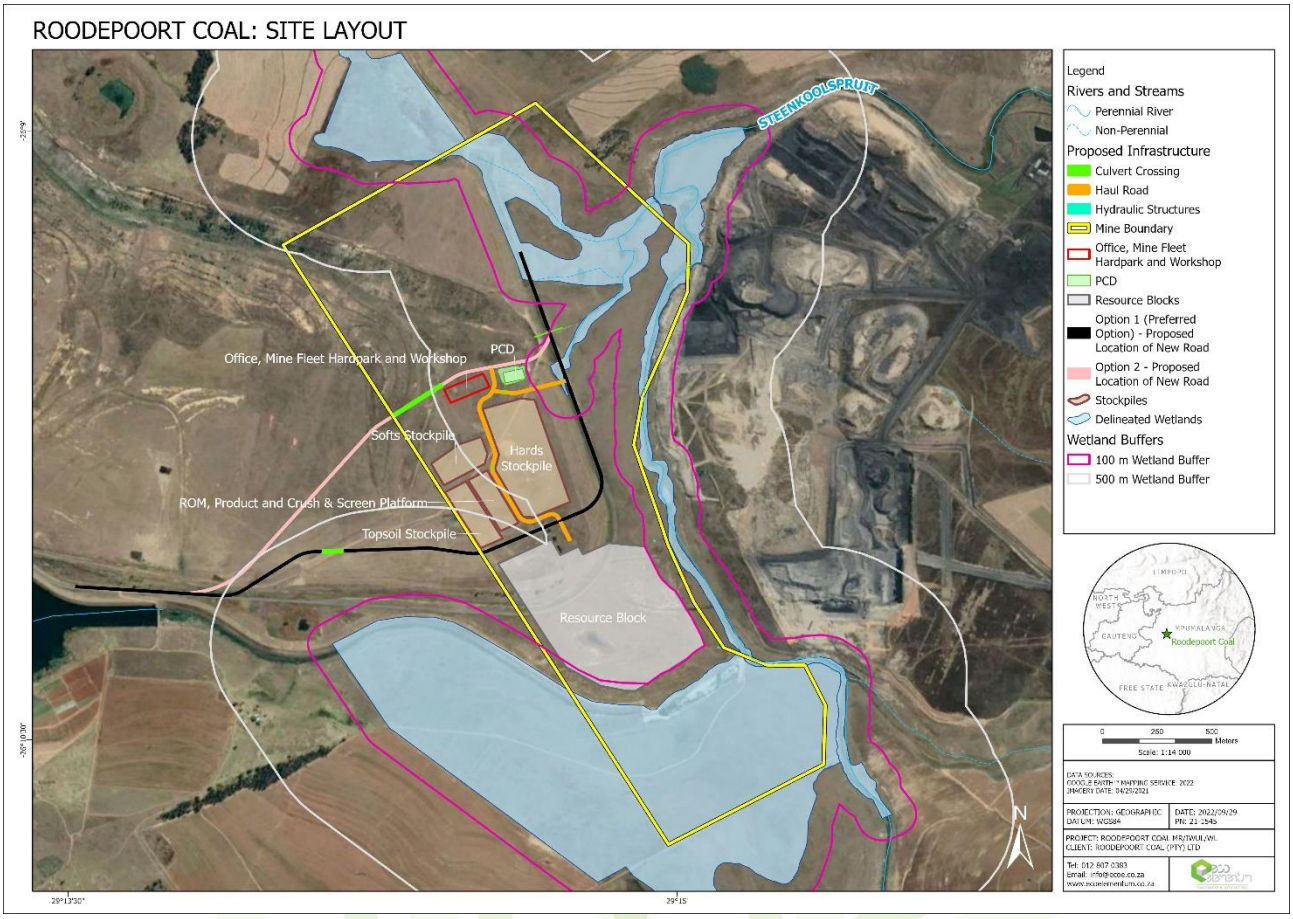

Figure 3.8: Prefered option

d) The Technology to Be Used in The Activity

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

An alternative would be to undertake beneficiation on site, however, this would be costly for a mine with such a short lifespan, and would also require more space and thereby possibly sterilising some of the mineable resource.

Thus, no beneficiation will take place on site, and therefore no further technology alternatives will apply.

e) Operational aspects of the activity

Opencast Rollover mining is the preferred alternative for mining, as majority of the coal had previously been mined underground.

The other alternatives would be beneficiation on site or off site. Due to the limited space available on site, the preferred alternative will be to transport ROM off site for further beneficiation. Therefore, no beneficiation plant will be required on site.

f) The Option of Not Implementing the Activity

The no-go option will result in the protection of the environment in situ and the continued use of the land for agricultural purposes where possible. Not mining the area for coal will result in the sterilisation of the coal resource. The no-go option would also prevent the socioeconomic benefits, including the need for job creation, increased socio-economic activity and social upliftment. If Roodepoort Coal (Pty) Ltd does not proceed with the Mining Right Application, another company is

almost certain to apply for the rights due to the availability of the coal resources and the current mining activities in the vicinity.

The following negative impacts will however be avoided should the project not go-ahead:

- Potential surface and groundwater pollution;
- Increased noise and dust levels (PM10 and PM2.5);
- Potential increase in decant of acid mine drainage during post closure (as a result of the sulphides) which may result in significant water quality modification;
- Lowering of the water table in the coal seam aquifer as a result of mine dewatering;
- Sense of place for the surrounding community and land users.

Because of the depth of the underground activities there is no risk of future subsidence. Rehabilitation after opencast mining will also ensure continuous monitoring of the area and possible future use for other activities.

3.g.ii Details of The Public Participation Process Followed

Section 41 of NEMA Regulation 982 (specifically Chapter 6) set out the Legal and Regulatory Requirement for Public Participation. The Public Participation Process (PPP) aims to involve the authorities and I&APs in the project process, and determines their needs, expectations and perceptions which in turn ensures a complete and comprehensive environmental study. An open and transparent process will/has been followed at all times and is based on reciprocal dissemination of information. The following was/will be undertaken during the PPP:

- Identification of Interested and Affected Parties (IAPs);
- Consultation with selected landowners;
- Notification of IAPs regarding the proposed project via newspaper advert (in the Witbank News); the placing of 4 x site notices at conspicuous places, the sending of notices to affected parties via email (in the form of Background Information Documents) and SMS'.
- A public information meeting (open day) with IAPs will be held on 28 October 2022 at the Boesmanland Lapa;
- Gathering comments, issues and concerns from IAPs;
- Responding to IAP comments, issues and concerns;
- Compilation and submission of results of consultation report to the DMR; and
- Providing IAPs with the opportunity to review and comment on the Draft Scoping and EIA Reports

Refer to the PPP report in Appendix 2 for the full details of the PPP carried out to date.

Direct and Adjacent Landowners

Adjacent landowners were identified in the previous studies and this information was used in the current stakeholder database. These landowners were then notified of the project via email and SMS notification. Adjacent landowners were further invited to comment on the project / reports.

The registered owner of the farms were listed as follows:

Farm			Ptn	Owner
Roodepoort	40	IS	15	MANHATTAN SYNDICATE LTD

Surrounding landowners who were contacted are listed below:

Farm			Ptn	Owner
Roodekop	63	IS	1	UNIVERSAL COAL DEV IV PTY LTD
Middeldrift	42	IS	1	GLENCORE OPERATIONS SOUTH AFRICA PTY LTD

Farm			Ptn	Owner
Middeldrift	42	IS	4	GLENCORE OPERATIONS SOUTH AFRICA PTY LTD
Diepspruit	41	IS	0	UNIVERSAL COAL DEV IV PTY LTD
Diepspruit	41	IS	2	GLENCORE OPERATIONS SOUTH AFRICA PTY LTD
Diepspruit	41	IS	9	UNIVERSAL COAL DEV IV PTY LTD
Roodepoort	40	IS	17	LIZE TRUST
Roodepoort	40	IS	21	MANHATTAN SYNDICATE LTD
Roodepoort	40	IS	6	EMALAHLENI LOCAL MUNICIPALITY

Interested and Affected Parties

All other interested and affected parties (I&APs) were notified through the placement of site notices around the Project Area, and Advertisements placed in the Witbank News.

Commenting Authority Consultation

Commenting Authorities were provided with a copy of the Draft Reports and urged to give comments on the project. The following Commenting Authorities were provided with reports:

Department	Attention to
Department: Water and Sanitation - Bronkhorstspruit	Isaac Tlagadi / Adivaho Rambuda
Mpumalanga Provincial Government DARDLEA	Dineo Tswai
Nkangala District Municipality	Margaret Skosana
eMalahleni LM	Ordain Riba
Department of Roads and Transport	Mr. Morolo
South African Heritage Resources Agency	Online
Department of Mineral Resources (Competent Authority)	Registry
Mpumalanga Tourism and Parks Agency	Koomila Narasoo

3.g.iii Summary of issues raised by I&APs

Table 3.6: Summary of the issues raised by the various I&APs and the EAP's response/feedback thereto to date

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
AFFECTED PARTIES				
Landowner/s	x			
MANHATTAN SYNDICATE LTD (Phillip Mtshweni)	x		No comment received to date	
Landowners or lawful occupiers on adjacent properties				
No comments received to date				
Municipal councillor				
Municipality	x			
eMalahleni Local Municipality	x	19/10/2021	Mr Malele Riba requested to be registered as a Commenting Authority.	Mr Riba has been added as the contact person at the LM, and a copy of the DSR was sent to him.
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA)	x			
Transnet (Thami Hadebe)	x	11/10/2021	Your wayleave application with reference 21-1545-AUTH (MP 30/5/1/2/2/10338 MR) dated 08 October 2021 has reference. Transnet Pipelines, a division of Transnet SOC Limited, is not affected by the proposal. Your awareness of the existence of Transnet's pipeline servitudes and concern for their integrity is highly appreciated. This authorisation shall be valid for 48 months from the date - 11 October 2021.	Comment noted and taken into consideration.
Communities				
NA				
Dept. Land Affairs	x			
No comments received to date				
Traditional Leaders				
N/A				
Dept. Environmental Affairs	x			
No comments received to date				
Other Competent Authorities affected	x			
Mpumalanga Tourism and Parks Agency	x	05/11/2021	The sensitivity of the above farm was assessed using the Mpumalanga Biodiversity Sector Plan (MBSP; MTPA 2014). This sensitivity is assessed in terms of Terrestrial and Freshwater Assessments, In terms of the MBSP based terrestrial biodiversity assessment (Figure I), and freshwater biodiversity assessment (Figure 2) there are sensitive areas should be avoided. The MTPA has no objection to this application but has the following concerns: 1, The MTPA requires that an Ecological study is done. A site inspection and surveys during the growing season. 2, A botanical survey is required for the proposed mining site and immediate adjacent natural areas. All	An Ecological Assessment was undertaken by a SACNASP registered Ecologist, and included both terrestrial and aquatic assessments. Refer to Appendix 3 for the detailed study

			the species of conservation concern (Protected plants) should be marked for rescued purposes. 3. A thorough mitigation plan and rehabilitation plan designed to prevent AMD entering the natural system as well as the prevention of the re-colonization by exotic vegetation should be implemented. The rehabilitation plan should not only focus on the landscaping of the mined area but also on bioremediation of the soils in order for future post mining use. 4.An Active water purification system must be investigated and must address the possible pollution through AMD decanting, underground pollution plume, storm water pollution from discard dumps, overflow from pollution control facilities and leachates. Clean water must be provided back into the natural system. MBSP Terrestrial Biodiversity Assessment: 1.CBA Optimal area should be avoided by opencast mining. 2. Other natural areas- Ecological study required. MBSP Freshwater Assessment: 1. CBA wetlands. Delineation with a 100-meter buffer to be avoided. 2. ONA: An ecological study is required.	
OTHER AFFECTED PARTIES				
No comments received to date				
INTERESTED PARTIES				
Cobus Burger		10/10/2021	In response to the BID document: Appreciate the feedback! just for my understanding what must we do with this form must we complete it?	If you wish to register as an interested and affected party for this project please complete the form at the back of the BID. If you wish to be removed from the database for this project, please let me know, and I will do so.
Gmamba Enterprise (PTY) LTD		12/10/2021	We are an SMME based in Emalahleni Our best interest is to empower youth in terms of jobs and skills opportunities we our we interested to be part of the local beneficiary	I have registered you as an interested and Affected Party.

3.g.iv The Environmental Attributes Associated with The Sites

3.g.iv.1 Baseline Environment

3.g.iv.1.a Type of Environment Affected by the proposed activity

The following specialist studies have been undertaken as part of the EIA process.

Table 3.7: List of Specialists

Specialist Study	Appointed Specialist	Company
Socio-Economic Impact Study	Vumile Ribeiro	Niara (Pty) Ltd
Air quality	Neel Breitenbach	Eco Elementum (Pty) Ltd
Aquatic Ecology	Joppie Schrijvershof	Oasis Environmental Specialists (Pty) Ltd

Specialist Study	Appointed Specialist	Company
Visual Impact Assessment	Neel Breitenbach	Eco Elementum (Pty) Ltd
Noise Assessment	Neel Breitenbach	Eco Elementum (Pty) Ltd
Blasting and Vibration	Marica Pretorius	Big C Rock Engineering
Ecological	Joppie Schrijvershof	Oasis Environmental Specialists (Pty) Ltd
Geo-hydrological	Elida Naude	Eco Elementum (Pty) Ltd
Wetland	Joppie Schrijvershof	Oasis Environmental Specialists (Pty) Ltd
Heritage, Archaeological	Tobias Coetzee	Mr. Tobias Coetzee
Paleontological	Prof Marion Bamford	Independent Consultant
Soils, land use and land capability, Hydropedology	Karen King	WSP

GEOLOGY

Regional Geology

The Roodepoort MP area is underlain by rocks from the Karoo Supergroup. The site is also situated in the Witbank Coalfields which is the most important coal producing coalfields in South Africa (**Figure** 3.9). Five coal seams exist in the coal field, but not all are economically viable. These coal seams are hosted in Vryheid Formation the middle Ecca Group sediments. The number 1 seam is the lowest or deepest while the 5 seam is the upper most coal seam. The number 2 and 4 seams are the most exploited throughout the Witbank Coalfields.

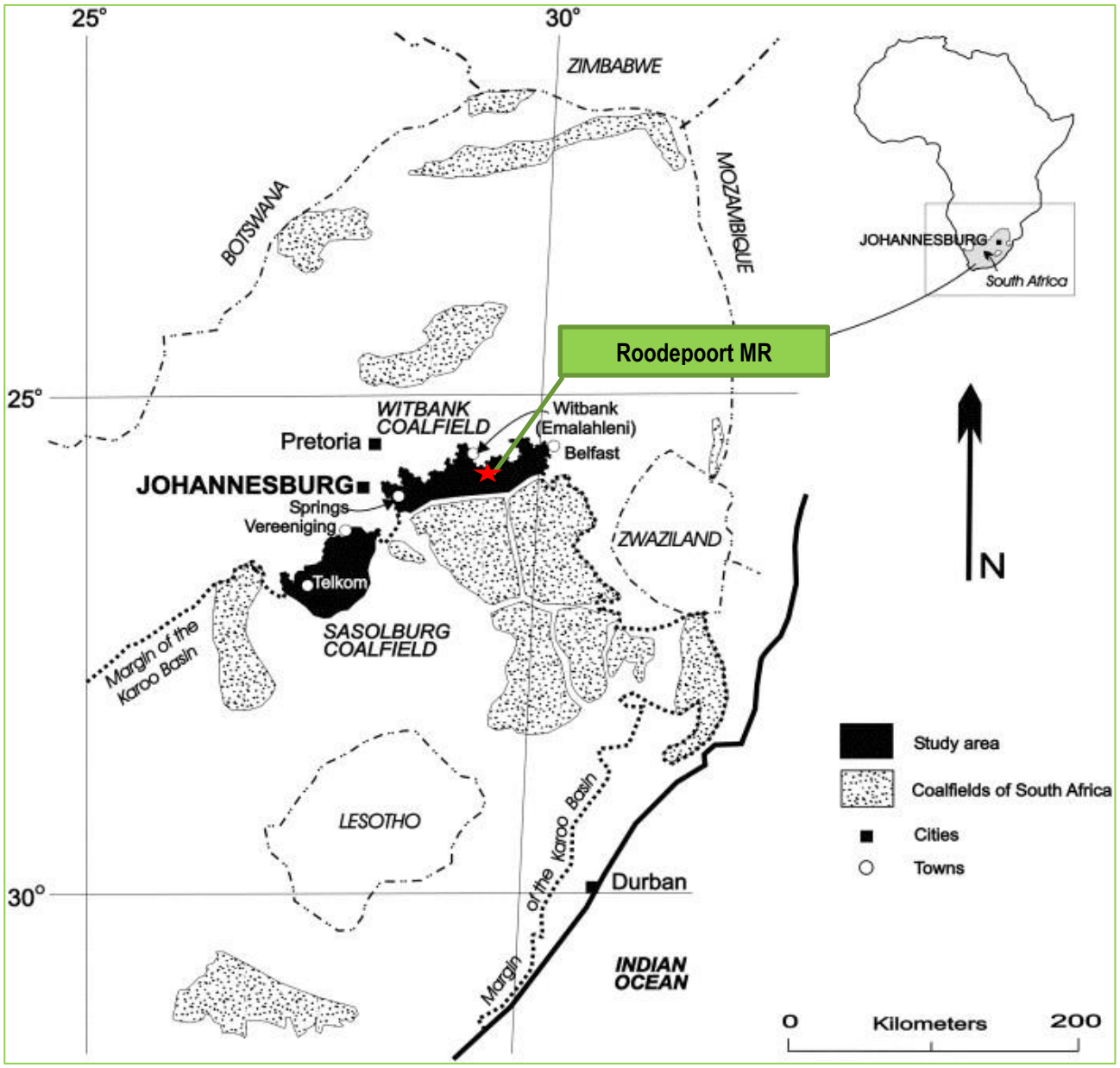

Figure 3.9: Witbank Coalfields and position of Roodepoort Coal MR area in relation to it (Denis et.al., 2007).

The Karoo Supergroup mainly consist of sedimentary successions of sandstone, shale and coal. The Ecca group is underlain by the Dwyka Formation which consist of tillites and diamictites.

Geological features such as dykes (dolerite intrusions) and faults are commonly found in the coal field. The dolerite intrusions typically act as groundwater flow barriers due to its low permeability, while the contact zone of the intrusions act as flow pathways due to cracks and faults leading to higher flow rates along these contact zones.

TOPOGRAPHY

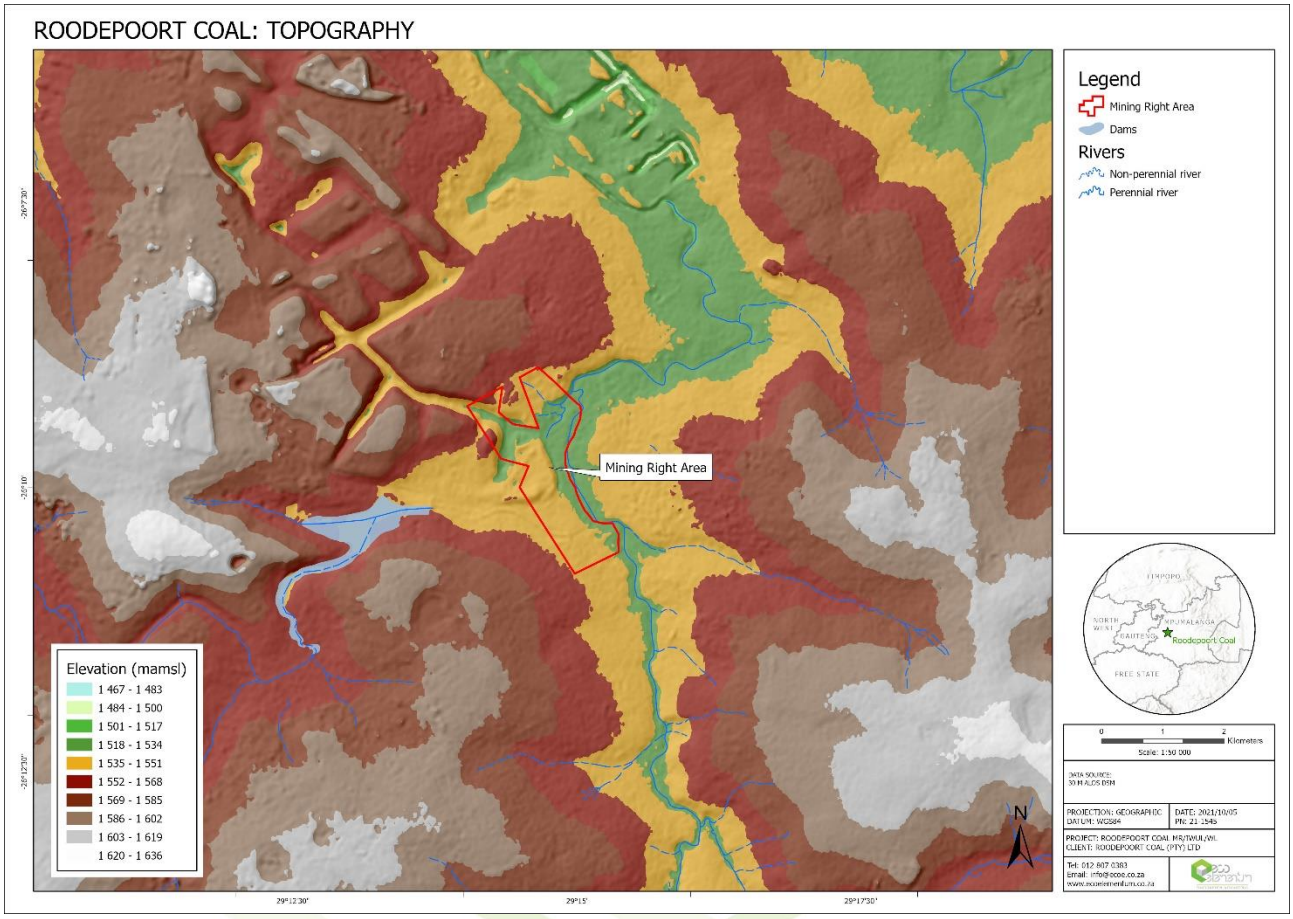

Figure 3.10: Topography of the area

CLIMATE

The average daily maximum temperatures range from 17°C in June to 26°C in February, with nightly minimum ranging from 0.5°C in June to 13°C in January, February and December.

The average precipitation for the Roodepoort region is presented in **Figure** 3.11 (WRC, 2015). The average precipitation for the region is approximately 665 mm/a with the majority of the rainfall over the summer months between October and March. Rainfall within the Highveld region is mainly contributed by thunderstorms where a large quantity of rainfall occurs within a short period of time.

Evaporation data is scarce and generally old. From available data the average annual precipitation for the Roodepoort area is ± 1 700 mma/a.

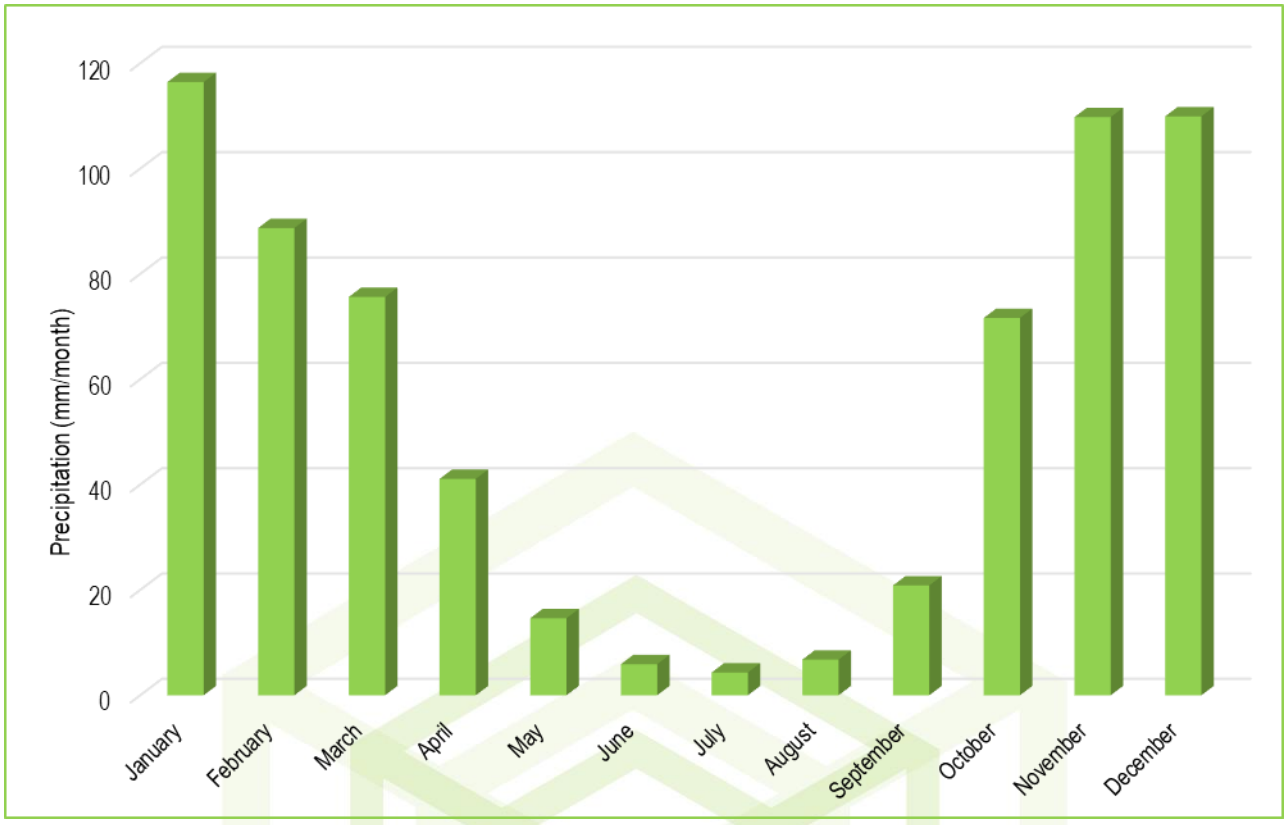

Figure 3.11: Monthly precipitation in the proposed Roodepoort mining area (WRC, 2015)

WETLAND AND AQUATIC ECOLOGY

Catchment description

The proposed mine is situated close to the Steenkoolspruit and Rietspruit confluence (Quaternary drainage region B11E) which falls within the Olifants Water Management Area (Figure 6). The land use features within the study site are mainly agriculture in the form of subsistence farming, crops and opencast mining (Figure 7).

According to the ecological importance classification for the quaternary catchments B11E; the Steenkoolspruit system (B11E-1297) is classified in its present state as a Category D (Largely Modified). The default ecological management class for the relevant quaternary catchments is considered to be moderate sensitive system in terms of ecological importance with a highly ecological sensitivity. The attainable ecological management class for the systems is a Category B (Largely Natural).

The Rietspruit system (B11E-1353) is classified in its present state as a Category E (Seriously Modified). The default ecological management class for the relevant quaternary catchments is considered to be moderate sensitive system in terms of ecological importance with a highly ecological sensitivity. The attainable ecological management class for the systems is a Category B (Largely Natural).

A summary of the ecological integrity (health) and management categories for the unnamed tributaries in quaternary catchments B11E is presented in Table 12.

Reach	PES Category Median	Mean EI Class	Mean ES Class	Length km	Stream Order	Attainable PES
B11E-01297 Steenkoolspruit	D	Moderate	High	18	3	B
B11E-01353 Rietspruit	E	Moderate	High	24	2	B

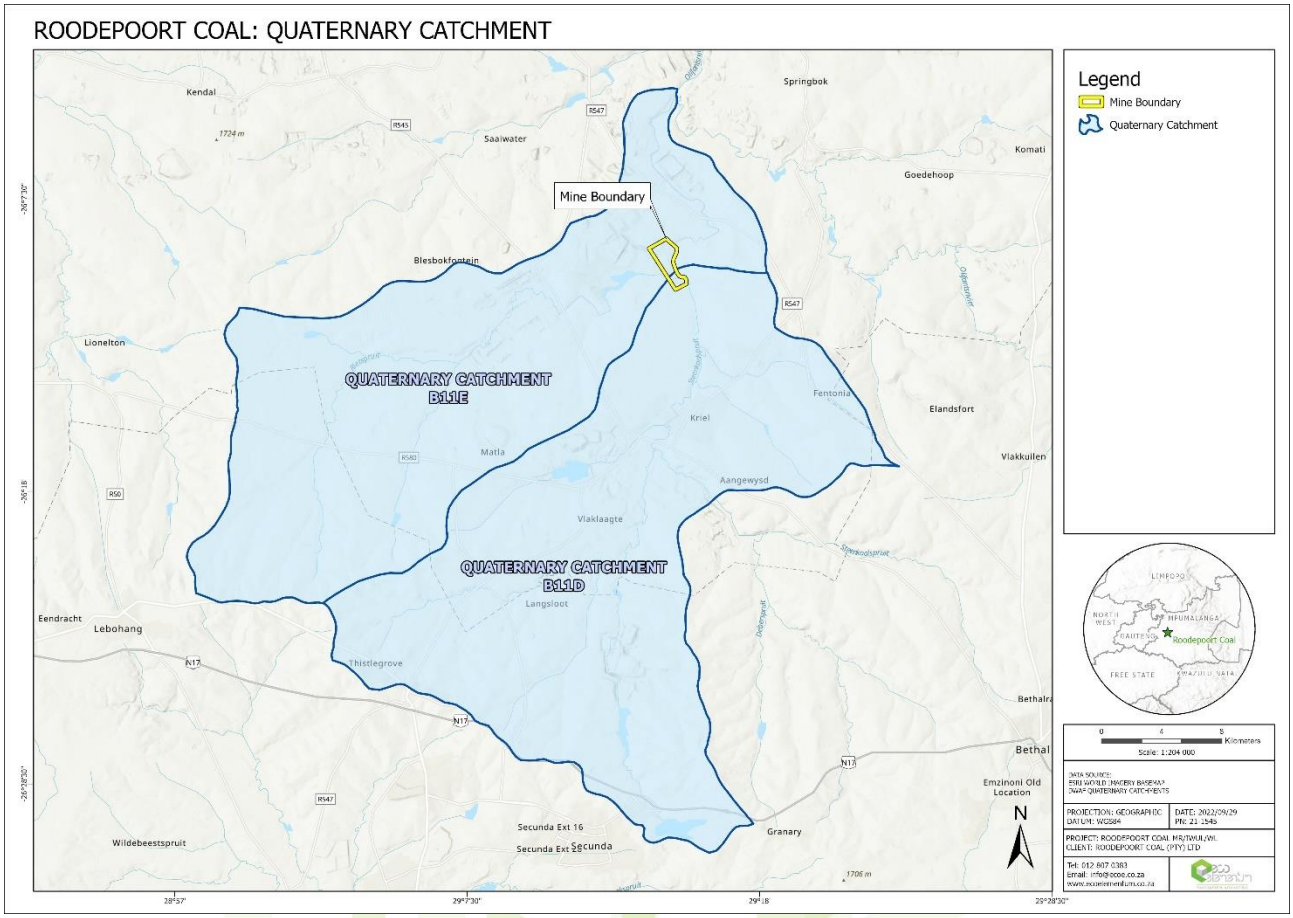

Figure 3.12: Quaternary Catchment of the study area

Delineation and Classification of wetlands

The study site can be characterised as having rolling hills with relatively steep sloping topography. The site ranges in altitude from 1522 m to 1602 m above sea level. A Digital Elevation Model (DEM) of the aerial photography of the site revealed depression in landscape to the middle of the mining boundary (Figure 3.13). These areas identified during the desktop assessment where then assessed in more detail during the field investigation and confirmed to be a the floodplain system.

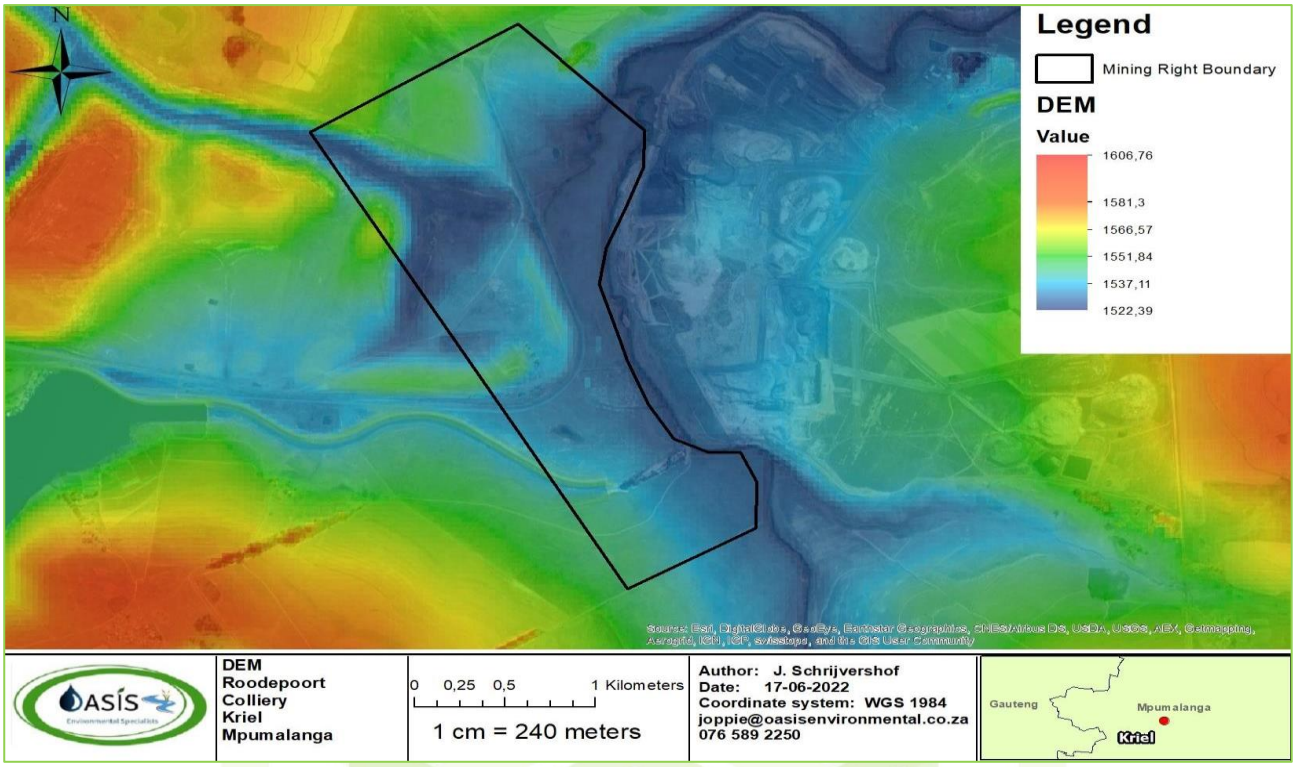

Figure 3.13: Digital Elevation Model

The Rietspruit initially flowed through the proposed mining property in the 1960s, however during the 1970s and 1980s the establishment of the Roodepoort Opencast Mine and the construction of the Rietspruit Dam led to a stream diversion to be created from the Rietspruit to the Steenkoolspruit, cutting off any water supply from the Rietspruit through that specific area (Figure 3.15). The old Rietspruit section cutting the mining property was mined over decades and was rehabilitated in 2012 (Figure 3.14). The rehabilitated areas within the proposed mining boundary led to uneven landscape sections with trenches and berms, creating depressions and dams within the landscape. These depressions created alluvial soils to cover most of the wetland areas. The soils were uneven but illustrated sandy clay soils starting to establish within the lower sections in these wetland areas.

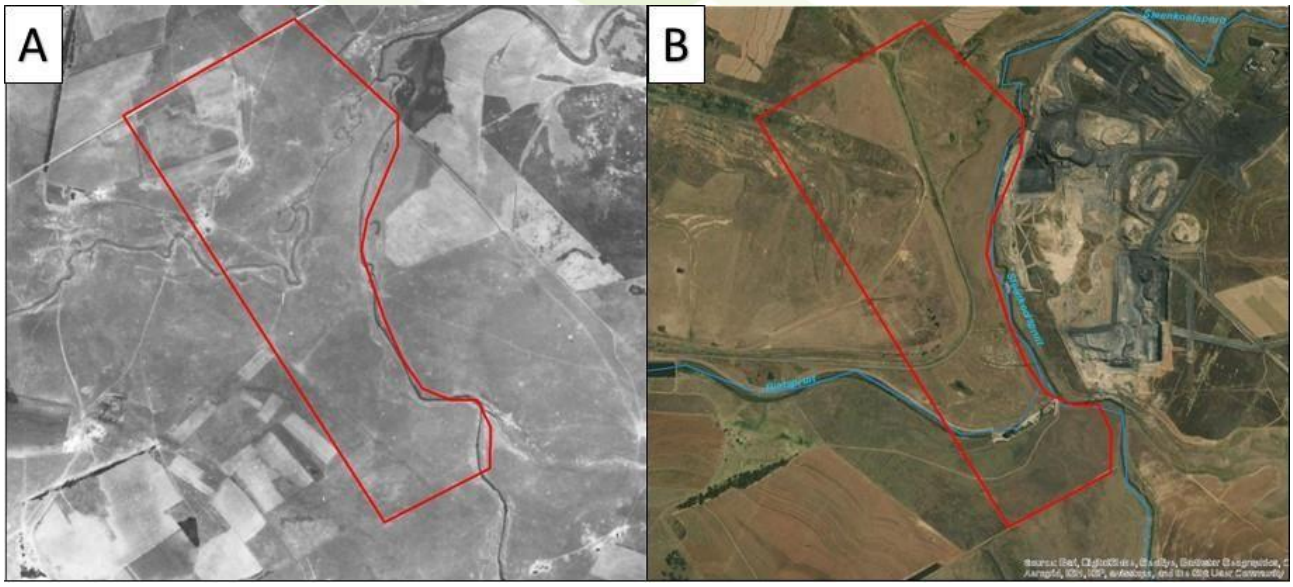

Figure 3.14: Proposed Roodepoort Colliery - Aerial Imagery Map from (A) 1958; (B) 2022

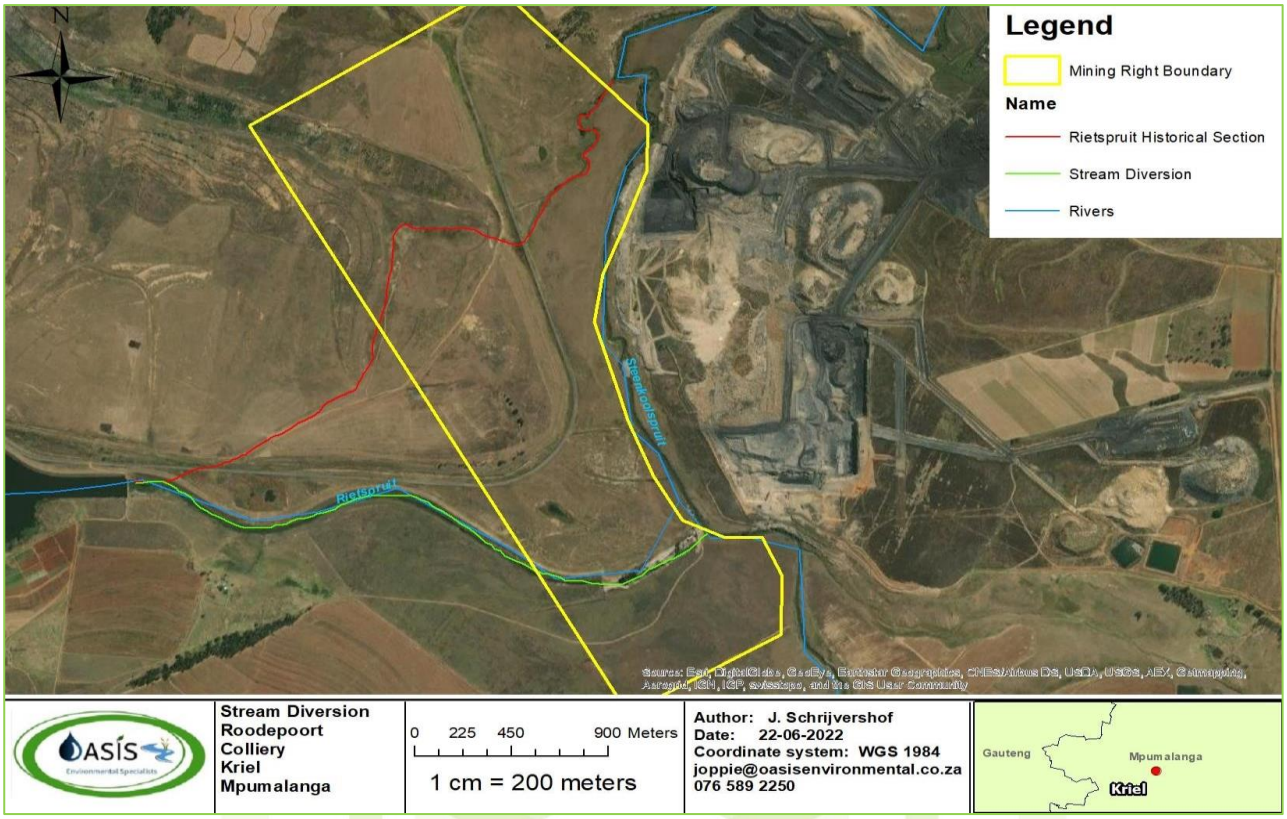

Figure 3.15: Proposed Roodepoort Coal - Rietspruit Stream Diversion Map.

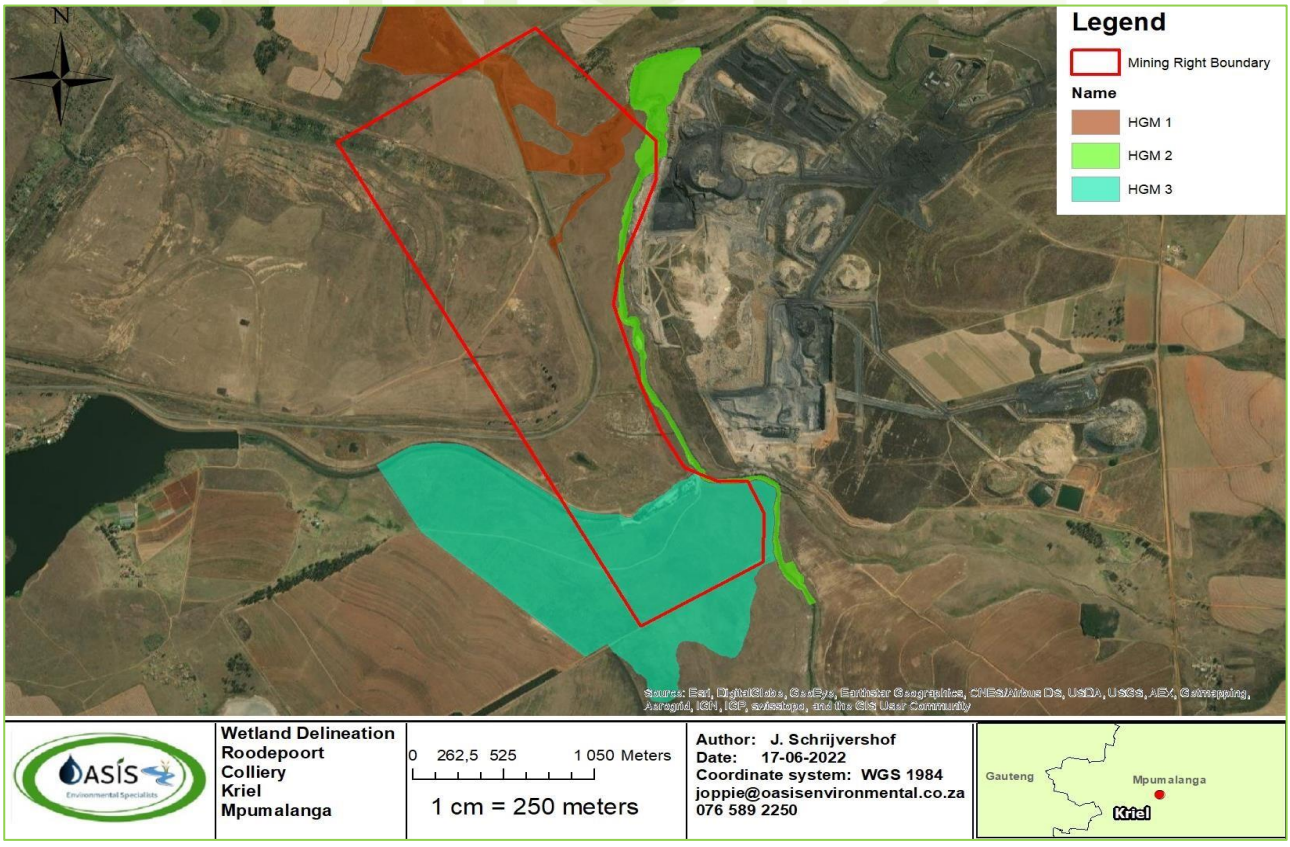

Figure 3.16: Wetland delineations

Wetland Health

The associated Hydro-geomorphic (HGM) unit is discussed on the following pages in more detail in terms of the functional integrity, Present Ecological Score and the impacts which affect wetland functionality.

The Ecological Services of the wetland has been recorded as intermediate and the sensitivity and importance (EIS) has been recorded as moderate (Table 3.8, Table 3.9). Although no red-data species were identified during the site investigation, the majority of these systems provide habitat for a number of floral and faunal species (Figure 3.17). The presence of open water and vegetation provides a suitable area for breeding, feeding, and protection for some faunal and floral species

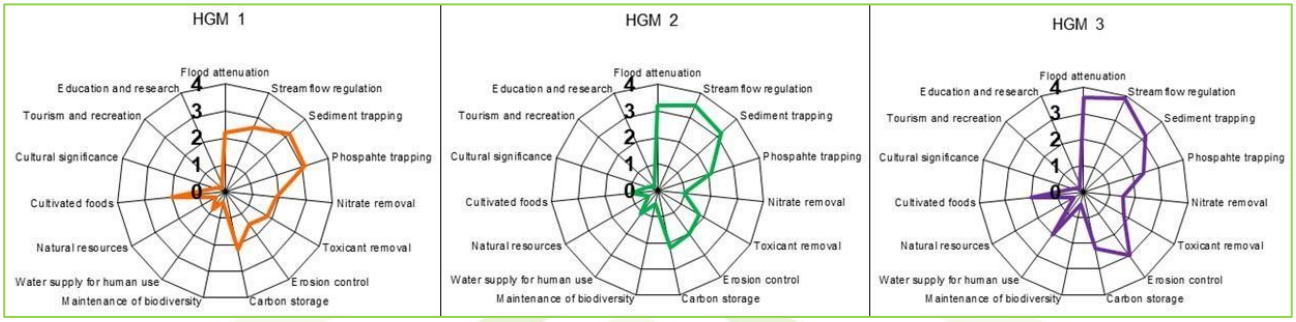

Figure 3.17: Eco-Services of the HGM units found at Roodepoort Colliery

Table 3.8: Summary of the Ecological Services of the four wetland systems for Roodepoort Colliery

	HGM 1	HGM 2	HGM 3	Note: <0.5 Low; 0.5-1.5 Moderately low; 1.5-2.5 Intermediate; 2.5-3.5 Moderately high; and >3.5 High
Overall	1,69	1,68	1,96	

Table 3.9: Summary of the Ecological Importance and Sensitivity of the wetland systems associated with the Roodepoort Colliery.

ECOLOGICAL IMPORTANCE AND SENSITIVITY:		None, Rating = 0 rarely sensitive to changes in water quality/hydrological regime; Low, Rating =1 One or a few elements sensitive to changes in water quality/hydrological regime; Moderate, Rating =2 some elements sensitive to changes in water quality/hydrological regime; High, Rating =3 Many elements sensitive to changes in water quality/ hydrological regime; Very high, Rating =4 Very many elements sensitive to changes in water quality/ hydrological regime
ECOLOGICAL IMPORTANCE & SENSITIVITY	1,25	
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	2,38	
DIRECT HUMAN BENEFITS	1,5	
OVERALL	**1,71**	

Seep Wetland

Two seepage wetlands (HGM 1 and HGM 3) were identified within the proposed mining boundary (Figure 3.16). The seep wetlands received poor scores, indicating that these wetland is heavily transformed system.

The seep wetland system was assessed in terms of health and was found to be categorised as largely modified (Category D) for HGM 1 and seriously modified (Category E) for HGM 3 (Table 3.10). The majority of the indigenous vegetation within the development footprint and the surrounding area is transformed with alien invasive vegetation, mining, grazing, cultivation and pollution from informal settlements. The stream diversion has negatively impacted HGM 3 and its water inputs.

Floodplain Wetland

One floodplain wetland (HGM 2) was identified within mining boundary of Roodepoort Colliery. The floodplain wetland received poor scores, indicating that these wetland is heavily transformed system with current mining areas within this system.

The floodplain wetland system was assessed in terms of health and was found to be categorised as seriously modified (Category E) (Table 3.10). The majority of the indigenous vegetation within the development footprint and the surrounding area is transformed with alien invasive vegetation, mining, grazing, cultivation and pollution from informal settlements.

Table 3.10: Summary of PES scores for the HGM Units at Roodepoort Colliery.

HGM Unit 1			
Module	**Impact Score**	**Category**	**Trajectory**
Hydrology	5,1	D	↓
Geomorphology	4,3	D	↓
Vegetation	4,2	D	↓
Overall Score	**4,61**	**D**	↓
HGM Unit 02			
Module	**Impact Score**	**Category**	**Trajectory**
Hydrology	6,2	E	↓
Geomorphology	6,5	E	↓
Vegetation	5,9	D	↓
Overall Score	**6,2**	**E**	↓
HGM Unit 03			
Module	**Impact Score**	**Category**	**Trajectory**
Hydrology	7,1	E	↓
Geomorphology	6,7	E	↓
Vegetation	4,9	D	↓
Overall Score	**6,36**	**E**	↓

Aquatic sample sites

A site assessment was conducted on the 14th of June 2022. The sampled sites are illustrated in the Figure 3.18, and the coordinates is provided in Table 3.11. During the site visit it was evident that alien invasive plant infestation, agriculture, sewage pollution and adjacent extensive mining activities affected water quality. The Steenkoolspruit was sampled above and below the Rietspruit confluence associated with the proposed Roodepoort Colliery at the time of the assessment. Site 1 represents the upstream site and Site 2 the downstream site for the Steenkoolspruit.

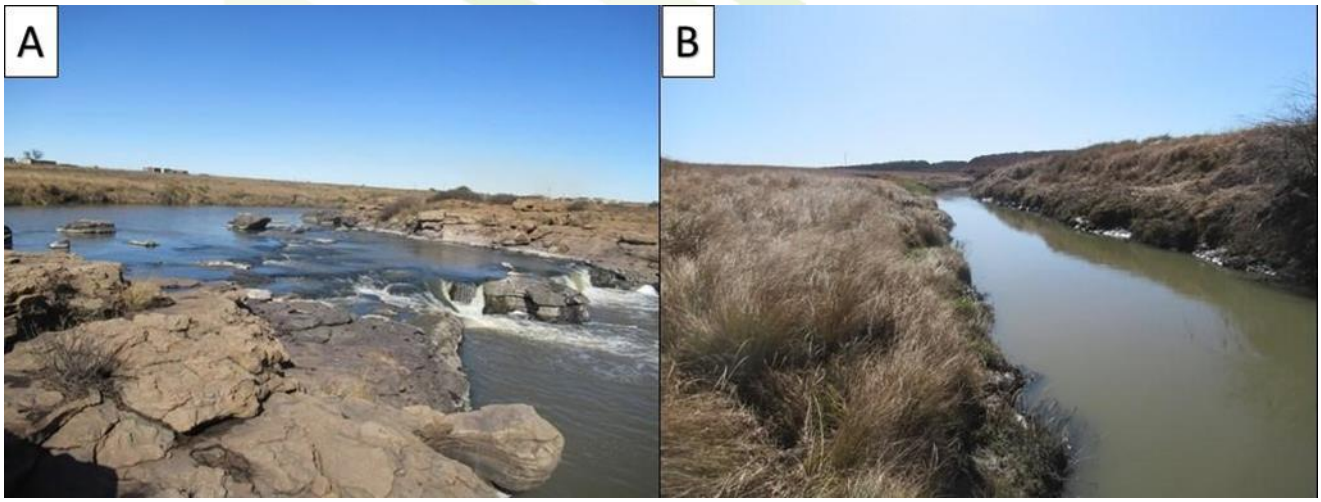

Figure 3.18: Sample sites for the Steenkoolspruit: (A) Upstream and (B) Downstream

Table 3.11: Coordinates for the aquatic study site at proposed Roodepoort Colliery

Site	Coordinates	
Site 1 (upstream)	26°10'31.66"S	29°15'24.53"E

Site 2 (downstream)	26° 8'15.67"S	29°16'12.42"E

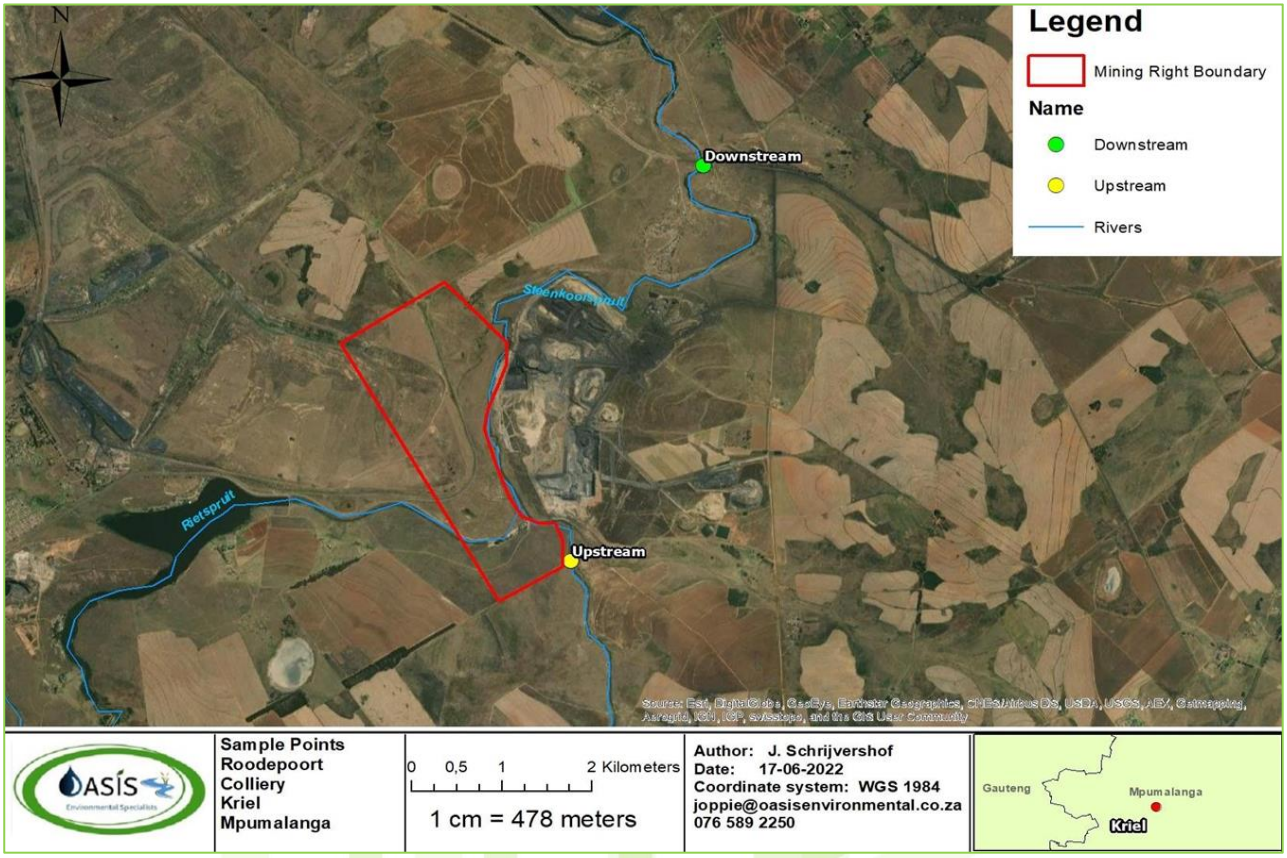

Figure 3.19: Sample locality of the biomonitoring points

In situ water quality variables was within acceptable limits compared to the Target Water Quality Ranges (TWQRs) for aquatic ecosystems of South Africa. The pH remained relatively constant throughout the sites and within the neutral range. Temperatures was relatively stable, where electrical conductivity levels within recommended guideline levels. Dissolved oxygen (DO) levels were slightly below guideline levels at both upstream and downstream sites. Extensive mining and sewage were observed at the time of the assessment at the sample locations.

The IHIA results recorded, placed both sites assessed within a **seriously modified state (Category E)**. A category of E indicates that the loss of natural habitat, biota and basic ecosystem functions is extensively transformed from reference conditions. The predominant cause for concern was agriculture, adjacent opencast mining and water pollution. The findings for the vegetation assessment also revealed that riparian habitat of the area was **seriously modified (Category E)**

During the SASS5 survey; no sensitive organisms were sampled at any of the study sites. Sampled invertebrates included the, Beatidae 1sp, Ancylidae, Corixidae, Culucidae, Ceraptogonidae and Chironomidae families. This SASS5 scores for both sites indicate that the stream **is seriously modified (Category E/F).** The habitat reaches which were assessed and found to be inadequate, where biotopes with limited habitat structures were present. The dominant feature of the invertebrate habitat is the mud substrate which dominates the streams under study. Generally, no stones in or out of current biotope were found to be available throughout the stream with extensive erosion present. Limited fringing vegetation were sampled at both study sites. A small section of stone habitat were available at the downstream site.

Flora

Eastern Highveld Grassland

Stretches over the Mpumalanga and Gauteng Provinces, with plains between Belfast to the east and the eastern side of Johannesburg and extending southwards to Bethal, Ermelo and Piet Retief. Altitude ranges between 1520 to 1780 m, but also as low as 1300 m (Mucina & Rutherford, 2006). Strongly seasonal summer rainfall, with very dry winters. Mean annual precipitation ranges between 650 mm to 900 mm (overall average: 726 mm) and is relatively uniform, but increases significantly in the southeast areas (Mucina & Rutherford, 2006). Incidence of frost from lasts from 13 to 42 days, but is higher at higher elevations (Mucina & Rutherford, 2006).

Slightly too moderately undulating plains, including some low hills and pan depressions (Mucina & Rutherford, 2006). The vegetation is short dense grassland dominated by the usual Highveld grass composition (Aristida, Digitaria, Eragrostis, Themeda, Tristachya etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra, Celtis africana, Diospyros lycioides* subsp *lycioides, Parinari capensis, Protea caffra, P. welwitschii* and *Rhus magalismontanum*) (Mucina & Rutherford, 2006).

Some 44% transformed primarily by cultivation, plantations, mines, urbanisation and dams. Cultivation may have had a more extensive impact, indicated by land-cover data (Mucina & Rutherford, 2006). No serious alien invasions are reported, but Acacia mearnsii can become dominant in disturbed sites, with very low erosion (Mucina & Rutherford, 2006).

Red to yellow sandy soils of the Ba and Bb land types found on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup). Land types are Bb (65%) and Ba (30%) (Mucina & Rutherford, 2006). Found on younger Pleistocene to recent sediments overlying fine-grained sedimentary rocks of the Karoo Supergroup (on sediments of both Ecca and Beaufort Groups due to the large extent of the area of occurrence) as well as of the much older dolomites of the Malmani Subgroup of the Transvaal Supergroup in the northwest (Mucina & Rutherford, 2006). In the areas built by Karoo Supergroup sediments are associated with the occurrence of Jurassic Karoo dolerite dykes having a profound influence on run-off (Mucina & Rutherford, 2006).

Soils are peaty (Champagne soil form) to vertic (Rensberg soil form) (Mucina & Rutherford, 2006). The pans and wetlands forms where flow of water is impeded by impermeable soils and/or by erosion resistant features, such as dolerite intrusions (Mucina & Rutherford, 2006). Many pans of this type of freshwater wetlands are inundated and/or saturated only during the summer rainfall season, and for some months after this into the middle of the dry winter season, but they may remain saturated all year round (Mucina & Rutherford, 2006). Surface water inundation may be present at any point while the wetland is saturated and some plant species will be present only under inundated conditions, or under permanently saturated conditions (Mucina & Rutherford, 2006). The presence of standing water should not be taken as a sign of permanent wet conditions (Mucina & Rutherford, 2006).

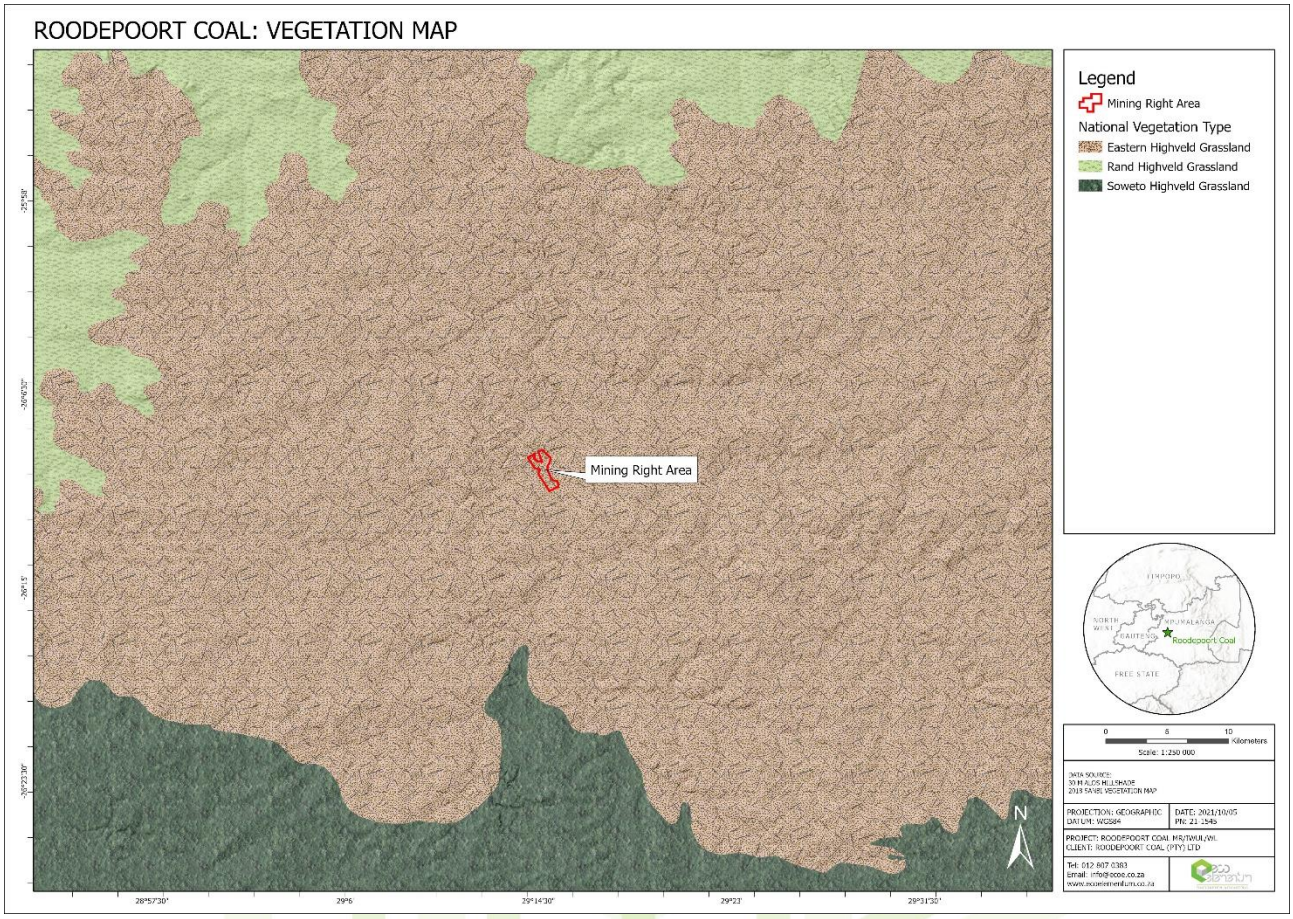

Figure 3.20: Vegetation type of the project area

Critical Biodiversity Areas

According to the Critical Biodiversity Areas datasets provided by SANBI (2022), the majority of the application area falls within a CBA associated with the Steenkoolspruit, with some areas as Other Natural Areas and Modified Areas as seen in Figure 3.21. These Other Natural and Modified Areas sections were confirmed to be the mining areas during the site visit.

Threatened Ecosystems and Protected areas

The mining area is not in close proximity to any threatened ecosystems and/or protected areas.

Important Bird Areas

The mining area does not occur within close proximity to any Important Bird Areas.

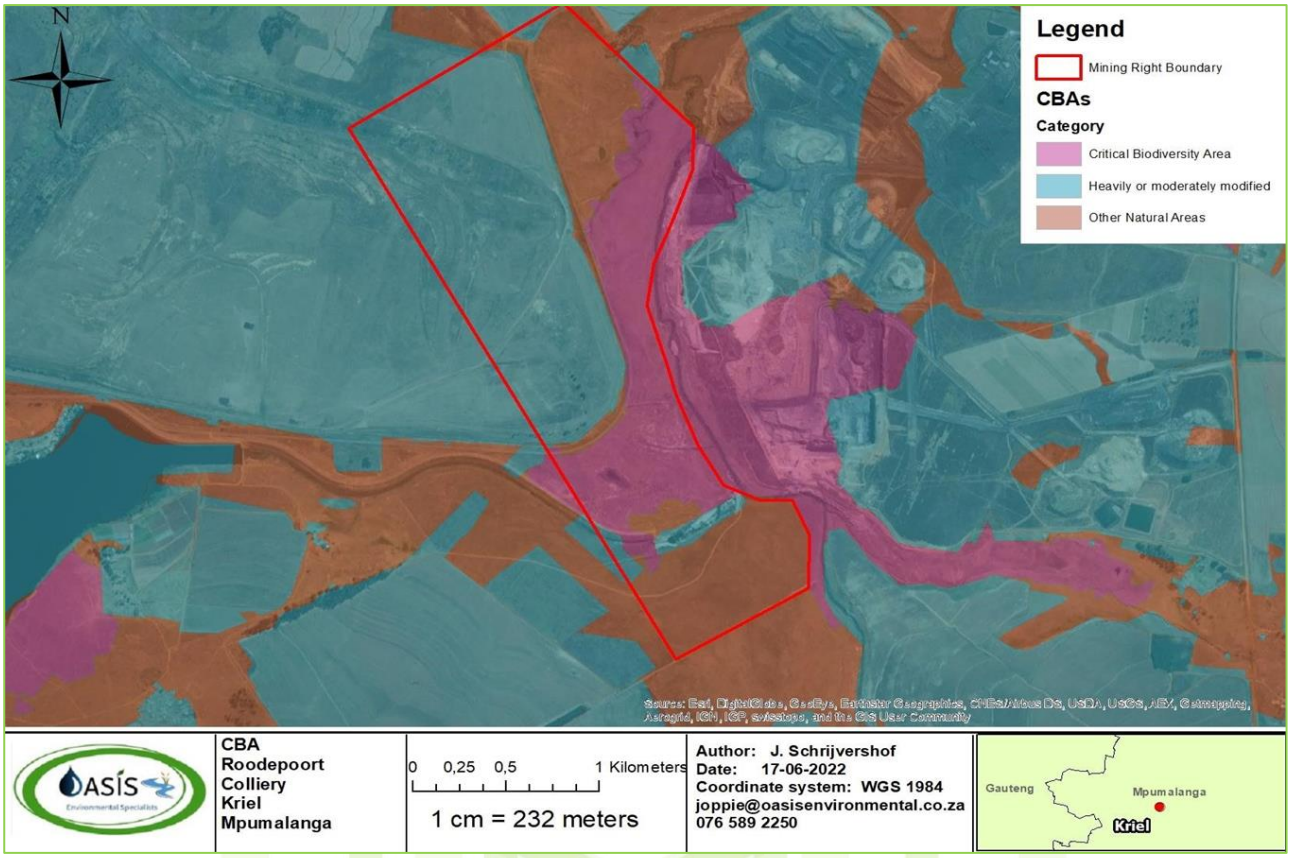

Figure 3.21: Proposed Roodepoort Colliery - Critical Biodiversity Areas map

Vegetation on site

The majority of the study site consisted of alien invasive vegetation and cropland, with very little indigenous vegetation,. No red listed floral species were observed during the site visit.

Commonly observed grasses (dominant species) within the area of investigation comprised *Imperata cylindrica* (Cogon grass), *Hyparrhenia hirta* (Thatching grass), *Melines repens* (Natal red top), *Eragrostis curvula*, *Themeda triandra* and *Pogonarthria squarrosa* (Herringboe grass).

Asparagus laricinus were identified in some areas along with balloon plant (*Gomphocarpus physocarpus*). Beyond the reaches of the grasslands is gumtree, poplar tree and black wattle invasion in the study area.

Alien Invasive Vegetation

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

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

Certain species have different alien invasive categories for different provinces in South Africa. The dominant plant species identified was alien invasive Eucalyptus tereticornis, Black Wattle (Acacia mearnsii) and Grey poplar tree (Populus canescens).

Fauna

Mammal species that were identified onsite included the yellow mongoose (*Cynictis penicillata*) and ground squirrel (*Xerus spp.*).

Bird species included Grey heron (*Ardea cinerea*), Long-tailed widowbird (*Euplectes progne*), Red-necked spurfowl or rednecked francolin (*Pternistis afer*) and Ring necked dove (*Streptopelia capicola*). Other species included Laughing dove (*Spilopelia senegalensis*), Southern red bishop (*Euplectes orix*); Southern masked weaver (*Ploceus velatus*); Blacksmith lapwing (*Vanellus armatus*), Hadeda ibis (*Bostrychia hagedash*) Helmeted guineafowl (*Numida meleagris*) and Indian myna (*Acridotheres tristis*).

No red listed faunal species were observed during the site visit, but the Serval (*Leptailurus serval*), Schreibers's Long-fingered Bat (*Miniopterus schreibersii*) and the Southern African Hedgehog (*Atelerix frontalis*) which all are listed Near Threatened and has been observed in that area based on desktop data, but is unlikely to occur in proximity of the mining areas.

Riparian and wetland vegetation along stream and wetlands can be considered highly sensitive areas which serves as a breeding and foraging habitat for avifauna and aquatic fauna. The remainder of the area can be regarded as low sensitive as it has been disturbed by surrounding impacts of agriculture and mining and covers the majority of the area.

HERITAGE

The demarcated development footprints, however, are located on previously mined areas only, indicating a low sensitivity and potential impact to cultural resources. One area associated with potentially historical buildings was identified on historical aerial imagery (Site B01), while one cemetery (Site F01) was identified during the pedestrian survey. Both sites, however, are located near the northern corner of the proposed Mining Right and do not intersect the demarcated development footprints.

The buildings associated with Site B01 are likely to exceed 60 years of age, but have completely been demolished and are no longer associated with surface remains. Also, the site is located approximately 306 m from the proposed development and is therefore not at risk of being impacted by the proposed development.

Cemetery F01 is located roughly 650 m from the proposed development and consists of 17 graves, some exceeding 60 years of age. Although the cemetery is considered to be sensitive from a heritage perspective, the site is unlikely to be impacted by the proposed project. The cemetery is protected by the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act (NHRA) 25 of 1999. Since the cemetery appears not to be in use anymore, it is recommended that a 50 m fenced-off conservation buffer be erected around the cemetery in order to avoid accidental damage. Access to the cemetery should also not be refused.

Table 3.12: Site coordinates & description

Name	Off. Name	Latitude	Longitude	Description	Age	Current Status	Estimated Extent	ID Source	Farm Portion	Intersecting Development
B01	2629AA-B01	-26.152250	29.246287	Building	Historical	Demolished – No surface remains	10 ha	Aerial 1968	15	No

Name	Off. Name	Latitude	Longitude	Description	Age	Current Status	Estimated Extent	ID Source	Farm Portion	Intersecting Development
F01	2629AA-F02	-26.152031	29.247251	Cemetery	Historical	Dilapidated	332 m²	Field	15	No

Table 3.13: Individual site ratings

Site / Survey Point Name	Type	Rating	Field Rating/Grade	Significance	Recommendation
2629AA-F01	Cemetery	Local	Grade 3 A	High	Mitigation not advised
2629AA-B01	Demolished Buildings	General Protection C	4 C	Low	No recording necessary

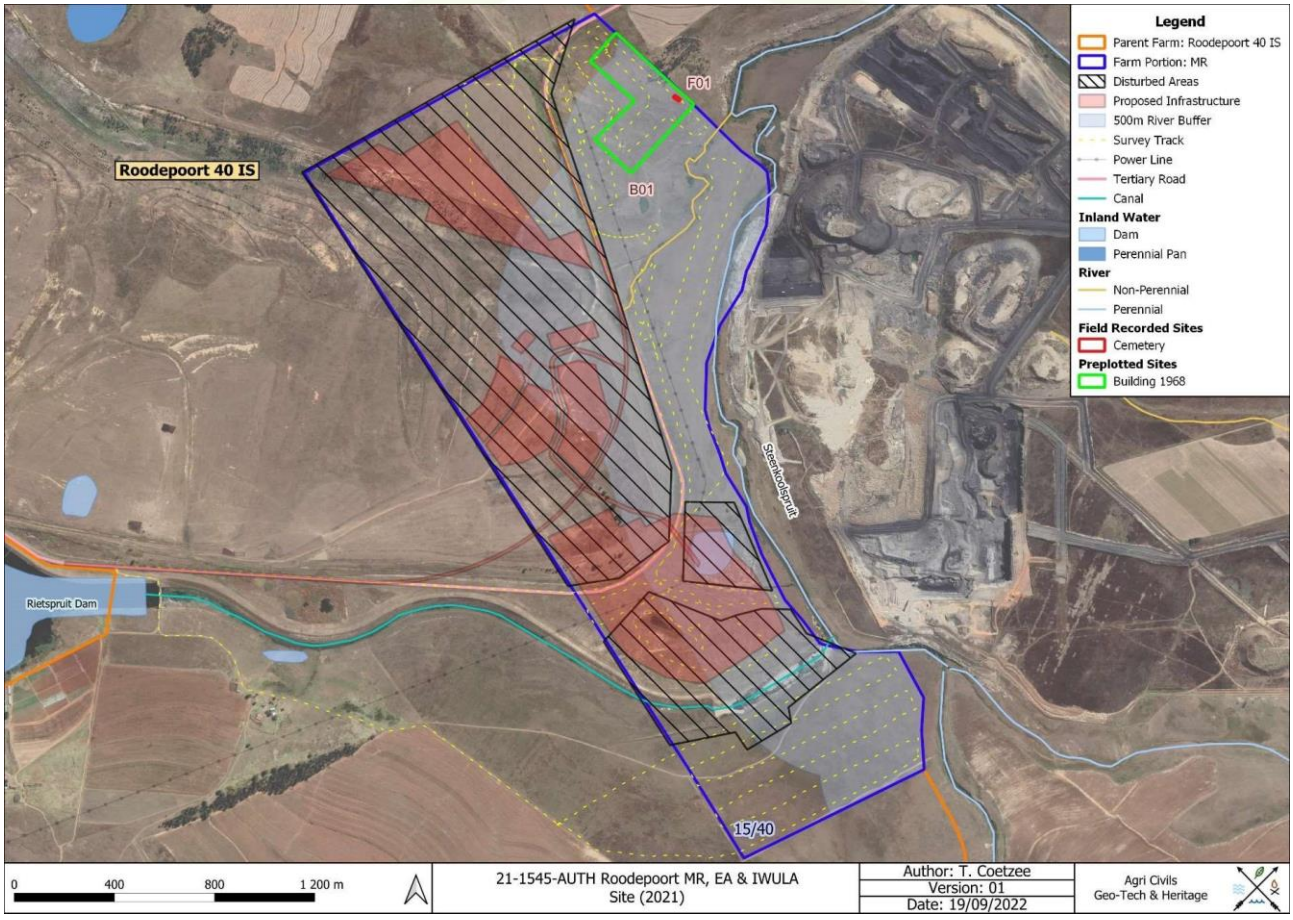

Figure 3.22: Study area with survey track and river buffer zone portrayed on a 2021 satellite image

PALAEONTOLOGY

The proposed site lies on the potentially very highly sensitive Vryheid Formation (Ecca Group, Karoo Supergroup) that could have fossils of the Glossopteris flora in the carbonaceous lenses associated with the coal seams. The site visit and walk through on 20th June 2022 by palaeontologists confirmed that there are NO FOSSILS visible on the surface which is covered by soils and grassland. There were no rocky outcrops that could have fossils. In 2001 fossils were collected from the shales in the opencast section of the Rietspruit Colliery, some metres below the ground surface. Therefore, a Fossil Chance Find

Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, developer, environmental officer or other designated responsible person once excavations, drilling or mining activities have commenced.

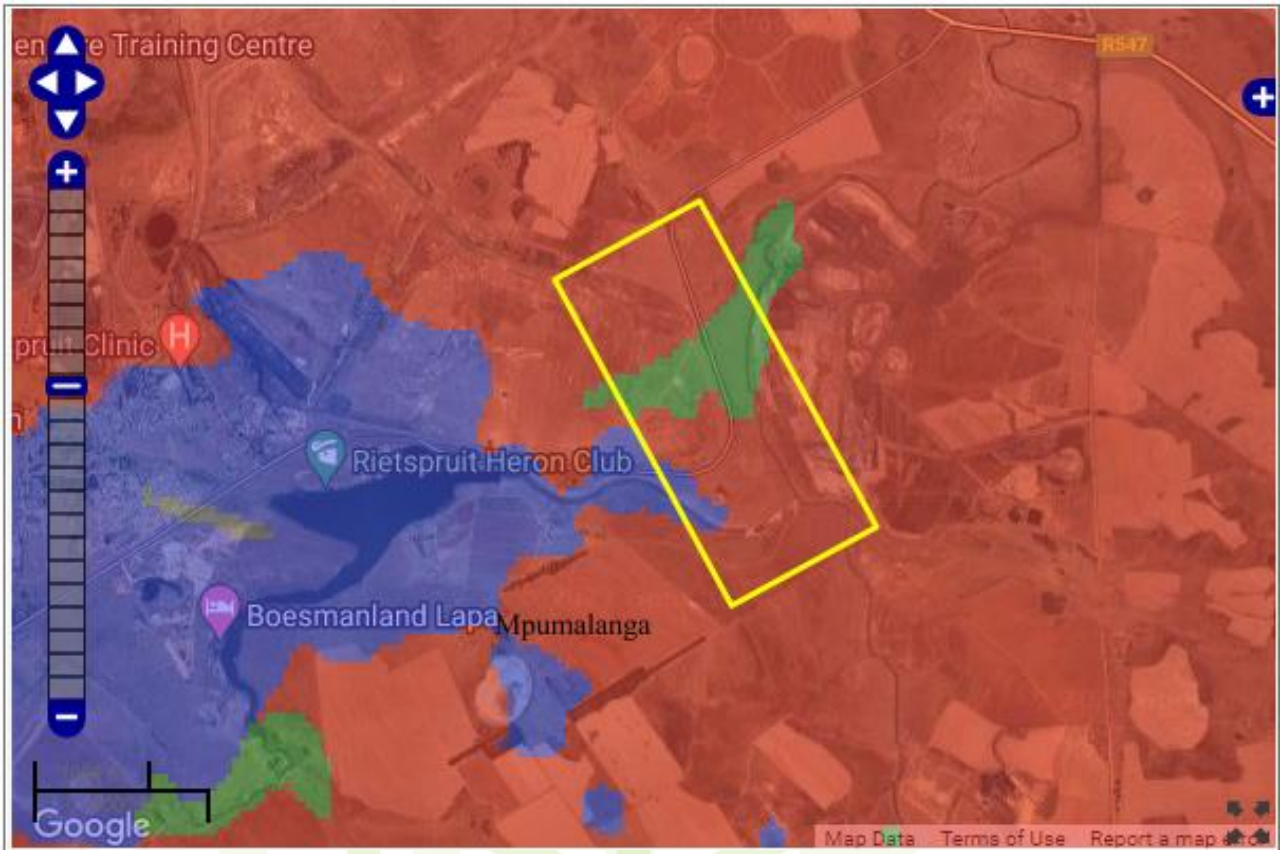

Figure 3.23: SAHRIS palaeosensitivity map for the site for the proposed Roodepoort Colliery MRA area shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

SURFACE WATER

The site is located within Quaternary Catchment B11E, within the Upper Olifants catchment and the Olifants Water Management Area. The main river within the catchment is the Steenkoolspruit.

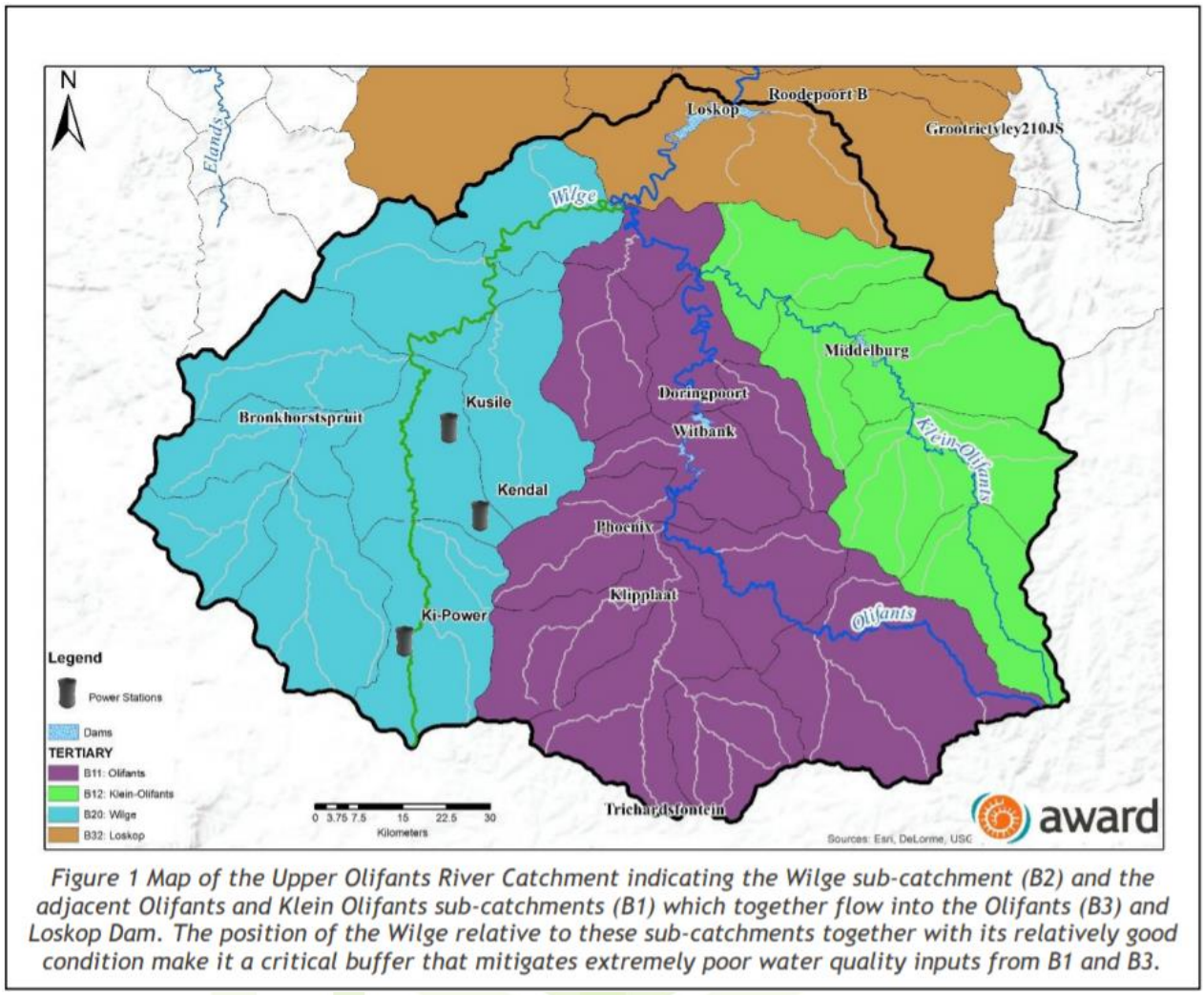

Figure 1 Map of the Upper Olifants River Catchment indicating the Wilge sub-catchment (B2) and the adjacent Olifants and Klein Olifants sub-catchments (B1) which together flow into the Olifants (B3) and Loskop Dam. The position of the Wilge relative to these sub-catchments together with its relatively good condition make it a critical buffer that mitigates extremely poor water quality inputs from B1 and B3.

Figure 3.24: Tertiary drainage regions

The Steenkoolspruit within the B11E Quaternary Catchment is categorised as Largely Modified.

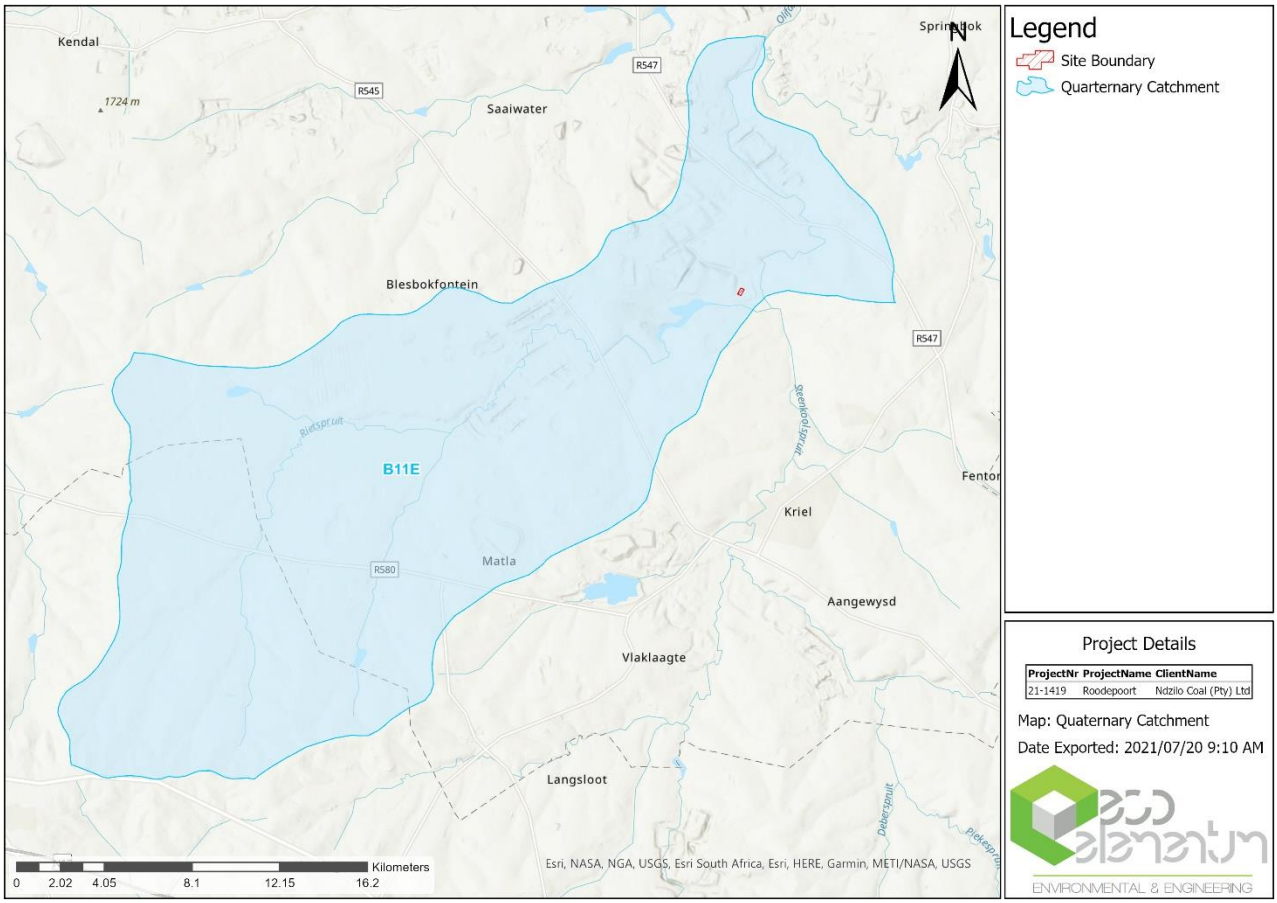

Figure 3.25: Quaternary Catchment B11E

GROUNDWATER

Unsaturated Zone

The unsaturated zone is the zone between the ground surface and the static water table. In the unsaturated zone the pores between the ground particles are filled with air and water- thus below saturation. Static water levels in the region of the Roodepoort MP area range from 2 to 14.5 mbs, therefore also the thickness of the unsaturated zone. The unsaturated zone may consist of soil, weathered bedrock and even solid bedrock from the sandstone and shale of the Ecca Group. However, in the case of the Roodepoort Coal MR area, the unsaturated zone may also consist of backfill material from the rehabilitation of the previous opencast pit.

Saturated Zone

The saturated zone is that part of the aquifer below the regional static water level where all pores and fractures are filled with water at a pressure greater than atmospheric pressure. The depth of the saturated zone in the Roodepoort Coal MR area, is therefore from ±2 to 14.5 mbs. In the RC MR area the saturated zone is expected to mainly consists of two aquifer systems.

- Firstly, the weathered, unconfined aquifer that typically occurs on the transition between soil and weathered bedrock (typically sandstone and shale). The groundwater flow closely mimics the surface topography. Groundwater levels are usually shallow in the low lying topographical regions and may even daylight on surface which is referred to as springs. The weathered aquifer is more prominent in the wet season because it is located on top of solid bedrock or clayey layers. This aquifer normally has a low yield.

- The second aquifer is known as the deeper, confined aquifer. Flow in this aquifer mainly occurs along fractures, bedding planes and other groundwater flow paths. The presence of fractures generally decreases with depth in this aquifer. The secondary aquifer, due to its heterogeneous nature, may be higher yielding than the weathered aquifer. Due to longer residence time of the groundwater in this aquifer, the salt load may be higher than that of the weather aquifer.

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

It should be noted that the historical mining may have impacted the aquifers in the region of the RC MR area in terms of boundaries, flow directions and other aquifer parameters and these affects will be discussed in the final geohydrological report.

Groundwater Levels

Groundwater level information is available for the RC MR area as they were recorded during the Eco Elementum hydrocensus in July 2021. Groundwater levels from the area generally varied from 2 to 14.5 mbs in the boreholes recorded during the hydrocensus. The recorded water levels in the hydrocensus boreholes are indicated in **Table** 3.14.

Table 3.14: Summary of Roodepoort MR area water levels in the hydrocensus boreholes.

Borehole	South	East	Elevation (mamsl)	Owner	SWL (mbs)	Casing (cm)
Rood-PU01	-26.17404	29.23470	1557	Danie de Wet	2.19	40
RBH16	-26.15115	29.24101	1553	Sereti- Mine monitoring borehole.	16.1	50
RBH19	-25.15153	29.24268	1549	Sereti- Mine monitoring borehole.	14.45	40
RBH20	-26.15928	29.24587	1532	Sereti- Mine monitoring borehole.	3.51	42
OBH9S1	-26.15570	29.23417	1540	Sereti- Mine monitoring borehole.	11.35	50
UG091	-26.16087	29.24517	1538	Sereti- Mine monitoring borehole.	11.3	25

In the typical Karoo aquifers, the water level elevations correlate very well with the topography. Water levels therefore closely mimics the topography of the area. The groundwater level elevations recorded in the RC MR area do not correlate very well with the topography – 71% **(Figure** 3.26**)**. This can be expected since the area is situated in a previously disturbed environment and the water levels are in all probability affected by the historical mining activities. The majority of the boreholes recorded during the hydrocensus, are situated within the rehabilitated area.

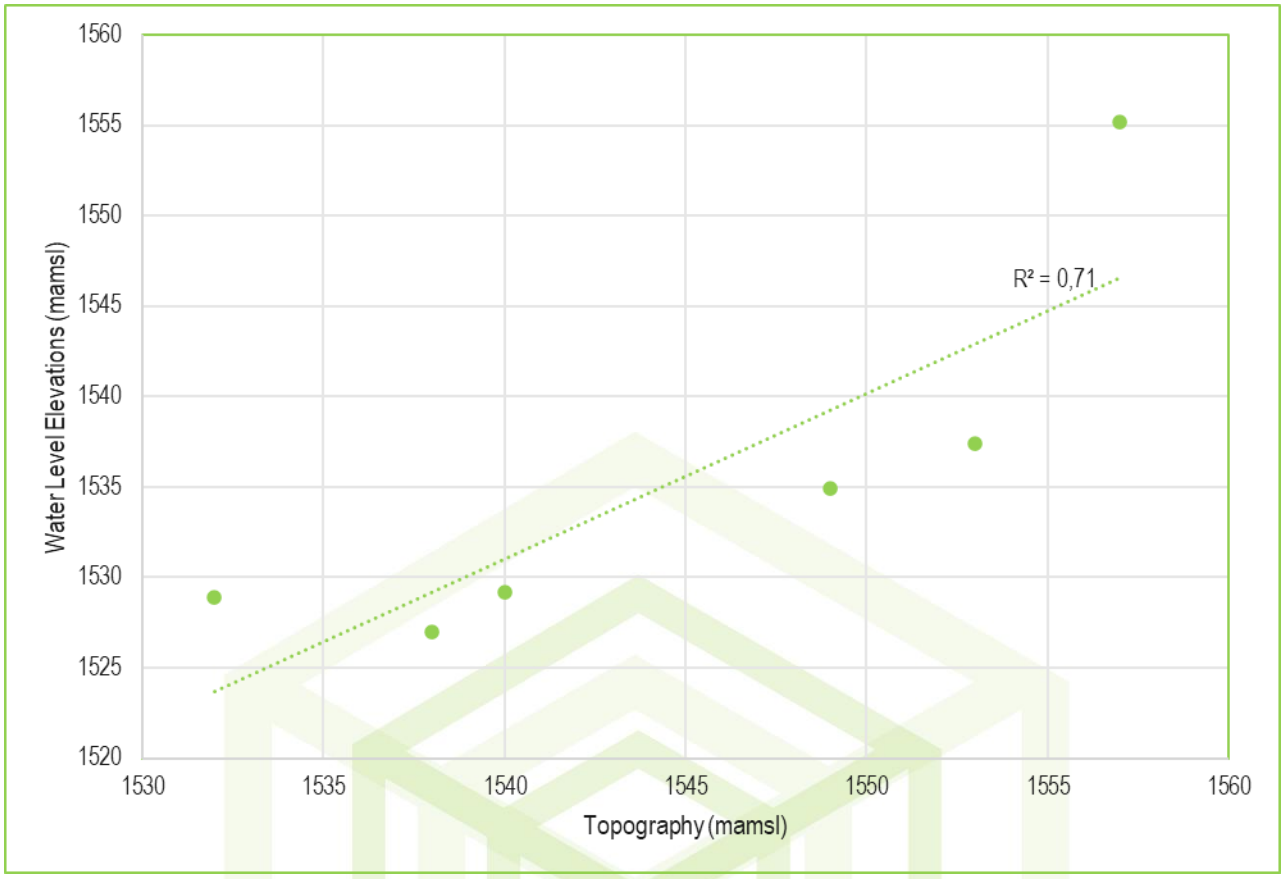

Figure 3.26: Correlation between groundwater level elevations and topography.

Groundwater Potential Contaminants

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

The general equation of pyrite oxidation is as follows:

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

Ferrous iron is oxidised to ferric iron:

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

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

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

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

Waste Classification

A waste classification should be conducted in accordance with the National Environmental Management: Waste Act (NEM: WA) Regulations (2013). The assessment is undertaken by comparing the samples' leachate concentration (LC) to the

leachable concentration threshold (LCT), and the total concentration (TC) to the total concentration thresholds (TCT). The results will indicate the type of waste and the type of liner, if any, required for the potential source.

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

- Coal material:
    - The coal samples are generally classed as Type 3 waste (hazardous) and according to the NEM: WA guidelines should be disposed of at a Class C landfill site or a site designed with the liner requirements as shown in Figure 3.27; and

1.1. The short-term storage of the coal material on stockpiles and good storm water management should ensure that environmental impacts are kept to a minimum and contained to the stockpile sites. Based on these management protocols the liner illustrated in **Figure 3.**27 should be sufficient, however the decision lies with the Department of Environmental Affairs.

- Waste rock material:
    - Waste rock are generally also classed as Type 3 waste and should be disposed of at Class C landfill sites or sites designed with liner requirements illustrated in **Figure 3.**27.

Table 3.15: Waste Classification Criteria

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

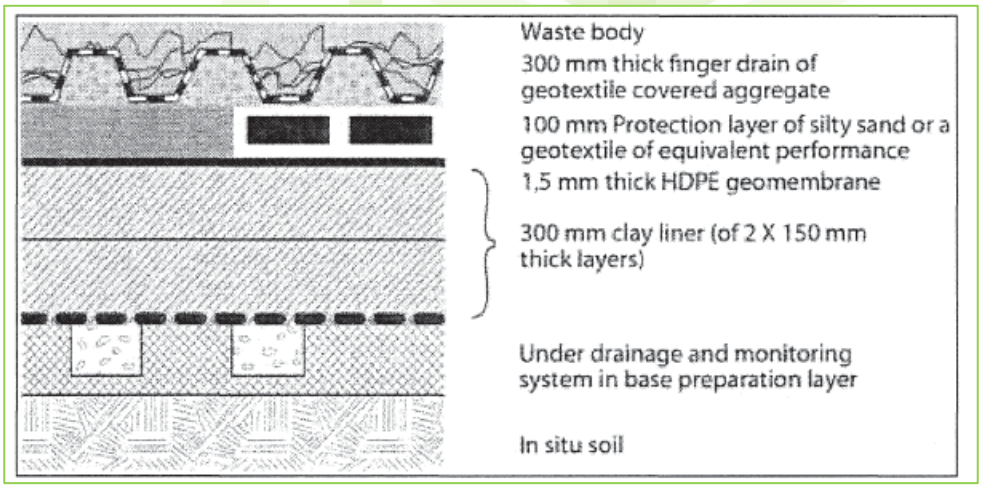

Figure 3.27: Class C landfill site liner requirements.

Groundwater Vulnerability

Groundwater vulnerability refers to the likelihood for contamination to reach a certain area/receptor after it has been introduced to the surface. For the RC MR area the vulnerability was estimated from the Aquifer Vulnerability map of South Africa (DWA, 2013) and by the Groundwater Vulnerability Classification System. According to the Aquifer Vulnerability map the area is located in moderate vulnerability rating area.

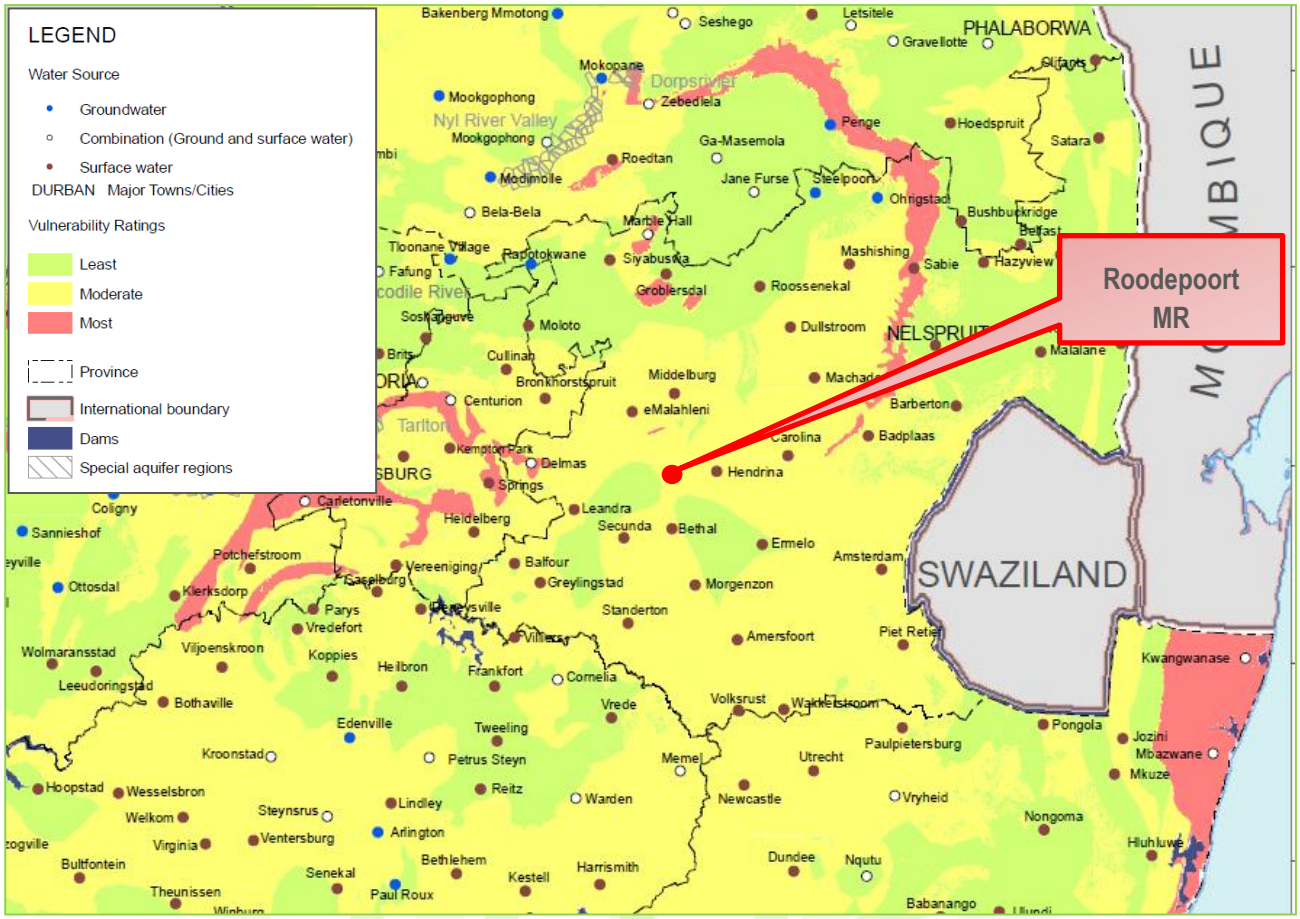

Figure 3.28: Aquifer vulnerability rating of the area (DWA, 2013)

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

Table 3.16: Groundwater Vulnerability Classification System

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

Table 3.17: Groundwater Vulnerability Rating

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

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

Aquifer Classification

According to the Aquifer Classification map (DWA, 2012), the RC MR area is in all probability situated in a minor aquifer classification area. Aquifer classification is based on the Parsons System (1995) - **Table** 3.18. Qualities in these aquifers can vary and is typically moderately yielding aquifers.

Table 3.18: Aquifer System Management Classes.

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

Two main aquifer systems are expected to exist in the RC MR area. Firstly, is a swallow, weathered aquifer which is found in the transitional soil and weathered bedrock zone. Due to direct recharge and dynamic groundwater flow through the weathered sediments, the natural groundwater qualities are often good. The direct recharge and dynamic groundwater flow are also the reason why this aquifer is vulnerable to pollution. Water levels in this aquifer are often shallow (few meters below ground level) and follow the surface topography.

Secondly is a deeper semi-confined to confined fractured aquifer where groundwater flow is predominantly fracture flow. The fractured Karoo aquifer consists of sedimentary successions of siltstone, shale, sandstone and the coal seams. Groundwater flow is dominated by secondary porosities like faults, fractures, joints, bedding planes or other geological contacts. Yields can be higher in this aquifer along these geological structures. The rock matrix is characterised by a low permeability. Borehole yields in the in the Ecca aquifers are generally low and can be expected to be less than 2 l/s.

Aquifer Protection Classification

As part of policy and regulation development and implementation, the aquifer classification used in **Table** 3.18 alone is not sufficient. To minimise misinterpretation, the decision support tool in **Table** 3.19 also needs to be incorporated as part of aquifer classification (Parsons, 1995). The combination of the Aquifer System Management Classification and the Aquifer Vulnerability Classification rating is referred to as the Groundwater Quality Management (GQM) classification, which provide a level of aquifer protection.

GQM = Aquifer System Management x Aquifer Vulnerability

Table 3.19: GQM Classification for the proposed RC MR Area.

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

The level protection for the RC MR aquifer according to the GQM Index will be determined when groundwater quality information is available.

The DWA has also compiled a susceptibility map for South Africa (2013) - **Figure** 3.29. This map indicates the qualitative measure of the relative ease with which an aquifer can potentially be contaminated. According to the aquifer susceptibility map, the RC MR area is also classified as low to medium susceptible to contamination.

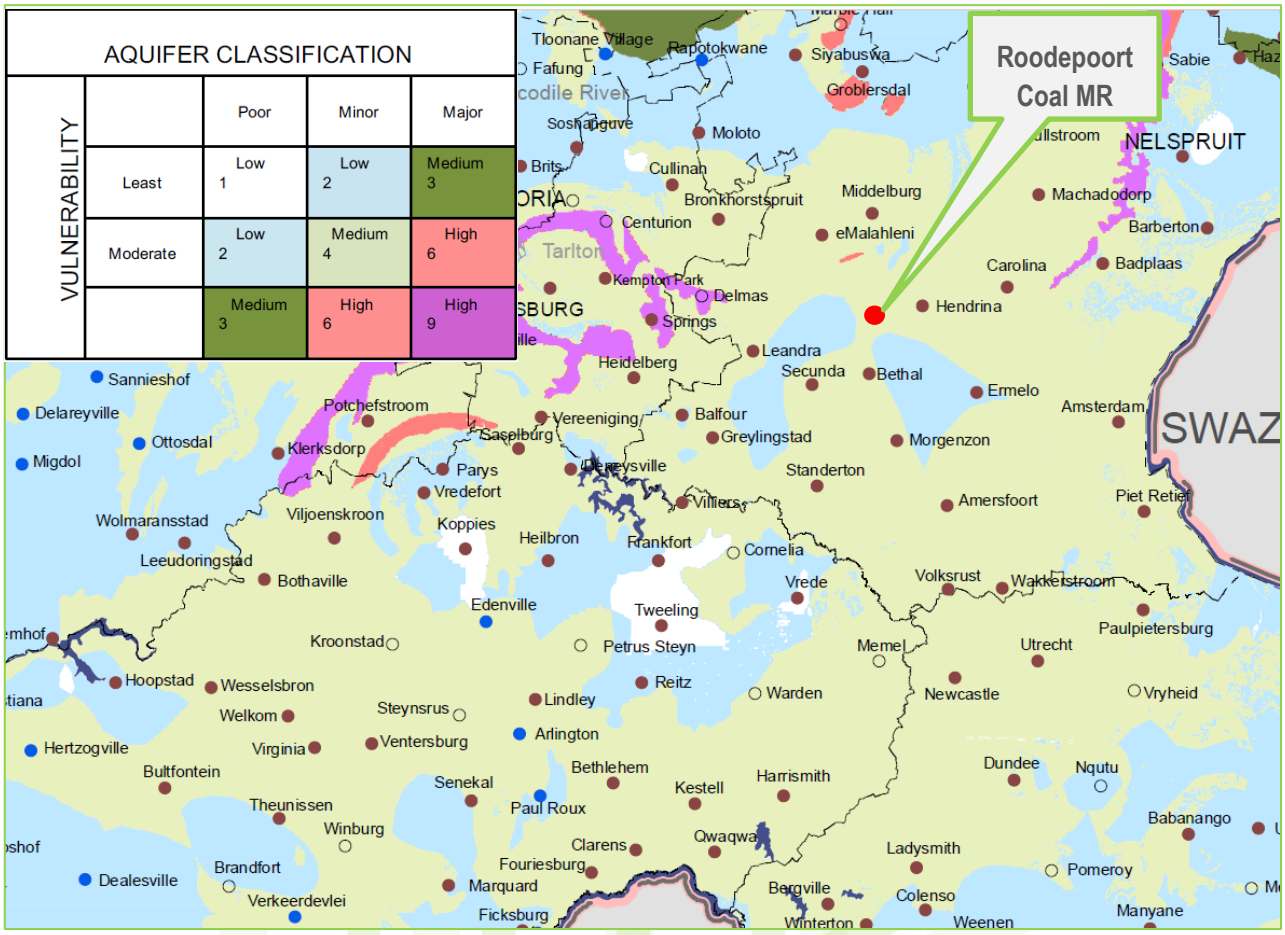

Figure 3.29: Aquifer susceptibility map for the Roodepoort Coal MR area.

BLASTING AND VIBRATION

Ground Vibrations Assessment

Explosives are used to break rock through the shockwaves and gases yielded from the explosion. Ground vibration is a natural result from blasting activities. The far field vibrations (those vibrations felt further away from the blast area) are inevitable, but undesirable by products of blasting operations. The shockwave energy that travels beyond the zone of rock breakage is wasted and could cause damage and annoyance further on. The following factors influences the magnitude of ground vibration (Rangasamy, 2018):

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

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

- The larger the charge mass per delay the greater the vibration energy yielded. A certain quantity of holes will detonate within the same time frame (delay) and it is the maximum total explosive mass per such delay that will have the greatest influence. In practice, this means that if all holes are detonated separately, the weight of explosives per single hole is considered. It follows that if more than one hole is detonated simultaneously, the mass per

- hole for each hole must be added together. Specifically, charges detonated within 15 milliseconds are considered as a single detonation, and delays of more than 15 milliseconds are treated as separate blasts.
- The distance between the blast and the point of interest. The ground vibrations attenuate over distance at a rate determined by the mass per delay, timing and geology. Each geological interface that a shockwave encounters will reduce the vibration energy due to reflections of the shockwave. Closer to the blast will yield high levels and further from the blast will yield lower levels of ground vibrations.
- The geology of the blast medium and surroundings also influences the magnitude of vibrations. High density materials have highs shockwave transferability where low density materials have low transferability of the shockwave.

AIR QUALITY

The following baseline information was sourced from the ***Baseline Assessment, Problem Analysis and the Air Quality Management Plan for the Highveld Priority Area (2011).***

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 nonindustrial sources (Held et al, 1996; DEAT, 2006). The Minister of Environmental Affairs and Tourism, Martinus van Schalkwyk, therefore, declared the Highveld Priority Area (HPA) on 23 November 2007. The priority area covers 31 106 km^2, including parts of Gauteng and Mpumalanga Provinces, with a single metropolitan municipality, three district municipalities, and nine local municipalities (Figure 3.30).

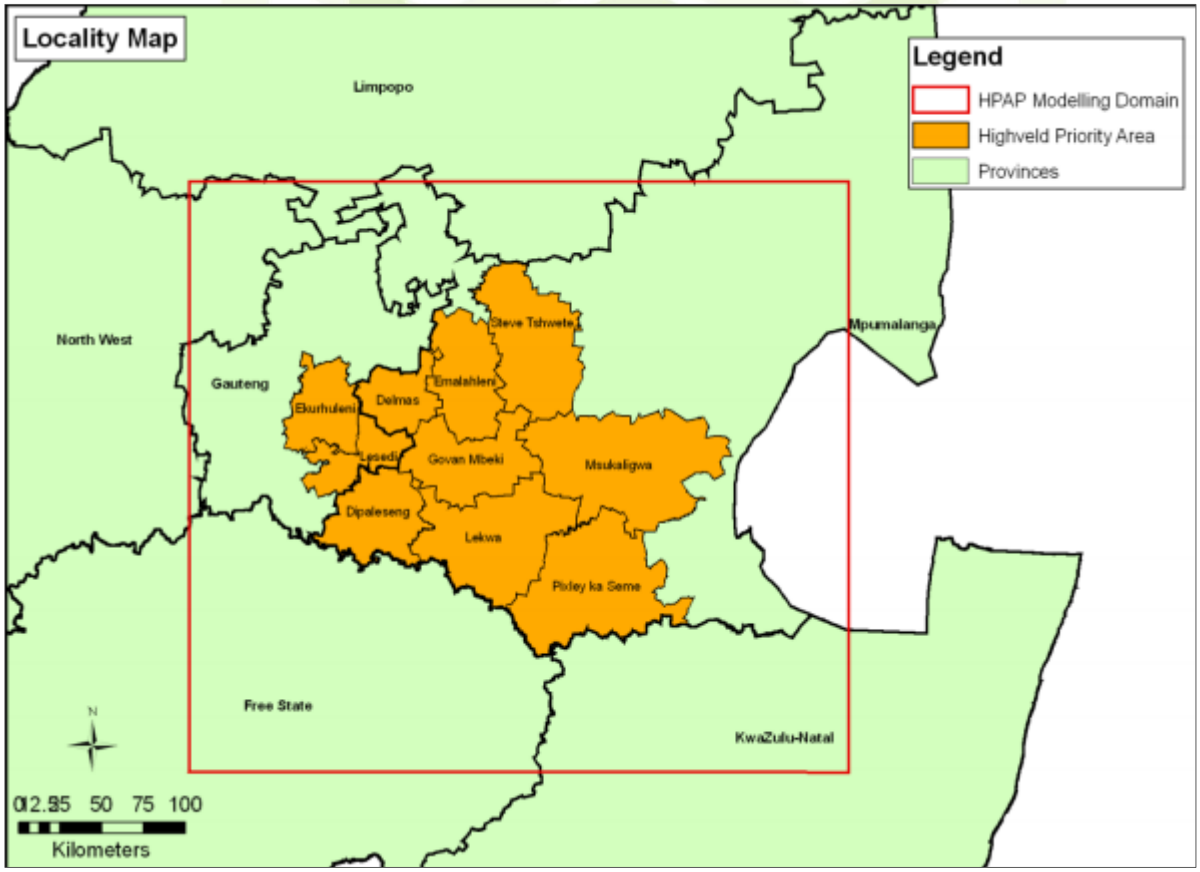

Figure 3.30: Highveld Priority Areas (HPA)

The total estimated annual emissions of fine particulate matter (PM_{10}) on the HPA is 279 630 tons, of which approximately half is attributed to particulate entrainment on opencast mine haul roads. The emission of PM_{10} from the primary metallurgical industry accounts for 17% of the total emission, with 12% of the total from power generation. By contrast, power generation contributes 73% of the total estimated oxides of nitrogen (NO_x) emission of 978 781 tons per annum and

82% of the total estimated sulphur dioxide (SO_2) emission of 1 633 655 tons per annum. The emission inventory for industrial sources was relatively complete and included all industries on the HPA with scheduled processes in terms of the APPA. Industrial sources in total are by far the largest contributor of emissions in the HPA, accounting for 89% of PM_{10}, 90% of NO_x and 99% of SO_2. Major industrial source contributors were grouped into the following categories:

- Power Generation
- Coal Mining
- Primary Metallurgical Operations
- Secondary Metallurgical Operations
- Brick Manufacturers
- Petrochemical Industry
- Ekurhuleni Industrial Sources
- Mpumalanga Industrial Sources

Table 3.20: Total emission of PM_{10}, NO_x and SO_2 from the different source types on the HPA (in tons per annum), and the percentage contribution for each source category

Source Category	PM10 t/a	%	NOx t/a	%	SO2 t/a	%
Ekurhuleni MM Industrial (incl. Kelvin)	8 909	3,00	15 636	2	25 772	2
Mpumalanga Industrial	684	0,00	590	0	5 941	0
Clay Brick Manufacturing	9 708	3,00	-		9 963	1
Power Generation	34 373	12,00	716 719	73	1 337 521	82
Primary Metallurgical	46 805	17,00	4 416	0	39 582	2
Secondary Metallurgical	3 060	1,00	229	0	3 223	0
Petrochemical	8 246	3,00	148 434	15	190 172	12
Mine Haul Roads	135 766	49,00	-		-	-
Motor vehicles	5 402	2,00	83 607	9	10 059	1
Household Fuel Burning	17 239	6,00	5 600	1	11 422	1
Biomass Burning	9 438	3,00	3 550	0	-	-
TOTAL HPA	**279 630**	**99***	**978 781**	**100**	**1 633 655**	**101***

* *Total Percentage does not count to 100% due to rounding of figures.*

Ambient air quality

Most of the HPA experiences relatively good air quality, but ambient air quality standards for SO_2, PM_{10} and ozone (O_3) concentrations are exceeded in nine extensive areas. These "hot spots" are illustrated in Figure 3.30 by the number of modelled exceedances of the 24-hour SO_2 and PM_{10} standards, and are confirmed by ambient monitoring data (Table 3.21). The air quality hot spots result mostly from a combination of emissions from the different industrial sectors and residential fuel burning, with motor vehicle emissions, mining and cross boundary transport of pollutants into the HPA adding to the base loading.

Available monitoring confirms that the areas of concern are in the vicinity of Witbank 2, Middelburg, Secunda, Ermelo, Standerton, Balfour, and Komati where exceedances of ambient SO_2 and PM_{10} air quality standards occur (Table 3.21).

Table 3.21: Exceedances at HPA sites based on historic and new monitoring data

Municipality	Area	NO_2 *1-hr (88)*	O_3 *8-hr (11)*	PM_{10} *24-hr (4)*	SO_2 *24-hr (4); 1 hr. (88)*
Emalahleni LM	Kendal 2	1	**58**		**34; 343**
	Phola	0		3	7; 27
	Witbank	37	9	**9**	**4**; 51
	Witbank 2		**17**	**25**	1; 11
Steve Tshwete LM	Columbus				
	Komati 2			**26**	1; 14
	Hendrina	1	**22**	3	1; 2
	Middelburg	71	**60**	**7**	1; 4
	Middelburg 2		1	**7**	0; 1
Govan Mbeki LM	Sasol Club	1		0	0; 25
	Langverwacht	1		0	2; 78
	Bosjesspruit				2; 27

Municipality	Area	NO_2 *1-hr (88)*	O_3 *8-hr (11)*	PM_{10} *24-hr (4)*	SO_2 *24-hr (4); 1 hr. (88)*
	Elandsfontein	0	**73**	3	4; 33
	Leandra				6; 114
	eMbalenhle	2	4	**39**	0; 1
Msukaligwa LM	Camden	0	**24**	1	0; 4
	Ermelo	1	**73**	**22**	**21**; 10
Pixley Ka Seme LM	Amersfoort				
	Majuba 1				4; 87
	Majuba 2				
	Verkykkop	0	**46**	0	1; 7
Lekwa	Standerton	4	10	**29**	1; 6
Dipaleseng	Balfour		**29**	**8**	0; 4

NB. - Row 1: The averaging period for the relevant pollutant's standard is represented below the pollutant and following the allowed frequency of exceedance in brackets - Exceedances in bold are greater than the permitted frequency in the standard for the monitoring period. The permitted frequency of exceedance varies according to period for which data is presented at each monitoring site, and for Eskom and Sasol stations must be assessed against a cumulative permitted frequency of exceedance for 3 years of data.

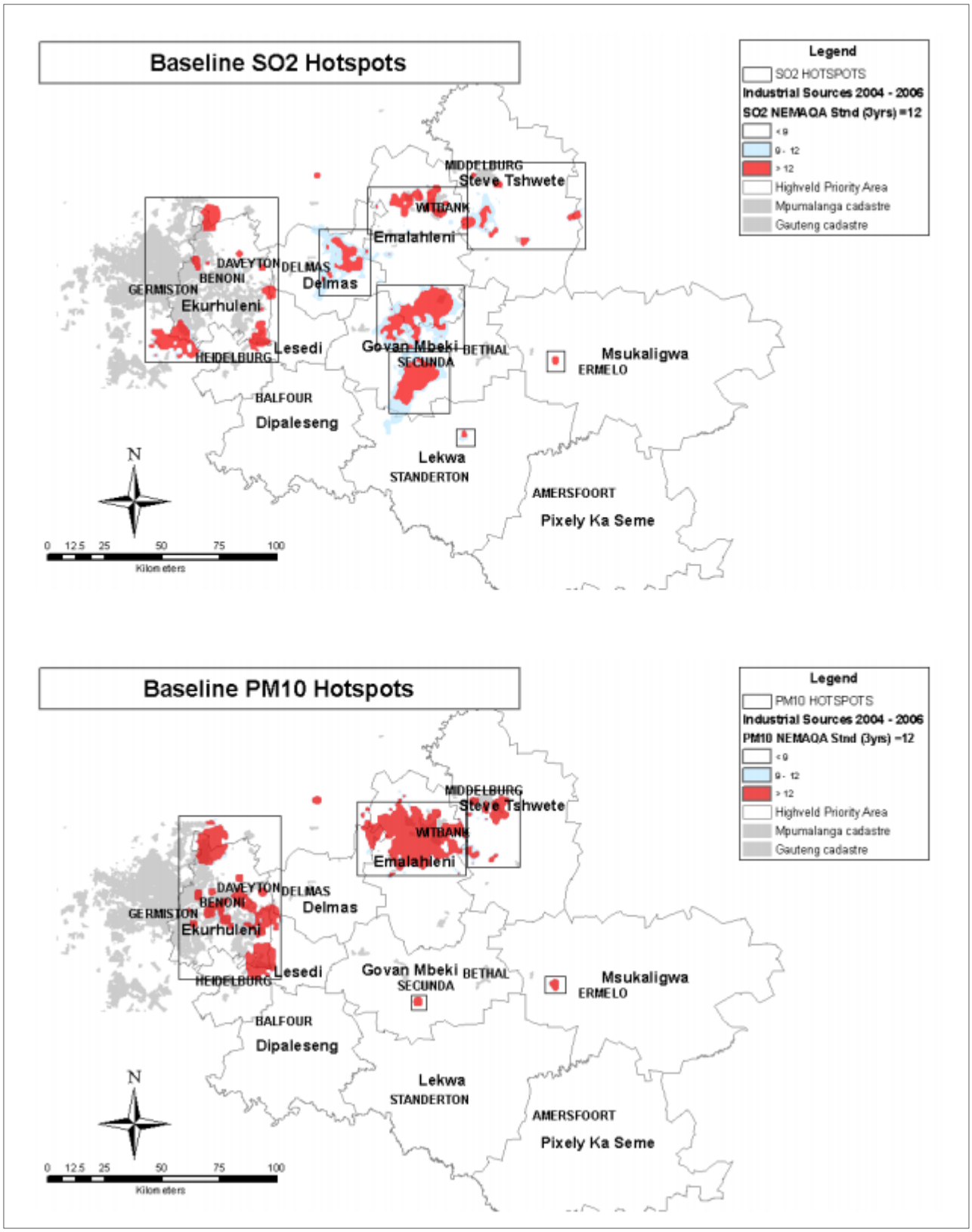

Figure 3.31: Modelled frequency of exceedance of 24-hour ambient SO_2 and PM_{10} standards in the HPA, indicating the modelled air quality Hot Spot areas

NOISE

Table 3.22 depicts acceptable noise levels within districts according to the SANS 10103 guideline.

Table 3.22: Acceptable rating levels for noise in districts (SANS 10103, 2008)

Type of District	Equivalent continuous rating level ($L_{Reg,T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}$a	$L_{Req,d}$b	$L_{Req,n}$b	$L_{R,dn}$a	$L_{Req,d}$b	$L_{Req,n}$b
RESIDENTIAL DISTRICTS						
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
NON-RESIDENTIAL DISTRICTS						
d) Urban districts with some workshops, with business premises, and with main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50
NOTE 1 If the measurement or calculation time interval is considerably shorter than the reference time intervals, significant deviations from the values given in the table might result.						
NOTE 2 If the spectrum of the sound contains significant low frequency components, or when an unbalanced spectrum towards the low frequencies is suspected, special precautions should be taken and specialist advice should be obtained. In this case the indoor sound levels might significantly differ from the values given in columns 5 to 7.						
NOTE 3 In districts where outdoor $L_{R,dn}$ exceeds 55 dBA, residential buildings (e.g. dormitories, hotel accommodation and residences) should preferably be treated acoustically to obtain indoor $L_{Req,T}$ values in line with those given in table 1.						
NOTE 4 For industrial districts, the $L_{R,dn}$ concept does not necessarily hold. For industries legitimately operating in an industrial district during the entire 24 h day/night cycle, LReq,d = LReq,n =70 dBA can be considered as typical and normal.						
NOTE 5 The values given in columns 2 and 5 in this table are equivalent continuous rating levels and include corrections for tonal character, impulsiveness of the noise and the time of day.						
NOTE 6 The noise from individual noise sources produced, or caused to be produced, by humans within natural quiet spaces such as national parks, wilderness areas and bird sanctuaries, should not exceed a maximum Weighted sound pressure level of 50 dBA at a distance of 15 m from each individual source.						
a) The values given in columns 2 and 5 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness of the noise and the time of day.						
b) The values given in columns 3, 4, 6 and 7 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness.						

The probable community/group response to levels in excess of the acceptable rating levels are presented in Table 3.23, where LReq,T is the equivalent continuous A-weighted sound pressure level, in decibels (dBA), determined over a specific time period. 'A-weighted' is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

Table 3.23: Categories of community/group response (SANS 10103, 2008)

Excess ($\Delta L_{Req,T}$)[a]dBA	Estimated community/group response	
	Category	Description
0 – 10	Little	Sporadic complaints
5 – 15	Medium	Widespread complaints
20-Oct	Strong	Threats of action
>15	Very strong	Vigorous action
NOTE Overlapping ranges for the excess values are given because a spread in the community reaction might be anticipated.		
a $\Delta L_{Req,T}$ should be calculated from the appropriate of the following:		
1) $\Delta L_{Req,T}$ = $L_{Req,T}$ of ambient noise under investigation MINUS LReq,T of the residual noise (determined in the absence of the specific noise under investigation);		
2) $\Delta L_{Req,T}$ = $L_{Req,T}$ of ambient noise under investigation MINUS the maximum rating level for the ambient noise given in table 1;		

Excess ($\Delta L_{Req,T}$)[a]dBA	Estimated community/group response	
	Category	Description
3) $\Delta L_{Req,T}$ = $L_{Req,T}$ of ambient noise under investigation MINUS the typical rating level for the applicable district as determined from table 2; or		
4) $\Delta L_{Req,T}$ = Expected increase in $L_{Req,T}$ of ambient noise in an area because of a proposed development under investigation.		

VISUAL

From a desktop study of satellite imagery and available national data, potential sensitive receptors were identified within 15 km of the proposed operations and are presented in Figure 3.32 below. Using satellite imagery, homesteads; schools; recreational facilities and tourist destinations were identified as potential sensitive receptors to the proposed project. It should be noted that the sensitive receptors in the area may differ from those identified as not all areas may have been identified from the imagery successfully.

Residential areas were also identified using the Statistics South Africa (StatsSA) sub-places database along with satellite imagery. The data indicated that 4 residential areas are located within the study area, namely Kriel, Thubelihle, Lehlaka Park and Klippoortjie.

The users on the road networks surrounding the study area are also considered as sensitive receptors due to their potential momentary views of the proposed development. The identified road network includes several main roads, namely the R545, R547, R544, and the R542, along with secondary roads. These roads service the abovementioned sensitive receptors.

The identified homesteads, schools, recreational facilities, tourist destinations and residential areas are expected to experience higher levels of visual impacts due to their static views of the proposed development, as compared to travellers using the road networks who are expected to experience lower levels of visual impacts due to their momentary views of the proposed development.

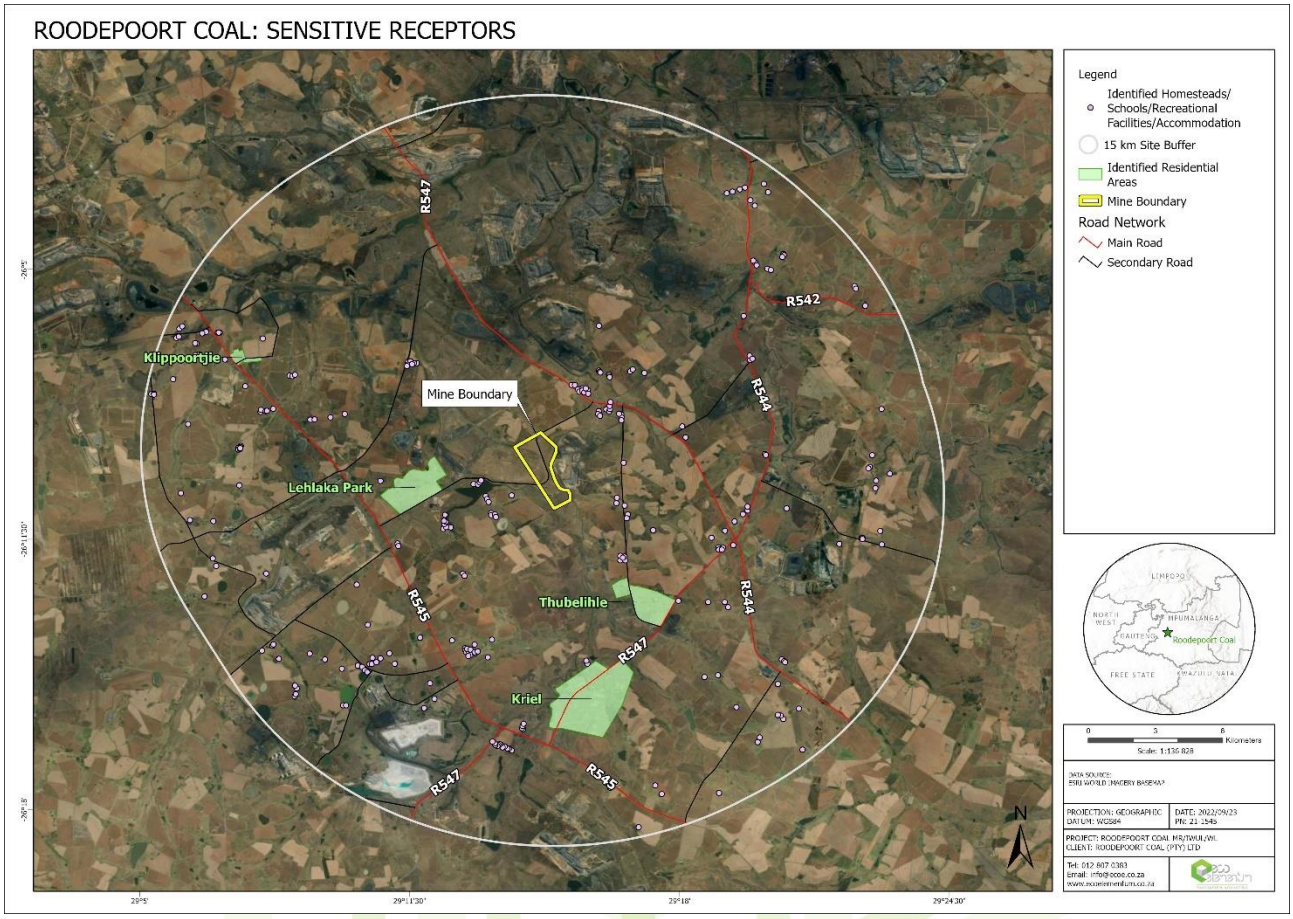

Figure 3.32: Sensitive Receptors

Figure 3.33 below is an indication of some of the existing mining and industrial areas, within 15 km of the proposed site, in relation to the identified sensitive receptors. The existing mining and industrial areas were delineated using the StatsSA sub-places database along with satellite imagery.

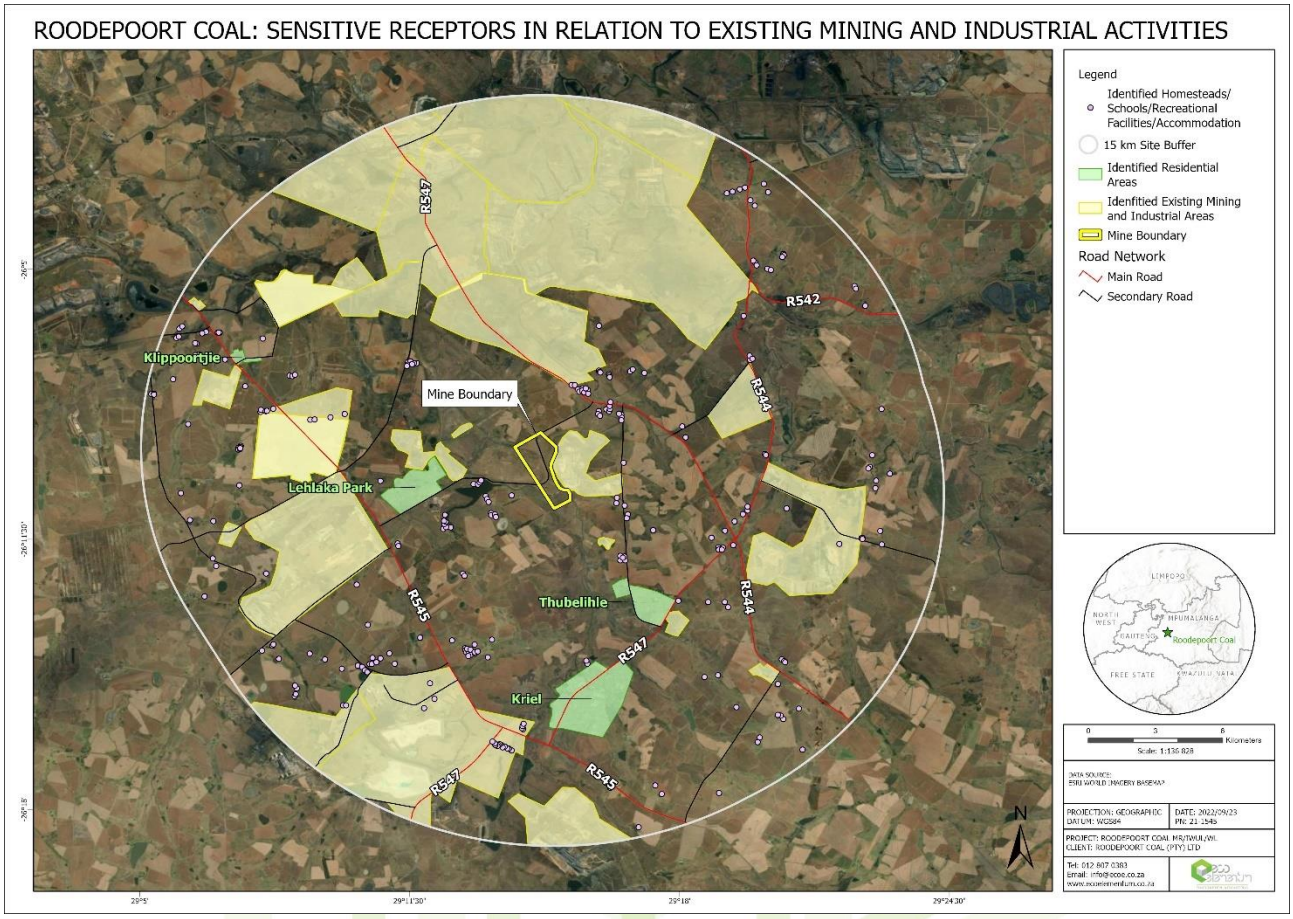

Figure 3.33: Sensitive Receptors in Relation to Existing Mining and Industrial Activities

The sense of place of the current study area can be characterized by the predominant mining, industrial and agricultural activities along with scattered informal residential areas. The proposed mining operations are therefore not expected to significantly detract from the existing sense of place.

Figure 3.34 below shows the slope angles of the terrain within the 15 km buffer area surrounding the proposed project. The results indicate that the proposed project will be built on a gently undulating slope.

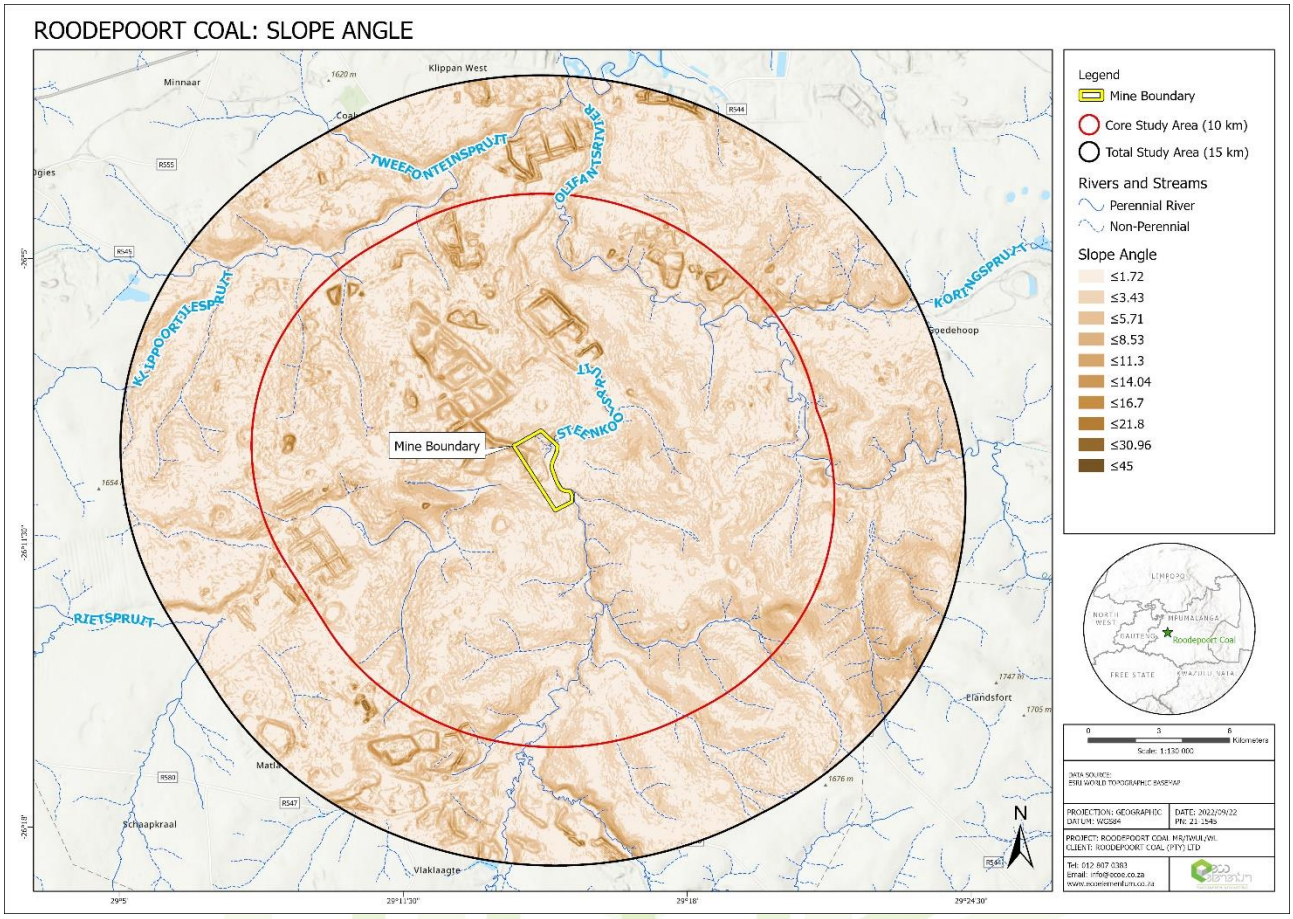

Figure 3.34: Slope Angles

Figure 3.34 shows the slope angles of the terrain within the 15 km buffer area surrounding the proposed project. The results indicate that the proposed project will be built on a gently undulating slope.

Figure 7.2 shows the slope aspect of the terrain within the 15 km buffer area surrounding the proposed project. The results indicate that the proposed site is situated on multidirectional slopes. This implies that the different types of proposed infrastructure will be illuminated by the sun at different times of the day therefore, not all infrastructure will be illuminated at the same time.

The results of the terrain ruggedness shows that the terrain is less rugged towards the southeast of the proposed site and within the edges of the total study area. The terrain ruggedness tends to be higher within the areas north and northwest of the site. This may be attributed to the existing mining activities within the area. Since rugged terrain has a tendency to increase the terrains VAC, it is expected that areas to the northwest of the site will be screened from the proposed development by the terrain and existing mining areas. Figure 7.3 shows the terrain ruggedness within 15 km of the proposed project area.

The results of the relative elevation shows that the proposed infrastructure will be built on medium to high lying areas. Figure 7.4 shows the relative elevation within 15 km of the proposed project.

Figure 7.5 indicates the landforms of the surrounding study area. The landform results show that the site is situated on mixed landforms. The results also indicate that the dominant landform for the total study area are plains, with areas of upper slopes and u-shaped valleys. The results of the slope position shown in Figure 3.40 show that the study area lies within an area with valleys, flat areas, mid slopes, upper slopes and ridges.

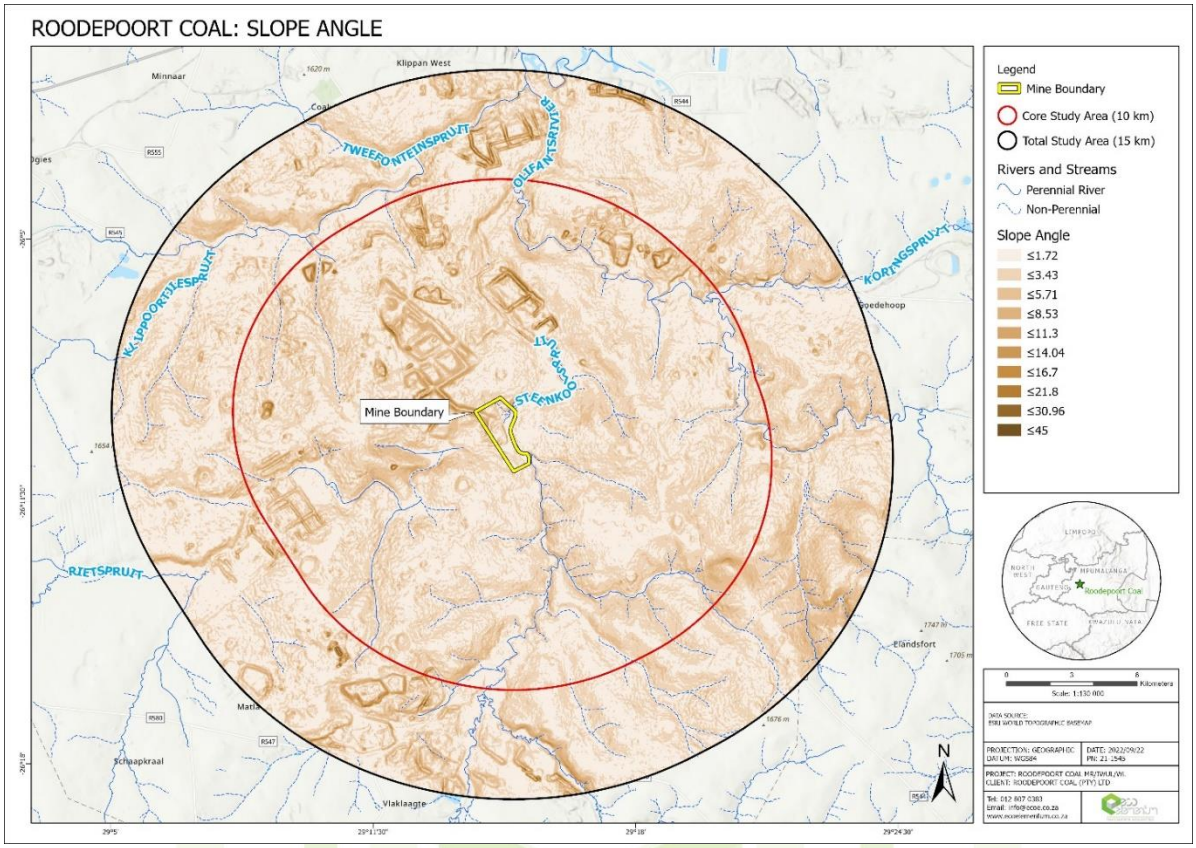

Figure 3.35: Slope Angles

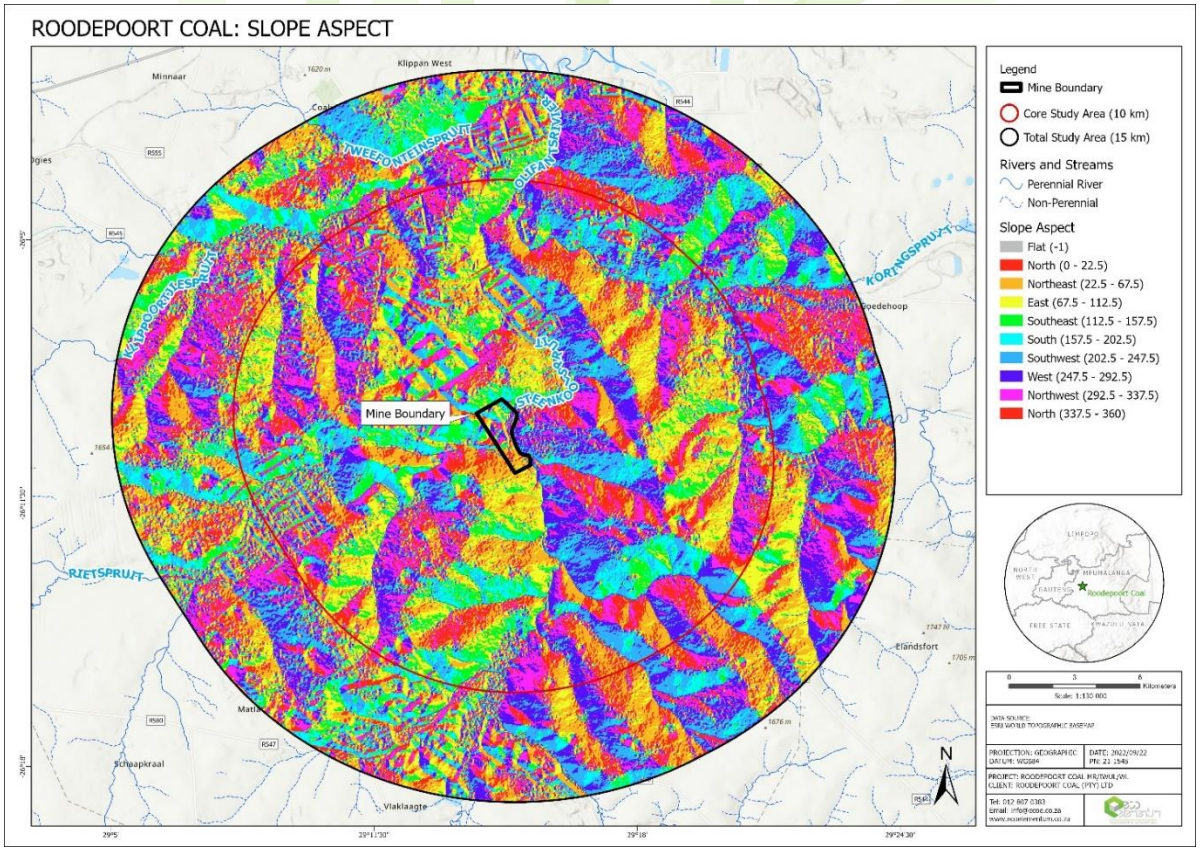

Figure 3.36: Slope Aspect

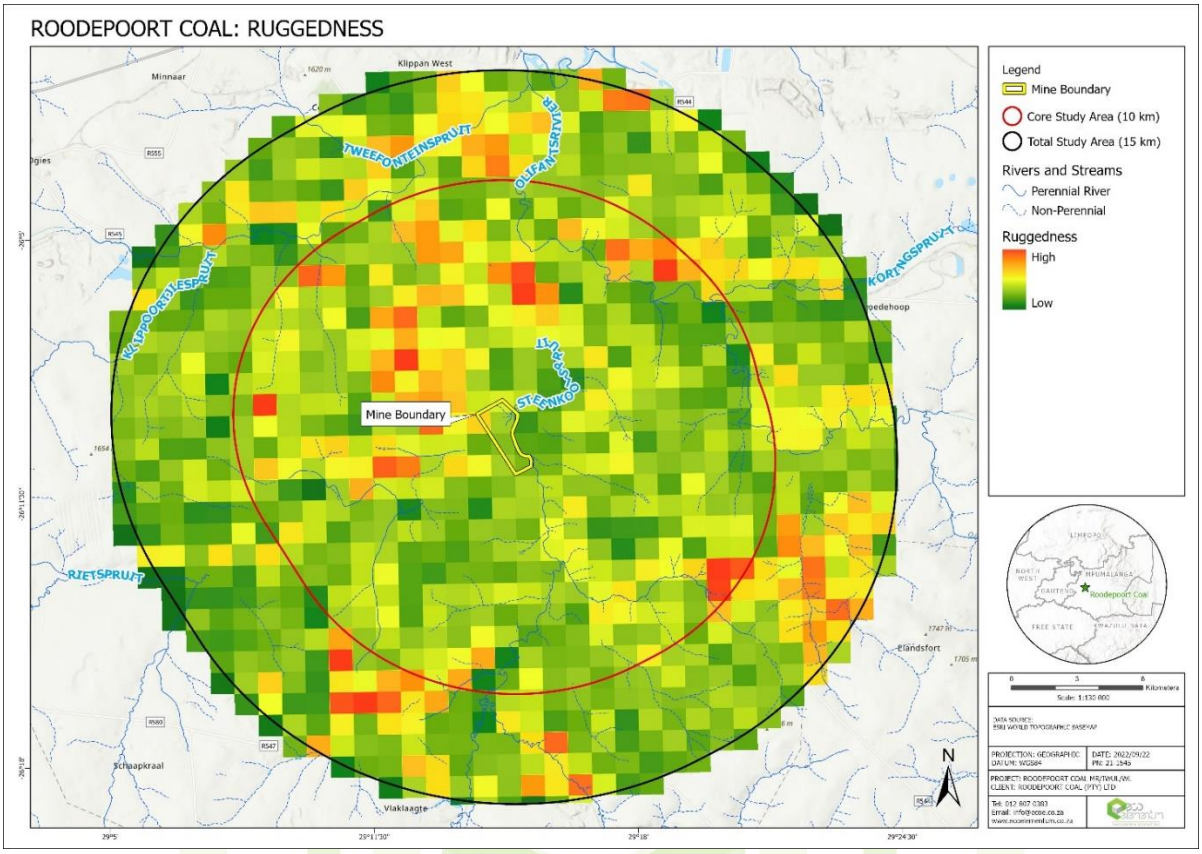

Figure 3.37: Terrain Ruggedness

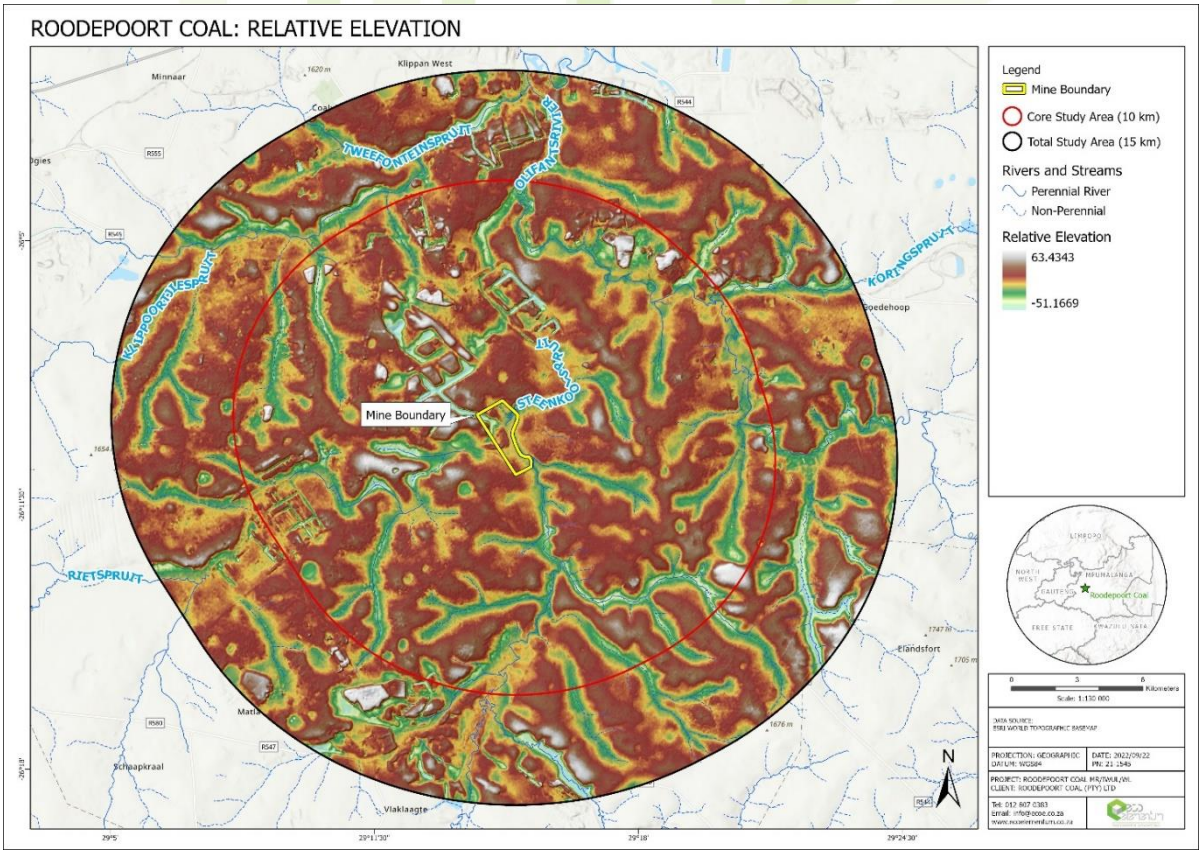

Figure 3.38: Relative Elevation

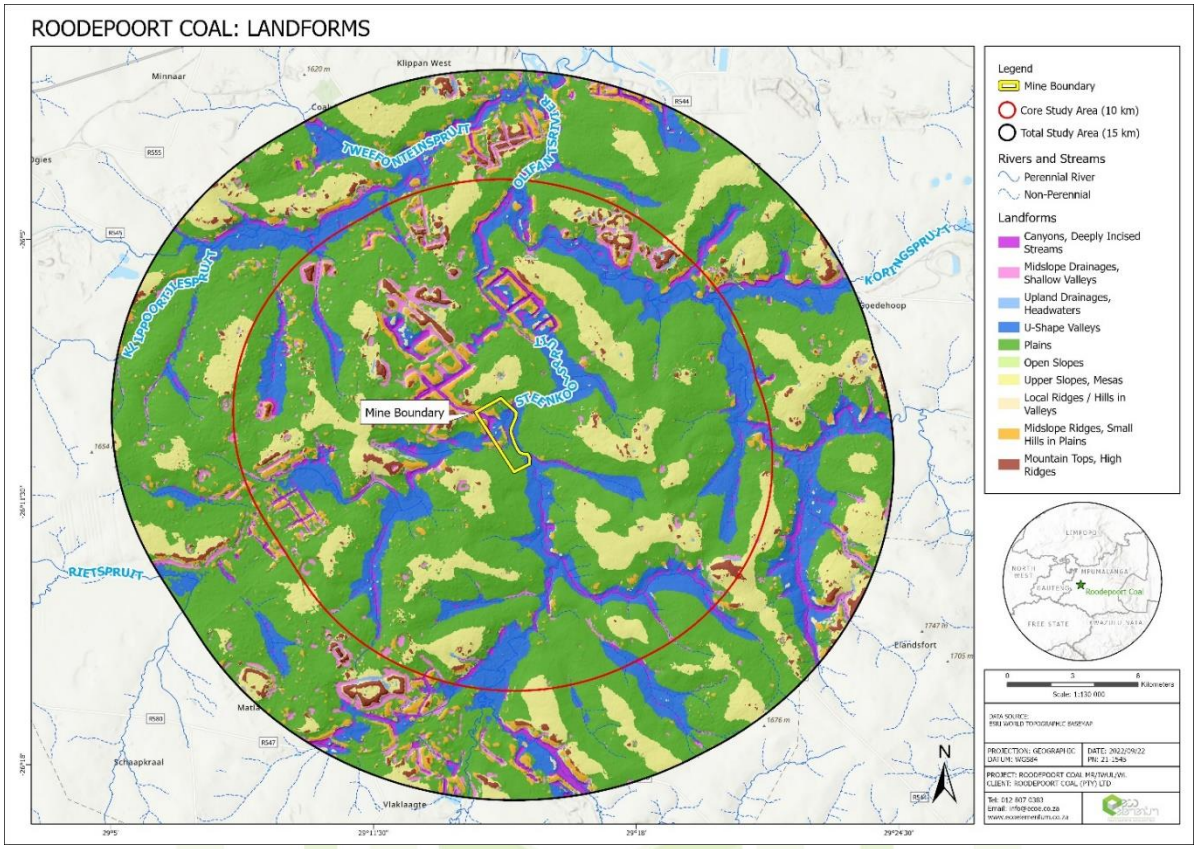

Figure 3.39: Landforms

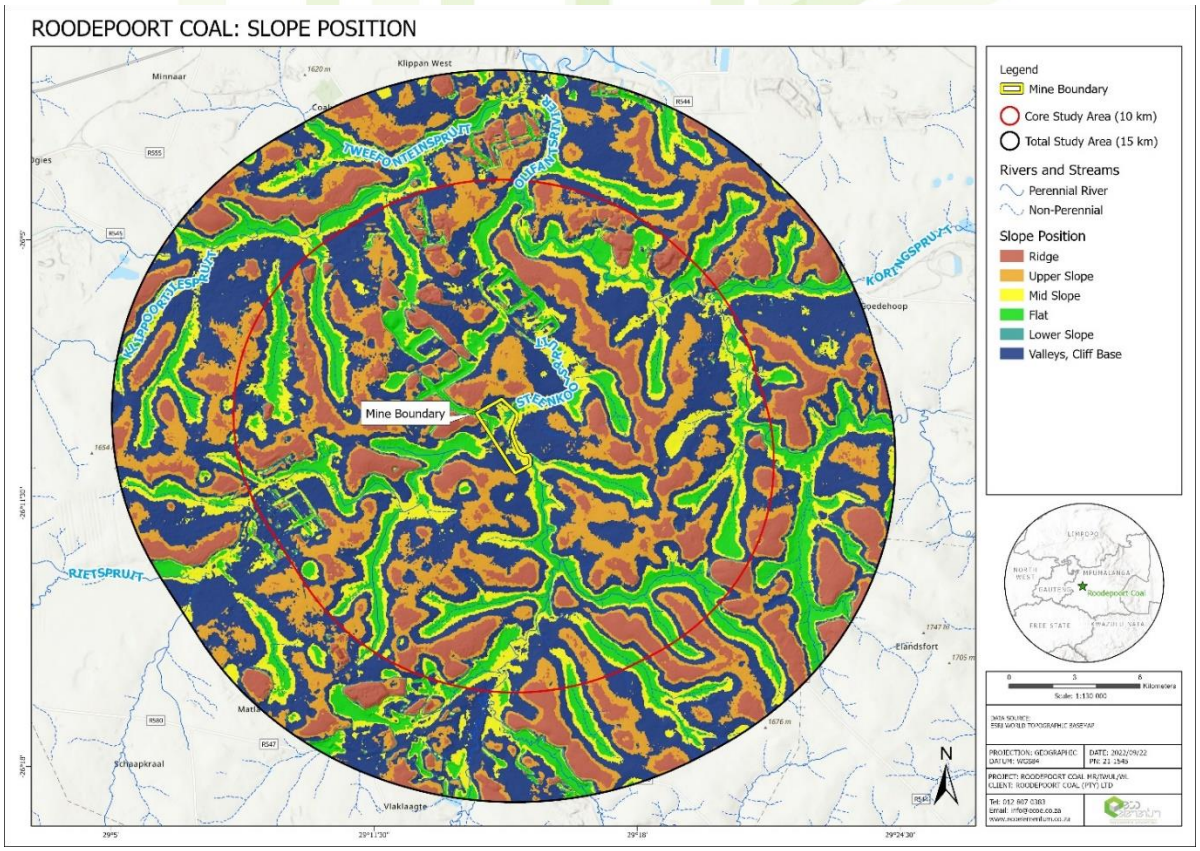

Figure 3.40: Slope Positions

Figure 3.41 indicates the possible VAC of the study area calculated using the surrounding landcover. The results indicate that the majority of the study area has a high VAC however, the areas north of the site have a lower VAC. However, from the desktop analysis, it was noted that there are several mining and industrial activities situated north of the proposed site which lends to the areas overall high VAC. The proposed project is therefore expected to blend in with the surroundings.

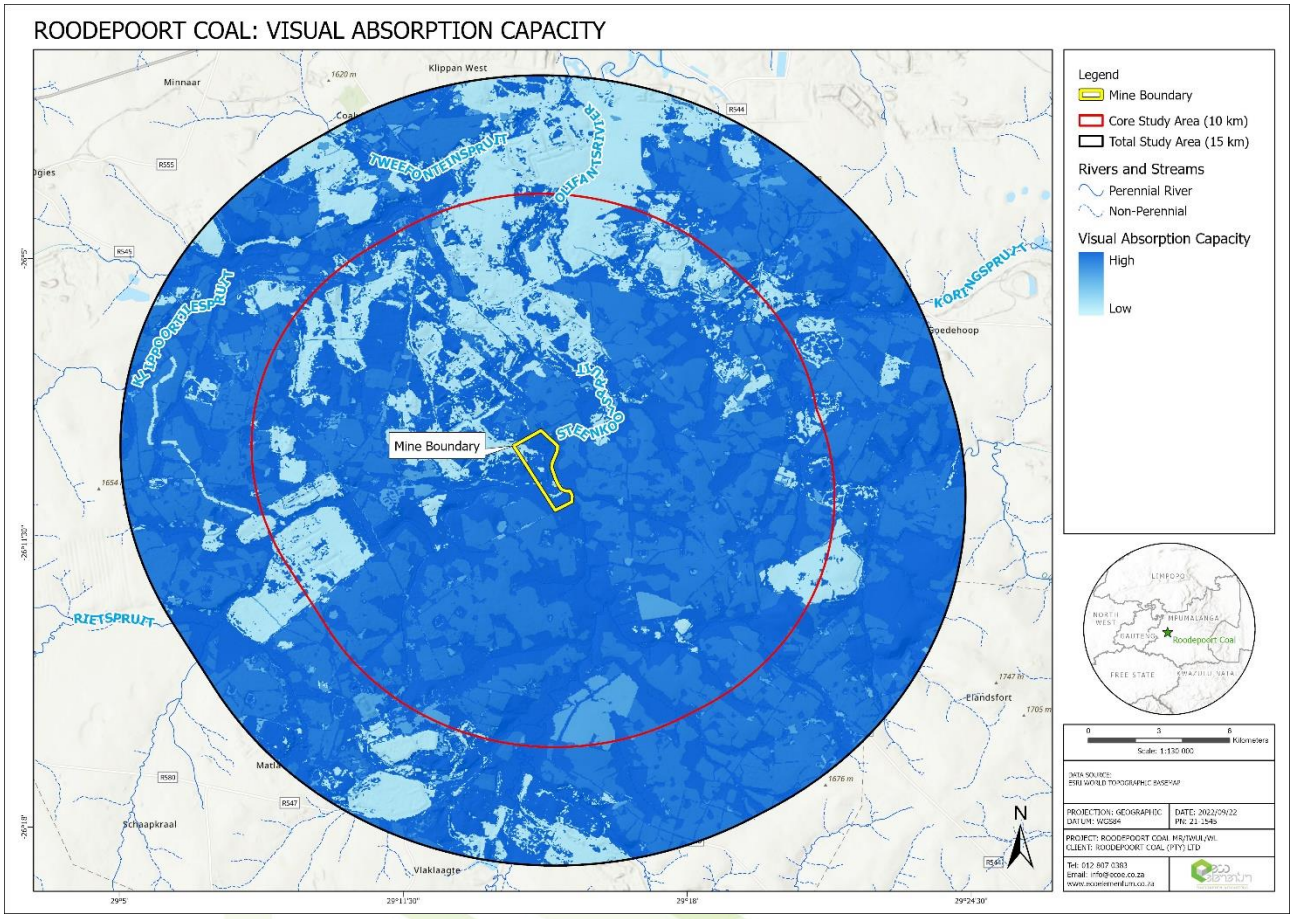

Figure 3.41: Potential VAC

Soils, Land Capability, Land Use, Agricultural Potential

In 2020 Golder Associates undertook a baseline soil specialist study at the Rietspruit Mine as input into an environmental mine closure report (Golder, 2020). As Roodepoort Coal are looking to mine the as-yet unmined portion of the mine site, the Project site falls within the study site of the previous Golder soils study. The soil forms identified within the Project area by the Golder 2020 report were the Dundee, Westleigh, Rensburg and Witbank soil forms. This signifies that the study site is a wetland area, which makes sense as two large watercourses characterise the site.

The following soil forms were classified on site:

- Witbank
- Dundee
- Westleigh
- Rensburg / Katspruit soils

Using the Chamber of Mines (2007) system, the majority of the site falls within Class I – Wetland (Figure 3.43). Using the Scotney et al. (1987) system, the majority of the site's land capability class is VII or VIII, the agricultural potential of both of

which is Marginal to Low. The remainder of the site falls into Land Capability Class V, which has a Medium agricultural potential (Figure 3.44). The current land use of the site is largely wetland (see Figure 3.45).

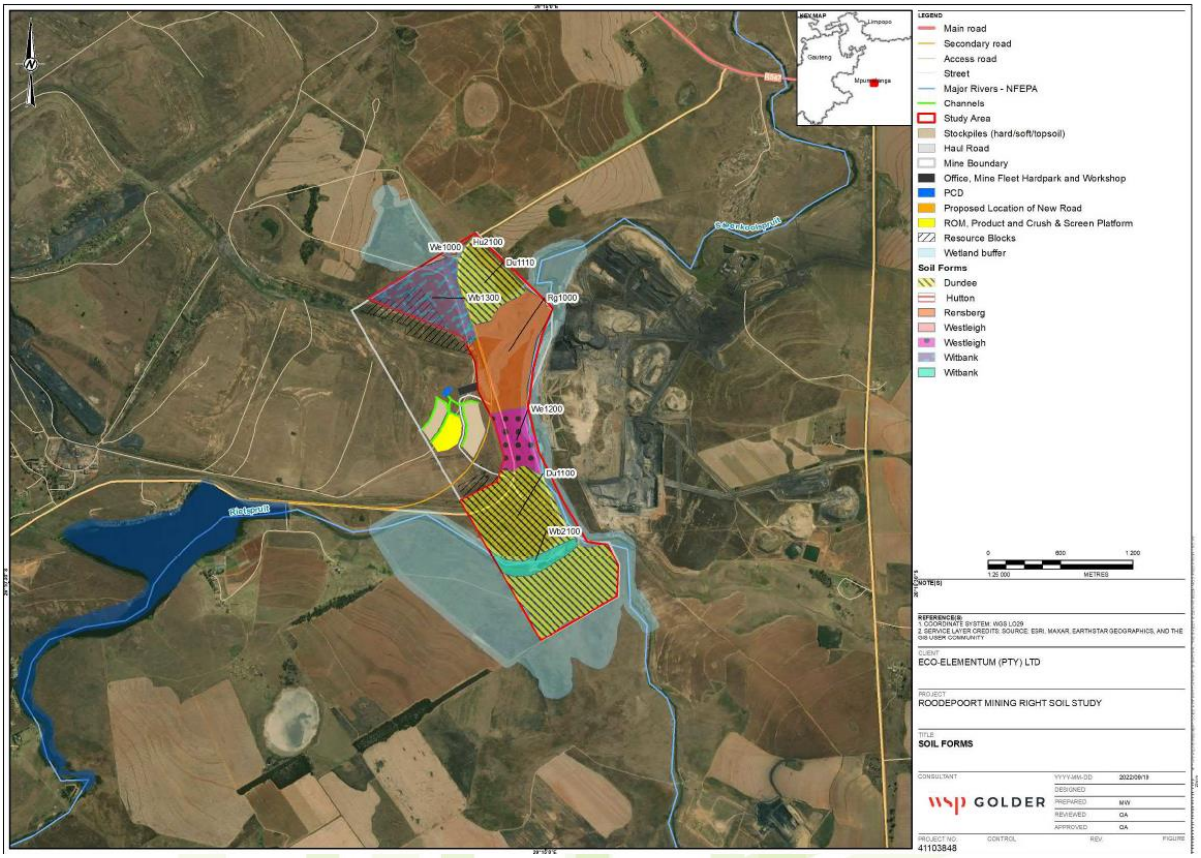

Figure 3.42: Soil forms found on site

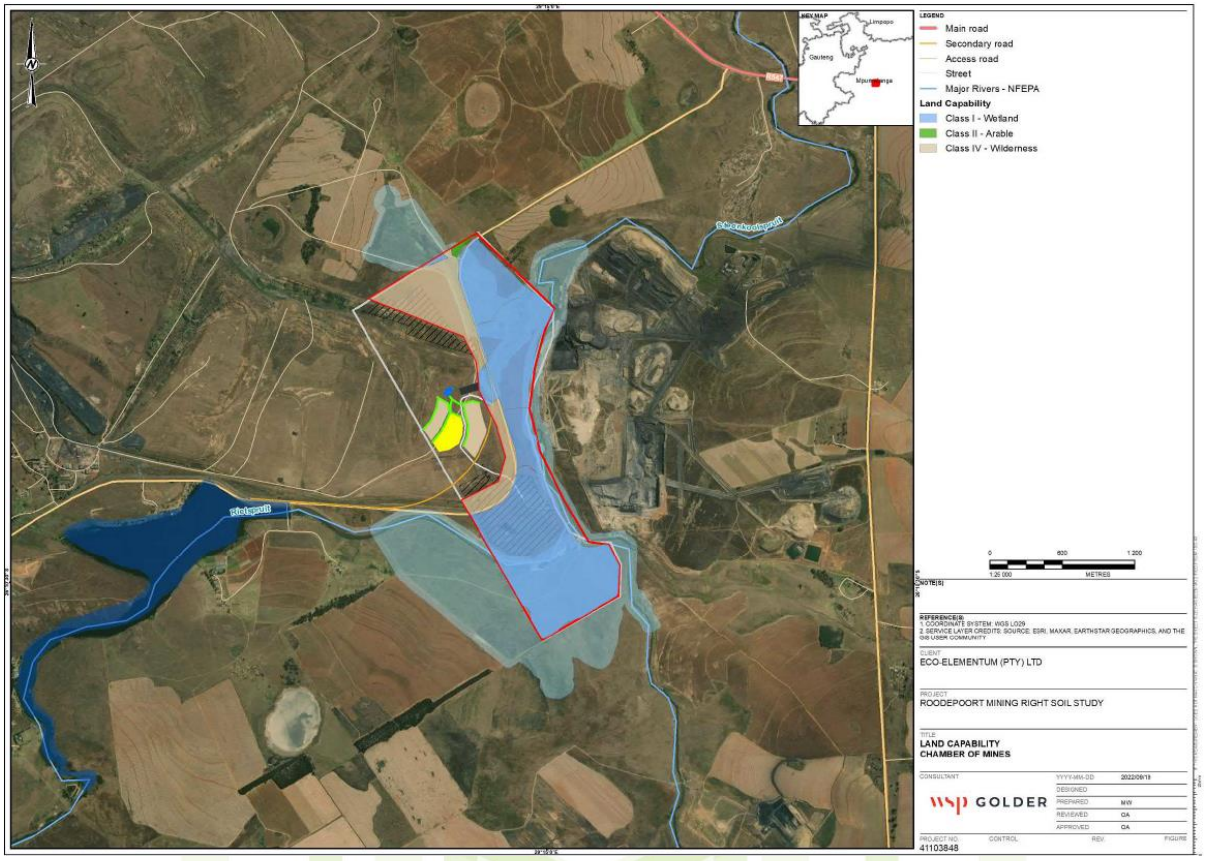

Figure 3.43: Land Capability (Chamber of Mines)

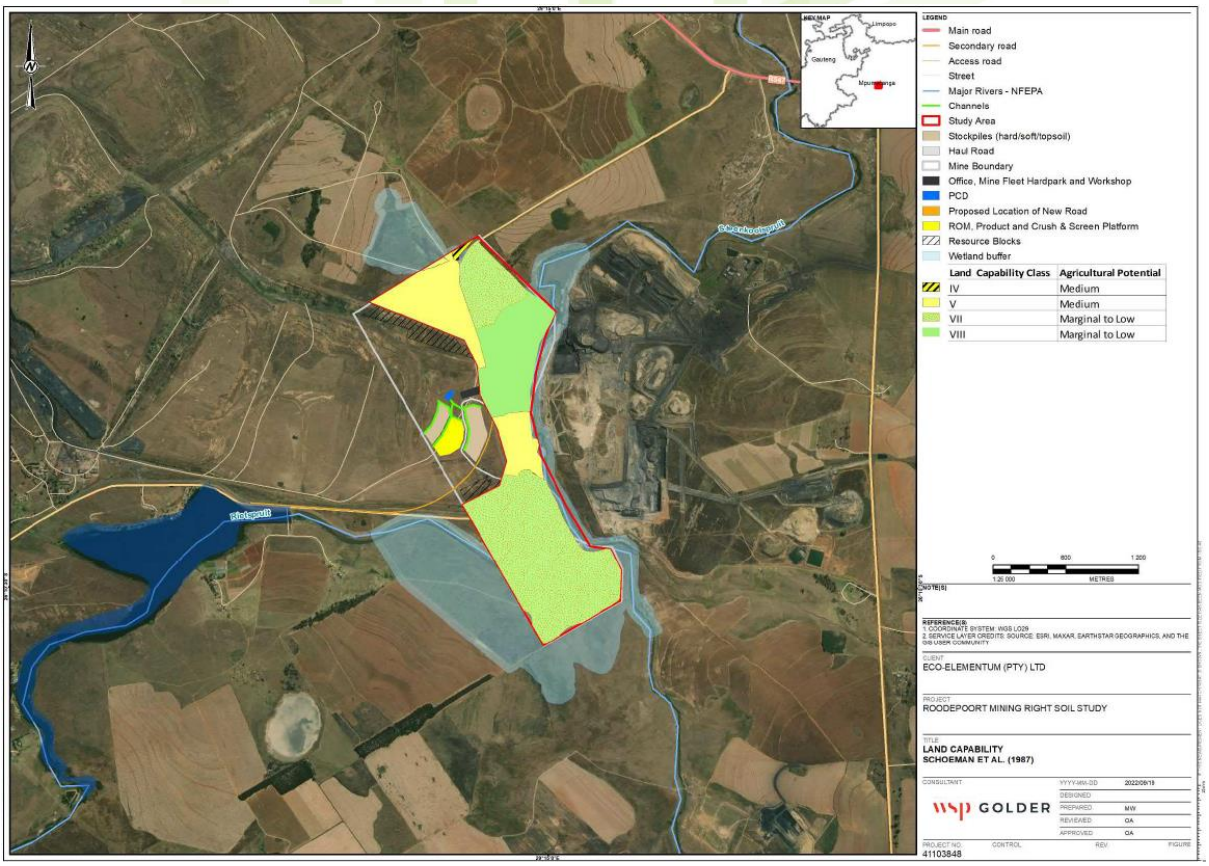

Figure 3.44: Land Capability (Schoeman *et al*)

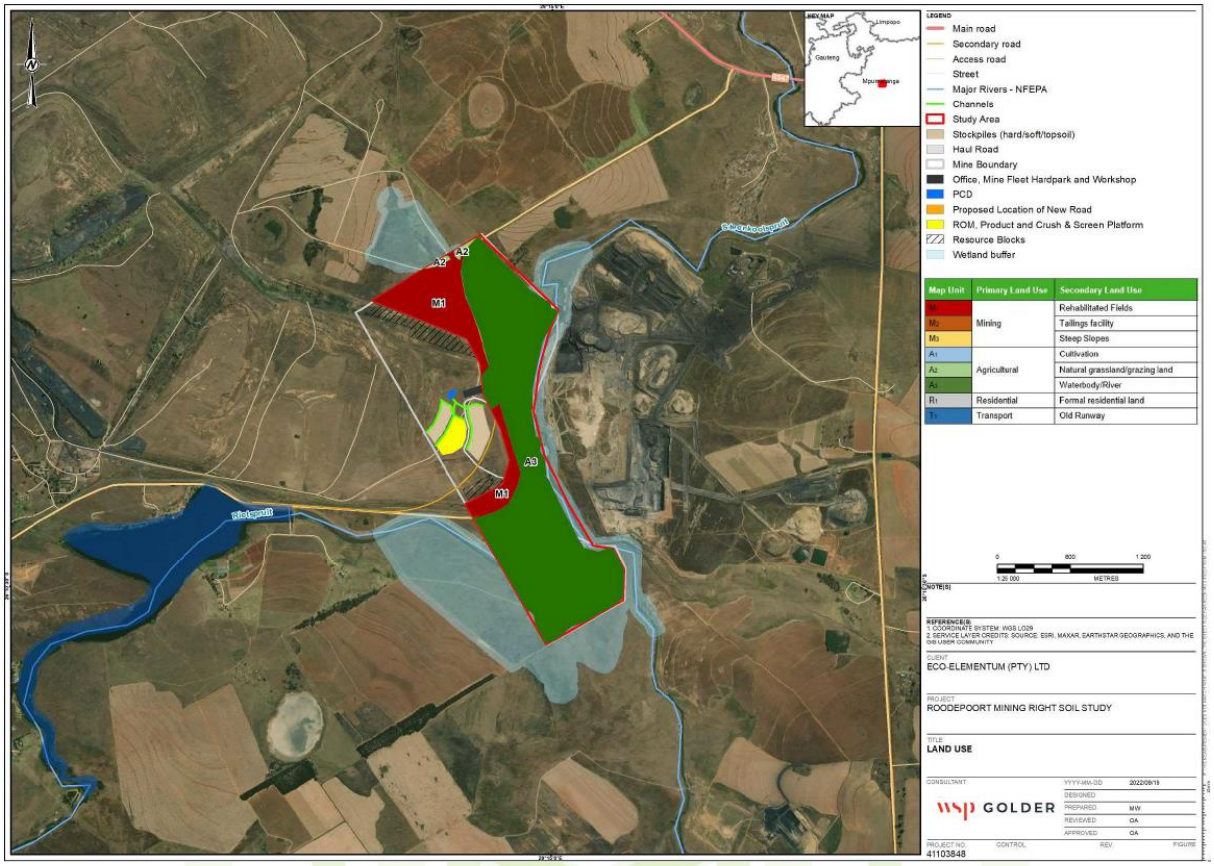

Figure 3.45: Current Land Use

SOCIAL ECONOMIC

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

Population and Demographics

According to the ELM 2013-2014 IDP, this municipality is the largest economic contributor to the NDM of the six local municipalities, contributing 45% to the district's economy. Dominant economic contributors include utilities (74.1%), mining (52.8%) and construction (52.5%). Emalahleni's population size, as recorded by Stats SA 2011, was 395 466 people which makes up 30% Nkangala District's population. The population lives in 119 874 households with an average household size of 3.3 people. This is a relatively low family size, which may reflect the young age of the urban centres in the district, in which large family structures have not had time to develop. More established towns generally have average family sizes in excess of 4.5 people, while rural areas often average 5.5 people or more per household. The ELM's population grew by 43.1% between 2001 and 2011 while annualised population growth rate was measured at 3.6%.

Educational Status

Educational achievement is a key development indicator of a population. The majority of the population (ages over twenty) in the local study area as well as district municipality have not completed matric, however, there is a large percentage of learners who complete primary level education.

Employment and Labour

According to Statistics South Africa, (2011) the employment rate for Mpumalanga Province and Nkangala District Municipality was 24% and 27% respectively (Stats SA, 2011). There has been a drop in unemployment rate in the ELM from 38.4% to 27% between 2001 and 2011. A large portion of those employed are absorbed into the mining, construction, power generation and agricultural sectors.

Annual Household Income

Over 40% of people in Mpumalanga Province have no annual income at all. Average income figures for the local study area, the ELM and the NDM are all very much in line with the provincial average; however, the income earning figures are slightly higher for the local study area, with more people earning between R3 201 and R12 800 (Stats SA, 2011). It can be gathered that the ELM has a higher income production than the provincial figures. This is attributed to the concentration of mining and power generation activities, and construction industry in this area (Stats SA, 2011).

Social Infrastructure and Services

All the urban areas within ELM (with the exception of informal settlements and townships) are fully reticulated in terms of potable water supply. A large percentage of households in the local study area have access to piped water either inside their house or within a communal yard, with an average of 77% having access to municipal water, whilst 8% have access to water through a borehole. In terms of sanitation, data from the 2011 census, show that an estimated 57% of households in the local study area have access to waterborne sewer services (flush toilets, with or without septic tanks); the majority (33%) of the remaining households use pit latrines (Stats SA, 2011). An estimated 69% of waste generated within the ELM is collected weekly by the local municipality. In contrast to the ELM, the most common means of waste disposal for populations in Ward 30 is through utilisation of their own refuse dumps (39%), 36% make use of municipal services and a significant amount of the population has no means of waste disposal at all. Of the households in local study area, 53% use electricity for cooking, heating and lighting. In contrast 69% of the households in the ELM use electricity. The bulk electricity provider throughout the municipality is Eskom (ELM IDP, 2012 - 2013). The ELM is strategically located in terms of the provincial context and transport network. It is situated in close proximity to the City of Johannesburg, City of Tshwane and Ekurhuleni Metropolitan Municipalities in Gauteng, and is connected to these areas by the N4 and N12 freeways. Although roads in the ELM are sufficiently connected with district, provincial and national roads, many secondary road systems are in a state of disrepair, being insufficient to handle the increased traffic created by mining and other industrial developments. Crime and community safety is generally a cause of concern for communities in the local study area. There has been a history of substance abuse and widespread criminal activity in the area, with several instances of community conflict, industrial action and opposition towards the local municipality and surrounding mining companies.

Health Services

It was found in an interview with the head nurses at the Phola Community Health Centre and the Ogies Clinic that prostitution has become an increased problem within the region as a result of the mining operations; this then in turn leads to an increase in HIV/AIDS rates. The mining operations also have resulted in an influx of inhabitants into the area which has put tremendous strain on health facilities.

3.g.iv.1.b Description of The Current Land Uses

When the surrounding environment is considered, the region is associated with crop cultivation and mining activity. Access to the study area is via a local road turning from a tertiary road. On a local scale, the area is associated with open veldt and rehabilitated open cast mining areas.

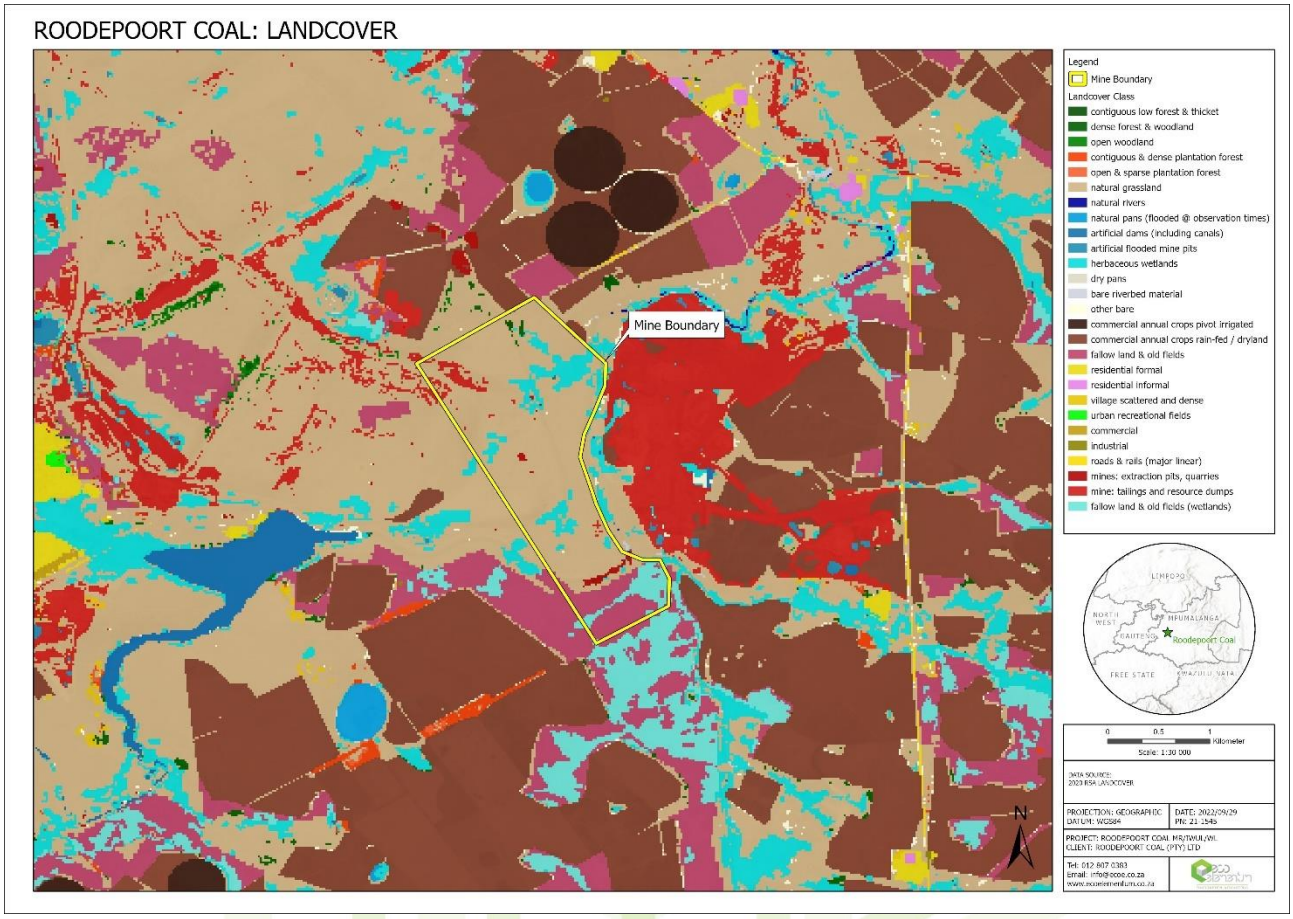

Figure 3.46: Landcover of the project area

3.g.iv.1.c Description of Specific Environmental Features and Infrastructure On the Site

The site is located within Quaternary Catchment B11E, within the Upper Olifants catchment and the Olifants Water Management Area. The main river within the catchment is the Steenkoolspruit. A diverted section of the Rietspruit runs through the southern section of the MR boundary

Majority of the study area was previously mined through opencast mining, and is currently being rehabilitated. The area comprises of grass veld as was used for rehabilitation purposes.

The majority of the study site also consisted very little indigenous vegetation.

Specific Sensitive Environmental Features

Riparian and wetland vegetation along stream and wetlands can be considered highly sensitive areas which serve as breeding and foraging habitat for avifauna and aquatic fauna. The remainder of the area can be regarded as low sensitive as it has been disturbed by surrounding impacts of agriculture and mining and covers the majority of the area

Specific Infrastructure on site

Table 3.24: Specific Infrastructure Features associated with the site

Name	Off. Name	Latitude	Longitude	Description	Age
B01	2629AA-B01	-26.152250	29.246287	Building	Historical

Name	Off. Name	Latitude	Longitude	Description	Age
F01	2629AA-F02	-26.152031	29.247251	Cemetery	Historical

3.g.iv.1.d Environmental Sensitivity and Current Land Use Map

Figure 3.47 below depicts the environmentally sensitive areas, in relation to, the proposed project infrastructure.

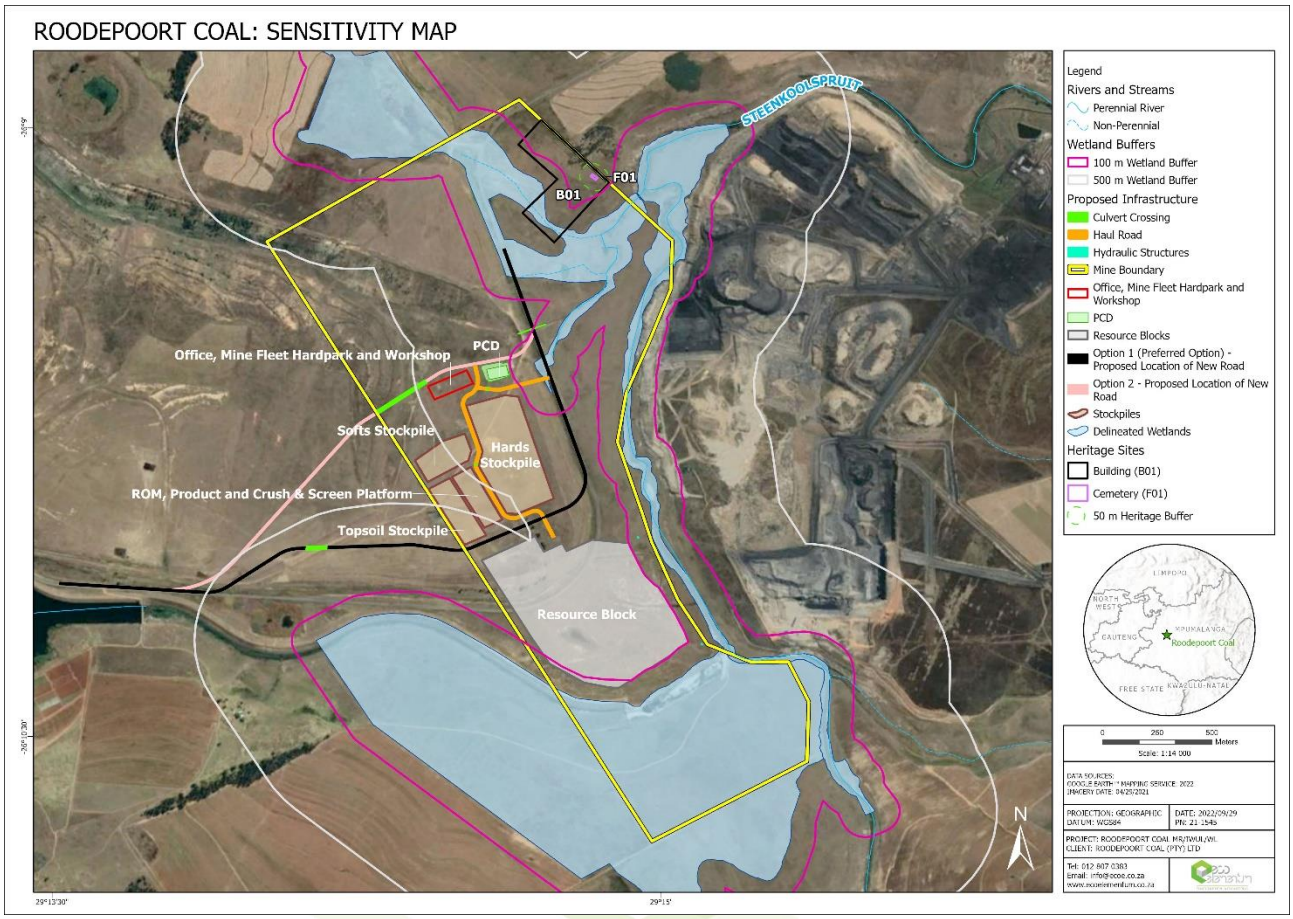

Figure 3.47: Areas of environmental sensitivity

3.g.v Summary of Impacts and Risks Identified by Specialists

This section summarises the main findings of various specialists' impact assessments with respect to the proposed project.

AIR QUALITY IMPACTS

Site Clearing, removal of topsoil and vegetation	During this activity, a number of operations take place such as land clearing, topsoil removal, loading of material, hauling, grading, stockpiling, bulldozing and compaction. Initially, topsoil and subsoil will be removed with large scrapers. The topsoil will be stockpiled for rehabilitation in the infrastructure area. It is anticipated that each of the above mentioned operations will have its own duration and potential for dust generation. Fugitive dust (containing TSP (total suspended particulate, will give rise to nuisance impacts as fallout dust), as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns giving rise to health impacts)) It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity, the specific operations, and the prevailing meteorological conditions. This activity will be short-term and localised, seizing after construction activities. Material will be removed by using a bulldozer and then storing this material separately for use during rehabilitation at end of life of mine when the operation cease. These construction sites are ideal for dust suppression measures as land disturbance from clearing and excavation generates a large amount of soil disturbance and open space for wind to pick up dust particles and deposit it elsewhere (wind erosion). Issues with dust can also arise during the transportation of the extracted material, usually by truck and shovel methods, to the stock piles. The dust can further be created by the entrainment from the vehicle itself or due to dust blown from the back of the bin of the trucks during transportation of material to and from stockpiles.
Construction of surface infrastructure	During this phase, it is anticipated there will be construction of infrastructure. This will include, access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, blasting and development of box cut for mining, etc. Activities of vehicles on access roads, levelling and compacting of surfaces, as well localised drilling and blasting will have implications on ambient air quality. The above mentioned activities will result in fugitive dust emissions containing TSP (total suspended particulate, giving rise to nuisance impacts as fallout dust). Opencast mining will commence with the stripping of the vegetation for the initial box cut. Topsoil and overburden need to be removed and stockpiled separately by means of truck and shovel methods (front end loaders, excavators and haul trucks). Once the rock has been reached will blasting be required to further remove material to the point where the mineral can be extracted. Bulldozing, excavation, drilling and blasting operations will result in the emission of dust to atmosphere. The construction of roads take place through removing the topsoil and then grading the exposed surface in order to achieve a smooth finish for vehicles to move on. Temporary stockpiles will be created close to the edge of the road in order to be backfilled easily once the road has expired or need to be rehabilitated.
General transportation, hauling and vehicle movement on site.	Transportation of the workers and materials in and out of mine site will be a constant feature during the construction phase. This will however result in the production of fugitive dust (containing TSP, as well as PM10 and PM2.5) due to suspension of friable materials from earth roads. It is anticipated this activity will be short-term and localised and will seize once the construction activities are finalised. Haul trucks generate the majority of dust emissions from surface operations. Observations of dust emissions from haul trucks show that if the dust emissions are uncontrolled, they can be a safety hazard by impairing the operator's visibility. Substantial secondary emissions may be emitted from material moved out from the site during grading and deposited adjacent to roads. Passing traffic can thus loosen and re-suspend the deposited material again into the air. In order to minimize these impacts the stockpiles should be vegetated for the duration that it is exposed.

Demolition & Removal of all infrastructure (incl. transportation off site)	During this activity, there is demolition of buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply, removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions. The impacts will be short-term and localised. Any implication or implications this phase will have on ambient air quality will seize once the activities are finalised.
Rehabilitation	During this activity, there is the reshaping and restructuring of the landscape. Since this is an opencast operation mainly, the area to be reconstructed will be limited to the opencast areas. Topsoil can be imported to reconstruct the soil structure. There is less transfer of soil from one area to other therefore negligible chances of dust through wind erosion. Profiling of dumps and waste rock dump to enhance vegetation cover and reduce wind erosion from such surfaces post mining.

Soils, Land Use and Land Capability

The following potential soil-related impacts were identified as applicable in respect of the proposed project.

- Erosion and Sedimentation
- Change in surface profile
- Change in land use
- Change in land capability
- Soil Contamination

The assessment of impact significance considers pre-mitigation as well as post-mitigation scenarios. Potential impacts associated with the construction, operation and closure of the site have been assessed and discussed in the following sections, along with identification of recommended mitigation measures. The soil protection strategies identified are, in part, taken from the International Finance Corporation (World Bank) Environmental, Health and Safety Guidelines for Mining, 2007 (IFC, 2007).

Construction Phase

This phase refers to the period when the proposed infrastructure is built/installed and usually has the largest direct impact on soils and land capability. This phase includes one of the major activities ahead of mining, which is to strip all useable soils for stockpiling and later rehabilitation use. It also includes site preparation prior to construction activities, involving vehicular movement (transportation of construction materials) and the removal of vegetation within the development footprint and associated disturbances to soil, and access to the site. Site preparation is followed by earthworks required for establishment of structures, leading to stockpiling and exposure of loose soils, as well as movement of construction equipment and personnel within the project area. The following potential impacts on soils were considered for the proposed project.

- Impact 1: Loss of Topsoil

The stripping of topsoil ahead of mining will lead to a significant loss of usable soil if not undertaken correctly. Topsoil needs to be kept aside for later concurrent and then final closure rehabilitation. If this is not done, wetland land capability cannot be restored as without the clay-rich soils, wetland vegetation cannot be re-established. The various soil types need to be separately stripped, stockpiled and replaced.

- Impact 2: Erosion and Sedimentation

Soil stripping, clearing of vegetation, movement of vehicles, mobile plant and equipment, as well as earthworks is very likely to result in increased loose material being exposed and consequent erosion. The Dundee soils are largely devoid of macrostructure, so are more prone to erosion than the better-structured Westleighs and wellstructured Katspruits are. As there are watercourses running through and flanking the site, the potential impact of sedimentation is linked to that of erosion. Although the magnitude and extent of erosion and sedimentation are likely to be limited if the recommended mitigation measures are properly implemented, some erosion is inevitable when clearing an area and erosion and sedimentation are not easily reversible. If the proposed project were to go ahead, the immediate impact receptor would be sensitive as it is a wetland area. In the case of this proposed project, using the impact assessment methodology described in Section 3, the impact significance without mitigation is Medium-High and with mitigation is Medium.

- Impact 3: Change In Surface Profile

Earthworks required for establishment of support structures, as well as establishment of access tracks, will result in a change of surface profile within the project area. A change in the surface profile would be long-term and inevitable as a result of earthworks. The current surface profile can only be re-established during mine closure. Having said this, the site is already flat, so the surface profile will not be changed to a large extent. The impact significance with and without mitigation is Low-Medium.

- Impact 4: Change In Land Use

Clearance of vegetation on site and establishment of infrastructure will result in a change of land use within the project area. The Project site is currently a wetland area and the proposed project will result in a change in land use to mining. The degree of alteration is very high (i.e. complete change in land use), the change will definitely take place and will be irreversible for at least the duration of the project life (i.e. the impact will take place in the construction phase but will remain as long as the project infrastructure is in place). The re-establishment of wetland soils will require re-establishment of the area as a functioning wetland at closure. The impact significance without and without mitigation is thus Medium-High.

- Impact 5: Change In Land Capability

The movement of mobile plant / equipment is very likely to result in compaction, disturbance and possible sterilization of soils and associated change in land capability. The degree of alteration is very high (i.e. complete loss of land capability) the change will definitely take place and will be irreversible for the duration of the project life (i.e. the impact will take place in the construction phase but will remain as long as the project infrastructure is in place). As mentioned, the agricultural potential of much of the site is marginal to low and the land capability is Class I – wetland. Construction activities would lead to draining and/or removal of wetland soils, leading to a complete change in the land capability. The impact significance with and without mitigation is Medium-High.

- Impact 6: Soil Contamination

Movement of vehicles and plant / equipment on site could result in leaks and spills of hazardous materials including hydrocarbons. Contaminated soil is expensive to rehabilitate and contamination entering the soils of the project area will infiltrate into the ground as well as migrate from site during rainfall events. With the implementation of mitigation measures, the probability and duration of the impact can be reduced, thereby reducing the potential impact from High to Low-Medium.

Operation Phase

This phase refers to the period of operation of the mine (i.e. following commissioning through project life). As indicated above, the identified impacts to soil often take place during the construction phase but the impact is felt throughout the

operation phase. The impacts to focus on during the operation phase are a Loss of Topsoil, Soil Contamination and Erosion and Sedimentation.

- Impact 1: Loss Of Topsoil

The major ongoing impact throughout operations is the loss of topsoil owing to ongoing stripping ahead of mining. The aforementioned mitigation measures should continue to be adhered to and an operation phase specific storm water management plan should be devised. The impact significance without mitigation is High and with mitigation is Medium. Vegetative cover of the stockpiles should be monitored.

- Impact 2: Erosion And Sedimentation

Ongoing erosion and consequent sedimentation throughout the operational phase of the project should be monitored and mitigated against. The impact significance without mitigation is Medium-High and with mitigation is Low-Medium.

- Impact 3: Soil Contamination

Everyday movement of vehicles and employees once the development is operational will likely lead to some soil contamination. The impact significance without mitigation is Medium-High and with mitigation is Low-Medium.

Closure Phase

The closure phase will be similar to the construction phase as large vehicles will be on site and earth will be moved. Erosion and Sedimentation, and Soil Contamination are the most likely negative impacts.

- Impact 1: Erosion And Sedimentation

Site rehabilitation associated with mine closure will involve movement of vehicles, mobile plant and equipment, as well as removal of structures. These activities are very likely to result in increased loose material being exposed. The less structured soils are the most susceptible to erosion and most likely to add to sedimentation. The impact significance without mitigation is Medium-High and with mitigation is Low.

- Impact 2: Soil Contamination

Movement of vehicles and plant / equipment on site could result in spills of hazardous materials. Contaminated soil is expensive to rehabilitate and contamination entering the soils of the project area infiltrate into the ground as well as migrate from site during rainfall events. The impact significance without mitigation is Medium-High and with mitigation is Low.

Surface Water

It can be deduced from the calculated figures in the groundwater model that the cumulative groundwater drawdown at the streams/wetlands close to the mine will have an impact.

Groundwater

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 on Groundwater Quantity

During the operational phase, it is expected that the main impact on the groundwater environment will be de-watering of the surrounding aquifer. Water entering the mining areas will have to be pumped out to enable mining activities. This will cause a lowering in the groundwater table in- and adjacent to the mine.

Impacts on Groundwater Quality

The flow in the aquifer will be directed towards the mine at this stage and very little groundwater pollution is thus expected. Additionally, current contaminated groundwater could also flow into the mine, temporary diverting the existing contaminant plume.

Decommissioning Phase

Groundwater Quantity

After closure, the water table will rise in the mine to reinstate equilibrium with the surrounding groundwater systems. However, the mined areas will have a slightly larger hydraulic conductivity compared to the pre-mining situation.

Groundwater Quality

Once the normal groundwater flow conditions have been re-instated, polluted water could potentially migrate away from the mining areas. As some coal and discards will remain in the mine, this outflow will be contaminated as a result of acid or neutral mine drainage. As sulphate is normally a significant solute in such drainage, it has been modelled as a conservative (non-reacting) indicator of mine drainage pollution.

WETLANDS AND AQUATICS

Project phases

Construction phase

During the construction phase, areas that are targeted for the expanded opencast mining and new access roads, will be cleared of vegetation and the topsoil will be stripped. This will lead to sediments being washed downslope into watercourses impacting on the biota and hydrodynamics of the wetlands. The increased runoff will increase the erosion potential and sediment carrying capacity of surface waters, especially during a storm event.

Construction/establishment activities associated with bulk earthworks (such as excavations, reshaping, back-filling and compaction) can alter natural patterns of surface runoff reaching water resources downslope/downstream. Excavations may impound and redirect/restrict water, starving downstream water resources. Infilling, compaction and rutting of soils caused by construction/establishment alter the patterns of diffuse surface and sub-surface flows by altering micro-topography and the permeability of soil profiles. Changes in flow patterns will affect hydrological functionality and ecosystem integrity. Increased runoff velocities linked to concentrated flow paths created during construction/establishment will lead to erosion and sedimentation. Should temporary damming and abstraction of water take place, a short-term reduction of flows to downstream habitat will also result in alterations of the sediment balance (Macfarlane et al., 2014).

Prior to stripping of vegetation, alien plant species must be identified and removed as per an alien invasive plant management plan. Only after the alien vegetation has been removed and disposed of appropriately can the remaining vegetation be stripped. All trees or bushes taller than 50 cm must be removed first and placed into a separate stockpile (these can be used in the ongoing rehabilitation to reduce erosion risk). After the taller vegetation has been removed, the

remaining vegetation in these areas can be stripped with the topsoil (top 30 cm only) and stockpiles as one. This will ensure a healthy seedbank remains within the topsoil layer as well as to provide nutrients and organic matter to keep the soil healthy. The remaining subsoil must be stripped and stockpiles separately

Upgrading and construction/establishment of infrastructure will result in increased sediment runoff and sedimentation. Site preparation and all associated infrastructure will entail blasting, drilling, dewatering, clearing, grubbing, grading and ground preparation as well as the creation of containment facilities that will eliminate some stream reaches and intercept all surface run-off within the proposed area. Impacts associated with this activity include increased erosion and sediment deposition in the receiving aquatic environment far downstream.

Topsoil and subsoil will be placed into stockpiles which change the natural drainage of the area where they have been placed. The stockpile could compact the soil below it and reduce infiltration and possible sub-surface flows, altering the hydrodynamics. Stockpiles also provide a source of sediment which could be eroded, increasing sediment loads to areas downslope.

Operational Phase

Increased sedimentation may occur as a result from the runoff from the waste rock dump. This has the potential to change habitat structure within the receiving environment and this will in turn result in changes in ecosystem function. Changes in habitat structure due to sedimentation would result in changes in the species composition. Water quality impairment has the potential to change ecosystem function, change community structure as species sensitive to water quality impairment are eliminated and tolerant species increase in number, this results in a loss of biodiversity of sensitive species.

Infrastructure construction/establishment/maintenance will introduce unnatural disturbance, enhancing the “edge effect” promoting establishment of disturbance-tolerant species, including further colonisation by alien invasive species in areas adjacent to the work servitude. While this impact is initiated during the construction/establishment phase the impacts will persist into the operational phase. Invasive alien plants have far reaching detrimental effects on native biota and has been widely accepted as being a leading cause of biodiversity loss. They typically have rapid reproductive turnover and are able to outcompete native species for environmental resources, alter soil stability, and promote erosion, change litter accumulation and soil properties. In addition, certain alien plants exacerbate soil erosion whilst others contribute to a reduction in stream flow thereby potentially increasing sediment inputs and altering natural hydrology of receiving watercourses. These impacts negatively affect areas that are largely natural (with low existing weed levels) greater than for areas already characterised by dense infestations of alien plants with low indigenous plant diversity (Macfarlane et al., 2014).

Impact types

Sedimentation and soil erosion

Soil erosion will result in the deposition of sediment into the wetland and channel system; posing a risk to the downstream catchment geomorphological/functional integrity. Subsequent impacts that are likely to result are: a loss of instream flow including aquatic refugia and flow dependent taxa; sedimentation of the watercourse that will be destructive to many faunal species affecting their habitat; breeding and feeding cycles.

Some of the key biological effects related to the deposition of sediment and suspension of fine sediment within the watercourses includes:

- Habitat alteration downstream of crossing points due to increased sediment deposition (degradation of coarse riverbed habitats by the infilling of interstitial spaces and the reduction of inter-granular flow for example);
- Reductions in photosynthetic activity and primary production caused by sediments impeding light penetration;

- Reduced density and diversity in benthic invertebrate communities as a result of habitat degradation, blanketing of fish spawning sites and the establishment of more tolerant taxa or exotic species; and
- Changes to the behaviour and feeding ability of fish at low levels of suspended sediments, while physiological damage and mortality can occur at very high concentrations of suspended sediment (e. as a result of clogging of fish gills, interference in embryogenesis and larval development of amphibians and mortality of filter-feeding macro-invertebrates).

During the operational phase of the mine rainfall is likely to filter through into the waste dump. This water is likely to accumulate particles and pollutants that will pose a risk to the surrounding water courses. Sediment that washes off the waste dump during periods of rainfall will also contribute to increased sedimentation in the aquatic environment.

Erosion and sedimentation impacts are linked to alterations in hydrological regimes as a result of increased storm water floodpeaks associated with increased impermeable surfaces and the concentration of flows. Increases in peak discharge may significantly increase stream power, increasing the risk of erosion (localised scouring and incision) and resultant sedimentation of watercourses. Local site factors such as soil erodibility, vegetation cover, gradient of local slopes and regional rainfall/runoff intensity will affect the probability and intensity of erosion impacts (Macfarlane et al., 2014). Typical results of erosion & sedimentation on water resources may include:

- Locally increased channel slopes;
- Loss of in-stream biotope diversity due to scouring or blanketing of sites with sediment;
- Localised scouring at stormwater discharge points into watercourses;
- Headcut migration upstream and subsequent deepening of channels (where base level lowering has occurred);
- Lowering of the local water table and subsequent desiccation of adjacent to the river and riparian areas;
- Relatively higher channel banks that may exceed critical height resulting in bank failure/collapse;
- Addition of sediment to the water column (increased turbidity) affecting suitability for aquatic organisms; and
- Deposition of large masses of sediment downstream causing localised channel braiding, instability of the river banks and alterations in water distribution.

Pollution of water resources and soil

Changes to the water quality will result in changes to the ecosystem structure and function as well as a potential loss of biodiversity. Water quality pollution leads to modification of the species composition where sensitive species are lost and organisms tolerant to environmental changes dominate the community structure. Any substances entering and polluting the wetland systems will directly impact downstream ecology through surface runoff during rainfall events, or subsurface water movement, particularly during the wetter summer months.

Contaminants such as hydrocarbons, solids, pathogens and hazardous materials may be generated during the construction/establishment phase from a number of potential sources (examples include petrol/diesel, oil/grease, paint, cement/concrete and other hazardous substances). These contaminants negatively affect aquatic ecosystems including sensitive or intolerant species of flora and fauna. Where significant changes in water quality occur, this will ultimately result in a shift in aquatic species composition, favouring more tolerant species, and potentially resulting in the localised exclusion of sensitive species. Water quality monitoring must be implemented to ensure sustainable management of water sources within that area. Sudden drastic changes in water quality can also have chronic effects on aquatic biota leading to localised extinctions. Deterioration in water quality will also affect its suitability for human domestic/agricultural use and have far reaching impacts for local communities who may rely on rivers as water supply (Macfarlane et al., 2014).

Alien Invasive Species

Any ground disturbance provides an opportunity for alien invasive plant species to spread and for new species to establish themselves in the areas. Alien invader plant species pose an ecological threat as they alter habitat structure, lower biodiversity (both number and “quality” of species), change nutrient cycling and productivity, and modify food webs (Zedler

& Kercher, 2004). Such changes on the ecology of the riparian habitat have/will have a detrimental impact on its ability to maintain both floral and faunal biodiversity. Invasive alien plant species, particularly woody species, have much increased water usage compared with indigenous vegetation. Many alien invasive plant species are particularly found in riparian ecosystems and their invasion results in the destruction of indigenous species; increased inflammable biomass (high fire intensity); erosion; clogging of waterways such as small streams and drainage channels causing decreased river flows and incision of river beds and banks. This results in an overall impact on the hydrological functioning of the system.

Habitat will be impacted directly through the complete removal or partial disturbance of existing indigenous riverine vegetation during construction by machinery and workers accessing the site or directly were the development intersects aquatic habitats, impacting directly on the ecological condition of vegetation and availability of natural habitat. The impact from clearing and disturbance is not limited to the construction/establishment zone of the plants and associated infrastructure but however and will include areas used by machinery and workers to access the site and to construct ancillary infrastructure such as drainage structures and erosion control measures. The result is either the complete loss (construction/establishment zone of the plants and associated infrastructure) or the disturbance and partial loss of indigenous vegetation communities impacting directly on the ecological condition and functionality of these ecosystems.

Physical alteration of cross-sectional and longitudinal profiles of rivers may also result from bulk earthworks associated with the plants for example, altering natural water flow and sediment dynamics within rivers, having a knock-on effect on habitat and ecosystem dynamics. These impacts can stimulate erosion, as well as potential sedimentation of downstream habitats and a change to water regimes of adjoining riverine and riparian habitat. Areas that are mainly natural/intact would be most affected by these impacts (Macfarlane et al., 2014).

FLORA & FAUNA

Loss of Species of Conservation Concern

No red listed faunal or floral species were identified in the study area, but some of the species numbers may deplete over time. All endemic species and species of concern have specific habitat requirements and the impacts of the mine operation might have effects on these species.

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

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

Alien Invasive Species

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

HERITAGE SITES

One site associated with demolished buildings (Site B01) and one cemetery (Site F01) were noted near the northern corner of the proposed Mining Right. The eastern half of the demarcated Mining Right also falls within 500 m of a river, an area generally considered to be sensitive from a heritage perspective. However, according to historical aerial imagery and topographical maps, the majority of the proposed Mining Right area was subjected to opencast mining activities and crop cultivation that significantly lowered the sensitivity in terms of heritage resources. Heritage studies conducted in the surrounding areas noted the presence of historical building sites and graves/cemeteries.

No sites were located within the demarcated development footprints. It should also be noted that the associated footprints fall on previously mined areas that are not considered to be sensitive from a heritage perspective.

PALAEONTOLOGY

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to preserve fossils. The site visit and walk through confirmed that there were NO FOSSILS on surface of the project footprint. Since there is a chance that fossils from the Vryheid Formation may occur below ground and be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is low-moderate pre-mitigation and Low post mitigation.

VISUAL

Figure 3.48 indicates that the proposed project infrastructure may be visible from less than 20% of the total study area. The highest number of observer points may be visible from directly north of the site, within approximately 1 km from the site boundary. The figure also indicates that the infrastructure may be visible from approximately 6 km northeast, southeast and west of the site boundary within the core study area. A lower number of observer points may be visible from areas towards the edge of the total study area. Overall, the number of observer points visible from the surrounding area is expected to be highest within the areas immediately surrounding the project site.

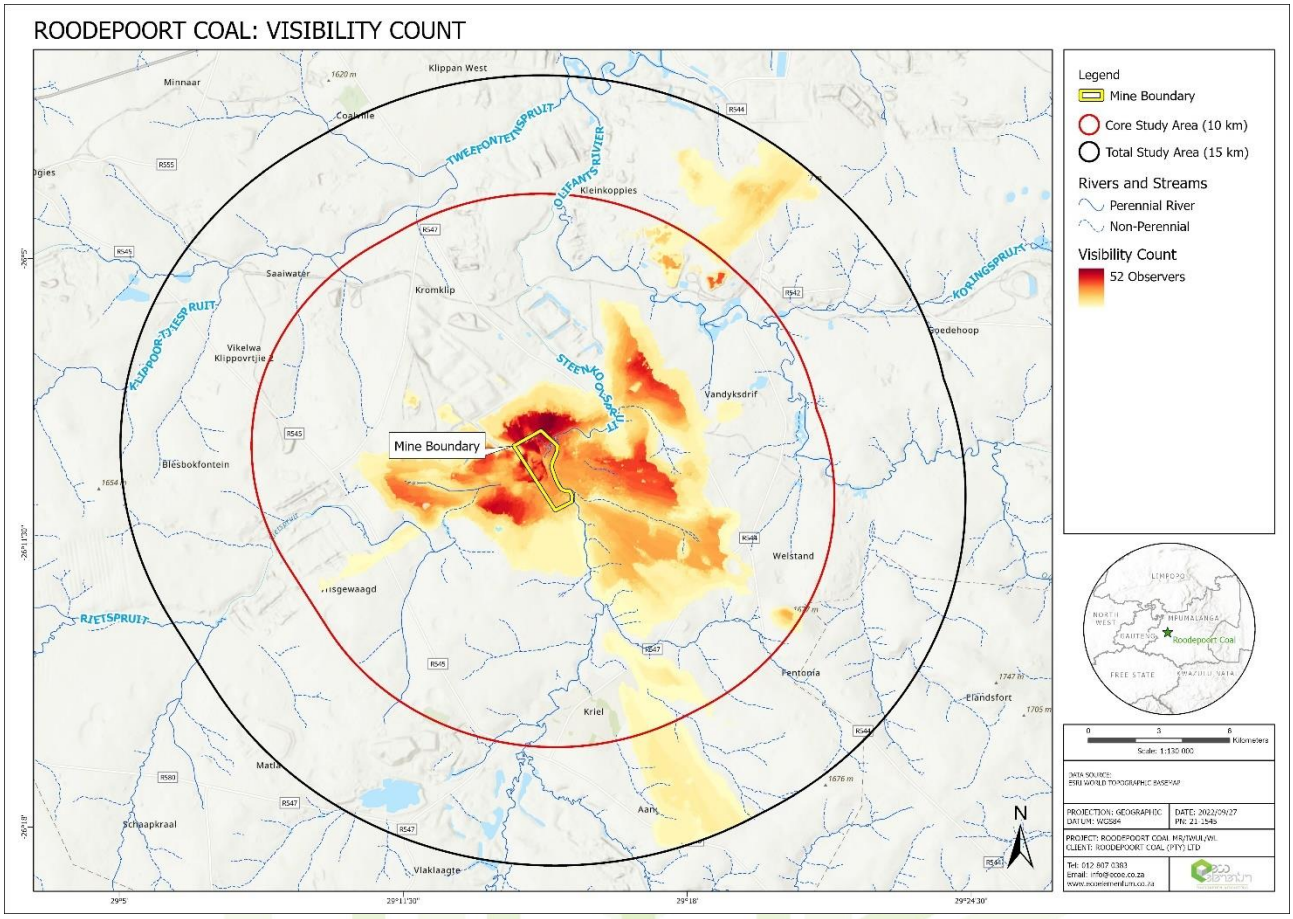

Figure 3.48: Viewshed Visibility Count – showing the number of observer points that may be visible from within 15 km of the proposed site

The results from the viewshed visibility are further ranked based on the distance from the centre of the proposed site. The distances are ranked according to Table 3-25 below.

Table 3-25: Visibility Rating

12 – 15 km	Very Low
9 – 12 km	Low
6 – 9 km	Medium
3 – 6 km	High
0 – 3 km	Very High

The results in Figure 3.49 shows that the visibility of the proposed infrastructure will be very high directly north of the site, within approximately 1 km from the site boundary. The visibility impact decreases as the distance from the site increases.

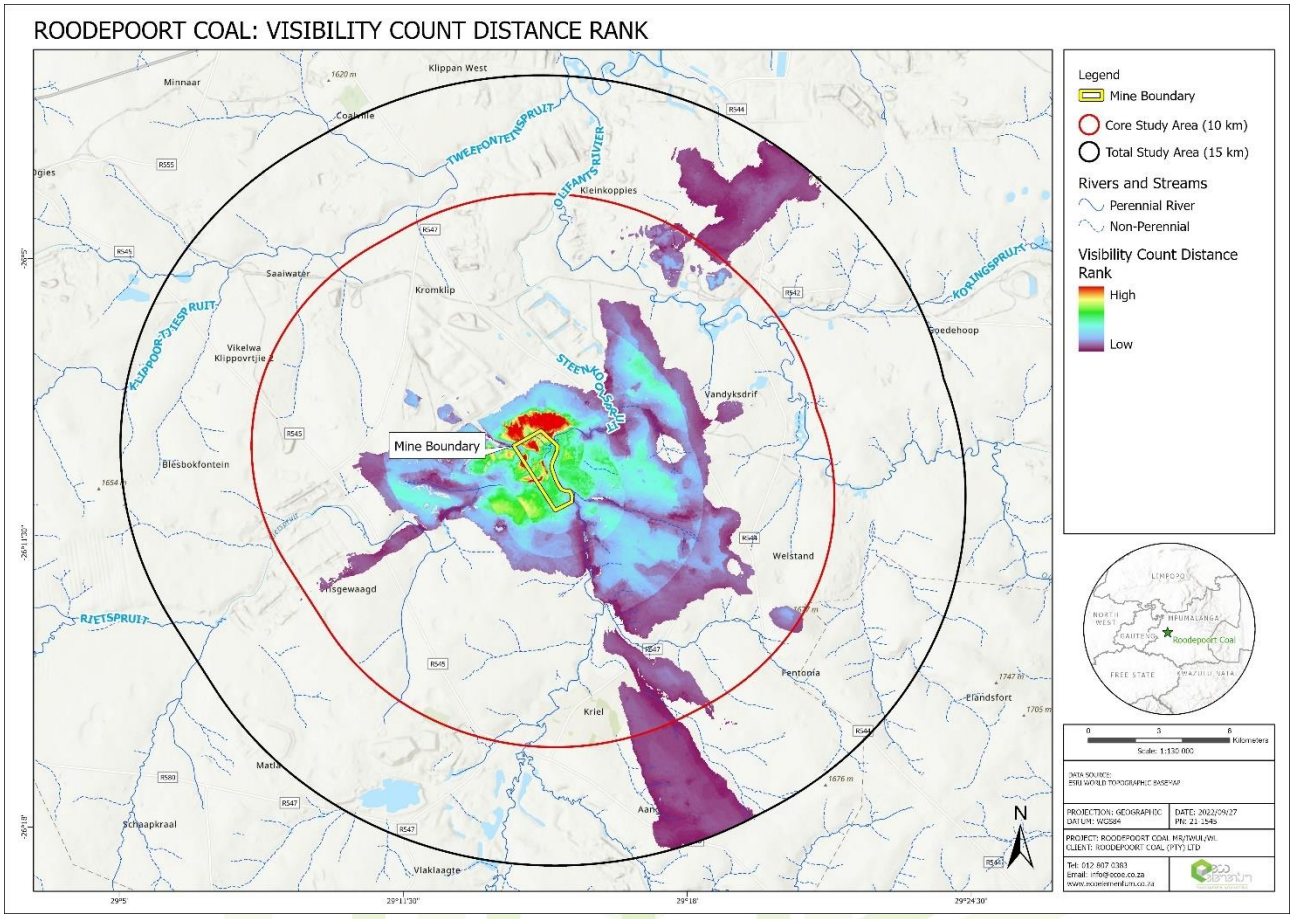

Figure 3.49: Visibility Count Distance Rank – showing the number of observer points that may be visible from within 15 km of the proposed site, ranked according to the distance from the proposed infrastructure

The viewshed visibility and distance ranking is combined with the slope angle, slope aspect, slope position, ruggedness, relative elevation, landforms and landcover VAC to obtain a quantitative visual exposure ranking of all areas where the proposed infrastructure may potentially be visible from. Table 3-26 below indicates the visual exposure ranking.

Table 3-26: Visual Exposure Ranking

1 - 2	Very Low
3 - 4	Low
5 - 6	Medium
7 - 8	High
9 - 10	Very High

The overall visual exposure (Figure 3.50) indicates that the highest level of visual exposure will be experienced from areas approximately 200 m west of the proposed study area. High levels of visual exposure are expected from the areas approximately 2 km west and southwest of the site boundary, and from areas approximately 1 km north of the site boundary. Low to medium levels are expected from the areas north, northwest and west of the site, and very low to low levels of visual

exposure are expected from the remaining areas covered by the viewshed. Overall, the visual exposure of the proposed project is expected to be low across the study area.

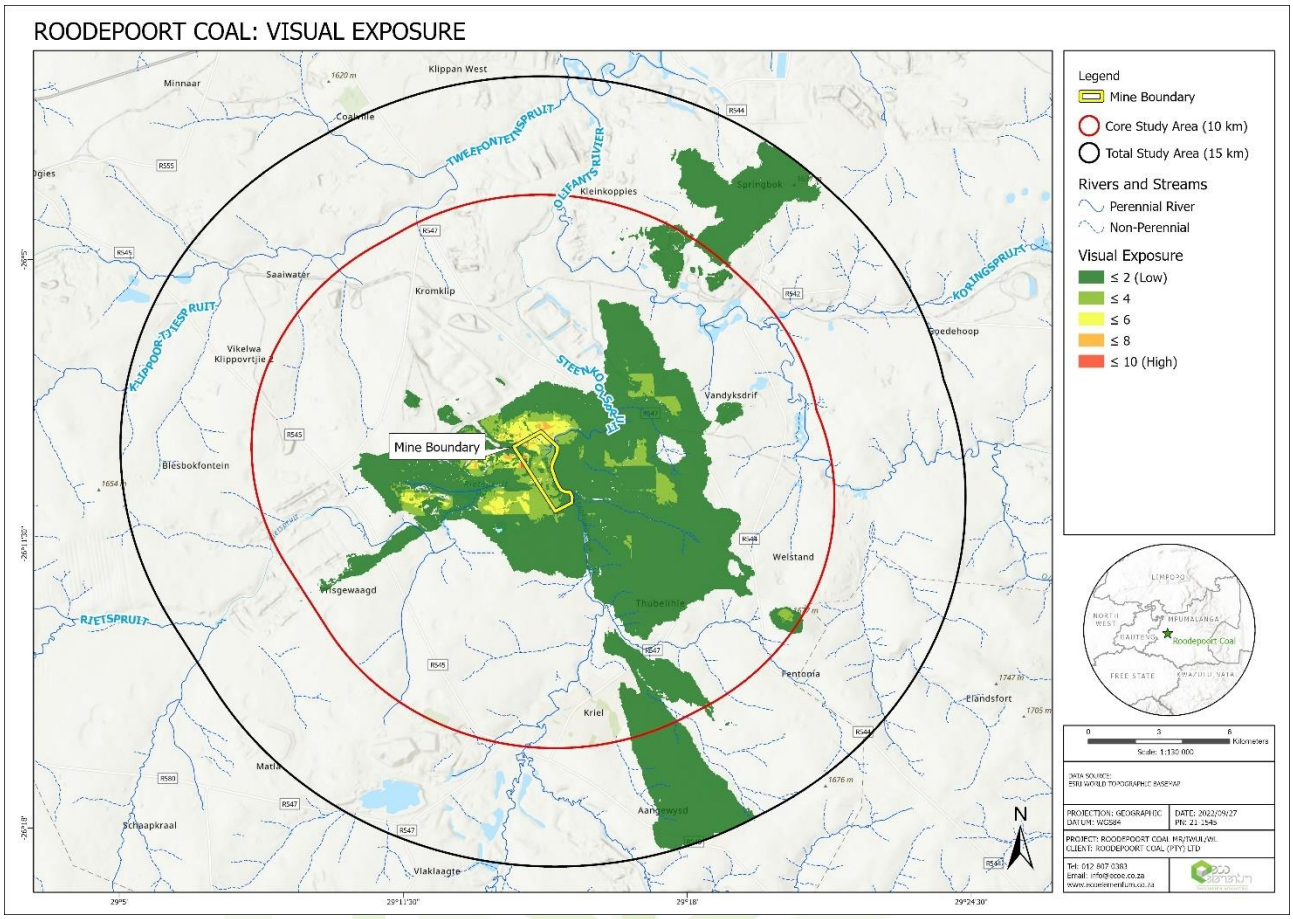

Figure 3.50: Visual exposure – showing the level of visual exposure which may be experienced within 15 km of the proposed site

Each identified sensitive receptor is then overlaid on the visual exposure ranking. It is important to note that the GIS tools used to quantify the overall visual exposure levels potentially experienced by the identified sensitive receptors only incorporates the variables as described in this report. Factors such as real time and micro scale vegetation are not considered, thus the actual level of visual exposure may be lower or higher depending on the updated land use in the vicinity or latest vegetation growth or height on a micro and macro scale. The results are by no means a rating of visual quality; it is rather used to determine the likelihood of the proposed infrastructure being visible from the viewpoint receptors

Figure 3.51 shows that travellers on the identified main roads are expected to experience no to very low levels of visual exposure from the proposed infrastructure. Travellers on the identified secondary road transecting the site are expected to experience low to high levels of visual exposure. Furthermore, the results indicate that most of Kriel will not experience any visual impacts from the proposed development, however, the north-eastern section of Kriel are expected to experience very low levels of visual exposure. Lehlaka Park is expected to experience low to medium levels of visual exposure. The town of Thubelihle is expected to experience very low levels of exposure, and residents of Klippoortjie are expected to experience no visual impacts from the proposed development.

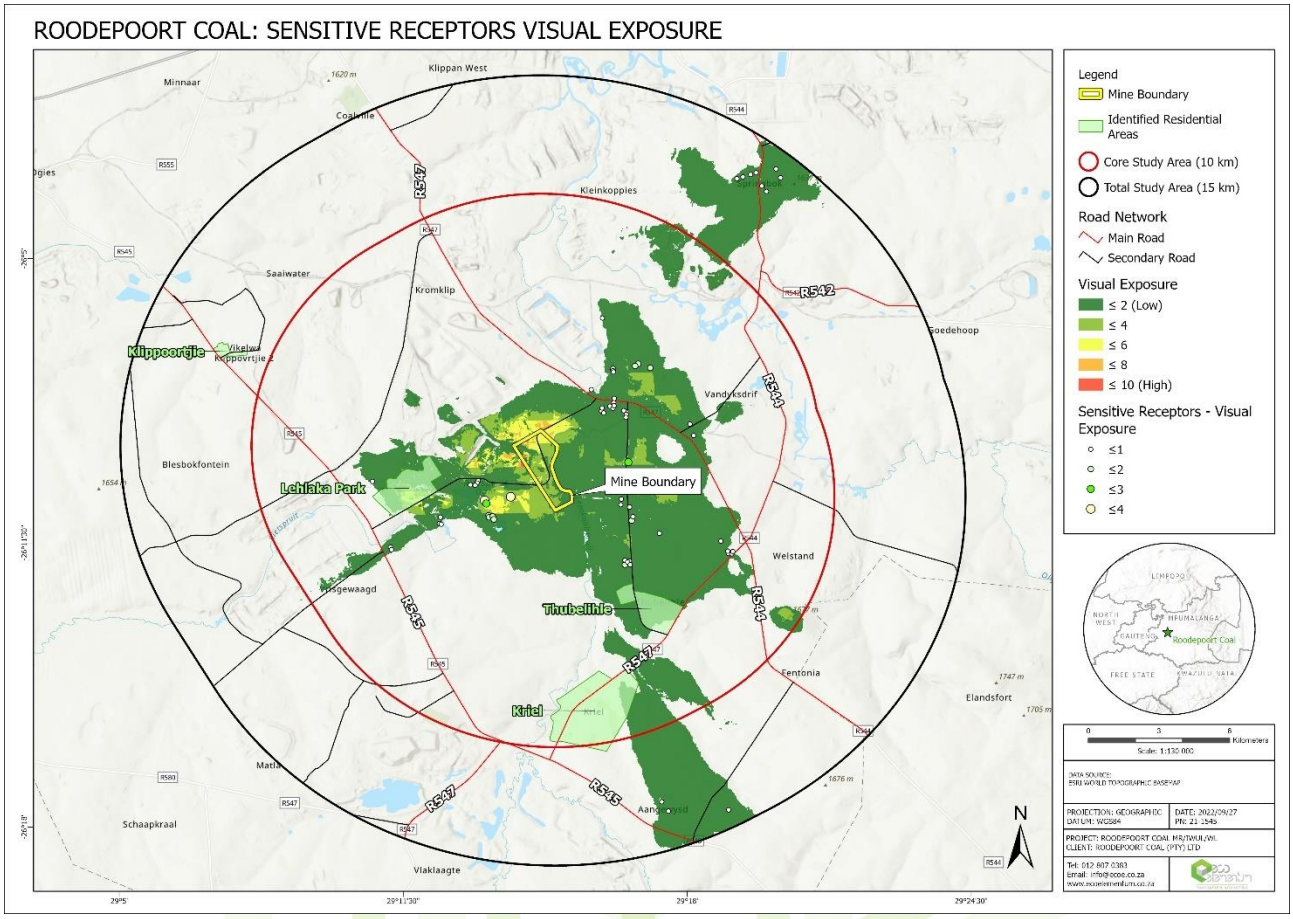

Figure 3.51: Visual exposure and sensitive receptors – showing the level of visual exposure potentially experienced by identified sensitive receptors

Overall, the proposed project is expected to have a low visual impact on the identified sensitive receptors.

NOISE, BLASTING AND VIBRATION

The following Noise intrusion level criteria are applicable:

Increase Δ -dBA	Assessment of impact magnitude	Color code
0 < Δ ≤ 1	Not audible	
1 < Δ ≤ 3	Very Low	
3 < Δ ≤ 5	Low	
5 < Δ ≤ 10	Medium	
10 < Δ ≤ 15	High	
15 < Δ	Very High	

Blasting can have the following negative impacts:

- Ground Vibrations as a result of blasting
  - Excessive ground vibrations resulting in damage to surface structures
- Air Blasts as a result of blasting
  - Excessive air blasts resulting in fly rock and damage to surface structures

BROAD LEVEL SOCIO-ECONOMIC ENVIRONMENT

It is expected that the proposed Mining Project will result in social changes which may positively and negatively affect communities within the study area. In terms of the social changes that have been assessed, the following social impacts have been identified:

- Employment opportunities;
- Multiplier impacts on the local economy
- Change in movement patterns;
- Loss of agricultural land and infrastructure;
- Physical and economical displacement;
- Impacts on the local tourism industry
- Increased pressure on Municipal infrastructure;
- Increased social pathologies linked to influx of workers and job seekers; and
- Increased nuisance factors and changed sense of place.

Although it is necessary to keep the complexity of social impacts in mind, it is also necessary to produce an SIA Report that will be accessible to a non-specialist audience and meet the requirements of the proponent, as well as international best practice. For this reason, predicted impacts have been categorised within the project phase (construction, operation and decommissioning) it is likely to originate, recognising that many impacts will span over more than one project phase.

3.g.vi Impact Assessment and Ranking Methodology

The following methodology was used to rank these impacts. Clearly defined rating and rankings scales were used to assess the impacts associated with the proposed activities. The impacts identified by each specialist study and through public participation were combined into a single impact rating table for ease of assessment.

Each impact identified was rated according the expected magnitude, duration, scale and probability of the impact.

Table 3.27: 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 Impact occurring is defined as 50%.	**3**
(H)IGHLY LIKELY	It is most likely that the Impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75%.	**4**
(D)EFINITE	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100%.	**5**
Weighting Factor		
Subjective score assigned by Impact Assessor to give the relative importance of a particular environmental component based on project knowledge and previous experience. Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.		
(L)OW		**1**
LOW- MEDIUM		**2**
MEDIUM (M)		**3**
MEDIUM-HIGH		4
HIGH (H)		5
Mitigation Measures and Mitigation Efficiency		
Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures.		
Mitigation measures were recommended to enhance benefits and minimise negative impacts and address the following: Mitigation objectives: what level of mitigation must be aimed at: For each identified impact, the specialist must provide mitigation objectives (tolerance limits) which would result in measurable reduction in impact. Where limited knowledge		

or expertise exists on such tolerance limits, the specialist must make "educated guesses" based on professional experience; Recommended mitigation measures: For each impact the specialist must recommend practicable mitigation actions that can measurably affect the significance rating. The specialist must also identify management actions, which could enhance the condition of the environment. Where no mitigation is considered feasible, this must be stated and reasons provided; Effectiveness of mitigation measures: The specialist must provide quantifiable standards (performance criteria) for reviewing or tracking the effectiveness of the proposed mitigation actions, where possible; and Recommended monitoring and evaluation programme: The specialist is required to recommend an appropriate monitoring and review programme, which can track the efficacy of the mitigation objectives. Each environmental impact is to be assessed before and after mitigation measures have been implemented. The management objectives, design standards, etc., which, if achieved, can eliminate, minimise or enhance potential impacts or benefits. National standards or criteria are examples, which can be stated as mitigation objectives.		
HIGH	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.	**0.2**
MEDIUM-HIGH	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.	**0.4**
MEDIUM	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.	**0.6**
LOW -MEDIUM	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.	**0.8**
LOW	The impact will be mitigated to the point where it is of limited importance.	**1.0**

Table 3.28: Description of bio-physical assessment parameters with its respective weighting

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

Table 3.29: Significant Rating Scale Without Mitigation

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

Table 3.30: Significant Rating Scale with Mitigation

Potential Impacts with Mitigation Measures (WM) – In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it will be necessary to re-evaluate the impact.
SIGNIFICANT RATING WITH MITIGATION EQUATION

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

3.g.vii Advantages and Disadvantages of Proposed Activity (in terms of initial site layout) and Alternatives

Table 3.31: Advantages and Disadvantages regarding beneficiation alternatives

Description	Advantages	Disadvantages
Beneficiation Alternatives		
On site beneficiation plant.	• Additional employment opportunities, higher staff requirements. • Less capital output on hauling of ROM.	• Greater surface area disturbance. • Possible sterilisation of some of the coal resource as larger area is required for infrastructure. • More capital output on infrastructure, for a mine with only a 4 year LOM. • Increased noise from the use of construction and mining machinery on surface during operations. • Higher closure rehabilitation costs.
Offsite beneficiation (preferred method)	• Smaller footprint associated with surface disturbance. • Reduced impact on dust, noise and air quality. • Reduced closure rehabilitation costs. • The coal resource can be optimally mined as infrastructure will not sterilise the resource. • Less capital output on infrastructure.	• Less employment opportunities. • More capital output on ROM hauling.

Table 3.32: Advantages and Disadvantages regarding Resource Alternatives

Description	Advantages	Disadvantages
Layout Alternatives		
Mining of the Northern Resource Block.	• Additional resource increases LOM, employment, and financial gain	• Extensive costs for dewatering as the Water table is higher than the Coal Seam Floor. • Additional impact on wetland and surrounding habitat. • Increased risk of increased water liability from historical mine workings. • Disturbance of areas currently being rehabilitated.
Mining only the Southern Resource Block	• Economically viable as more coal will be efficiently extracted. • Groundwater risk is limited. • Groundwater inflow can be managed effectively at a lower cost • Significantly smaller impact to wetland and surrounding habitat..	• Shorter LOM, employment and smaller financial gain.

3.g.viii Possible Mitigation Measures for I&AP-Identified Impacts

The proposed mitigation measures or alterations that could be implemented specifically to address issues and concerns raised by I&APs are summarised below and discussed in terms of overall risks if these mitigation measures are implemented on site.

All mitigation measures included in the EMP have taken cognizance of any I&AP issues during the process.

3.g.ix Motivation Where No Alternative Sites Were Considered

The site location is limited to the Current Mining Right Area, which is constrained by the location of other mining houses. The resource location and sensitive areas further restricts the infrastructure layout. The applicant has conducted extensive exploration and the current area provides the ideal and optimum coal resources, therefore no alternative sites were considered.

3.g.x Statement Motivating the Alternative Development Location Within the Overall Site

The infrastructure and mining layout is constrained by the mining right boundary and the location of other mining houses. The resource location and sensitive areas on the site further restrict the layout options.

Two (2) layouts were considered:

- The first layout (Figure 3.7) included a road realignment with a slightly lower curvature that the original road, with a Mining Block to the North of the proposed Mining Right area. This option sterilised an additional resource that could potentially be mine in the future due to the location of the road realignment, and also would have excessive influx of groundwater from the old mined out areas into the open pit, which would be very costly to manage.

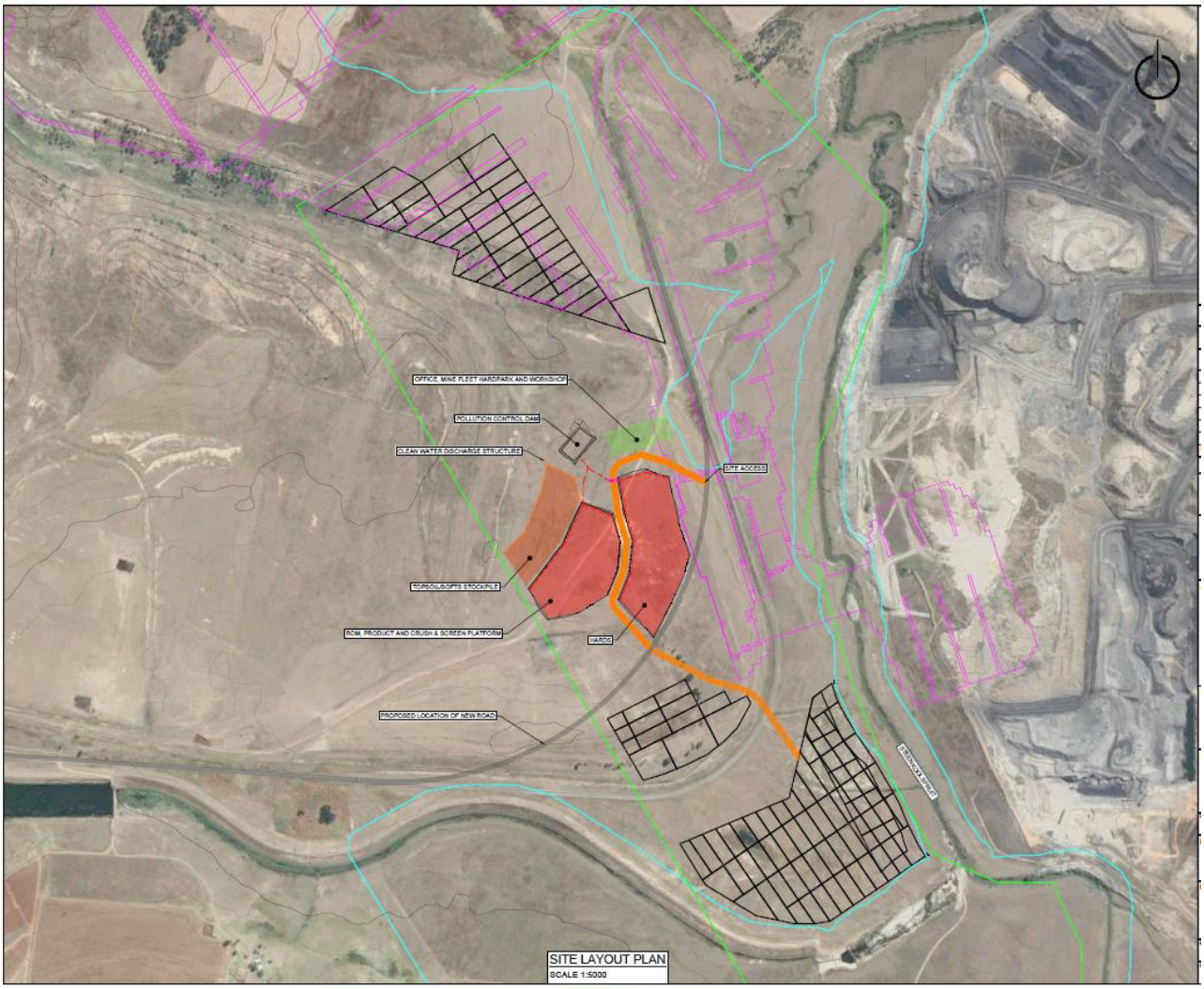

Figure 3.52: Alternative option

- The second option (Figure 3.53), which is the preferred option, had a road realignment that ensured no sterilization of future resources, and also excluded the Northern Pit, as a more financially viable option.

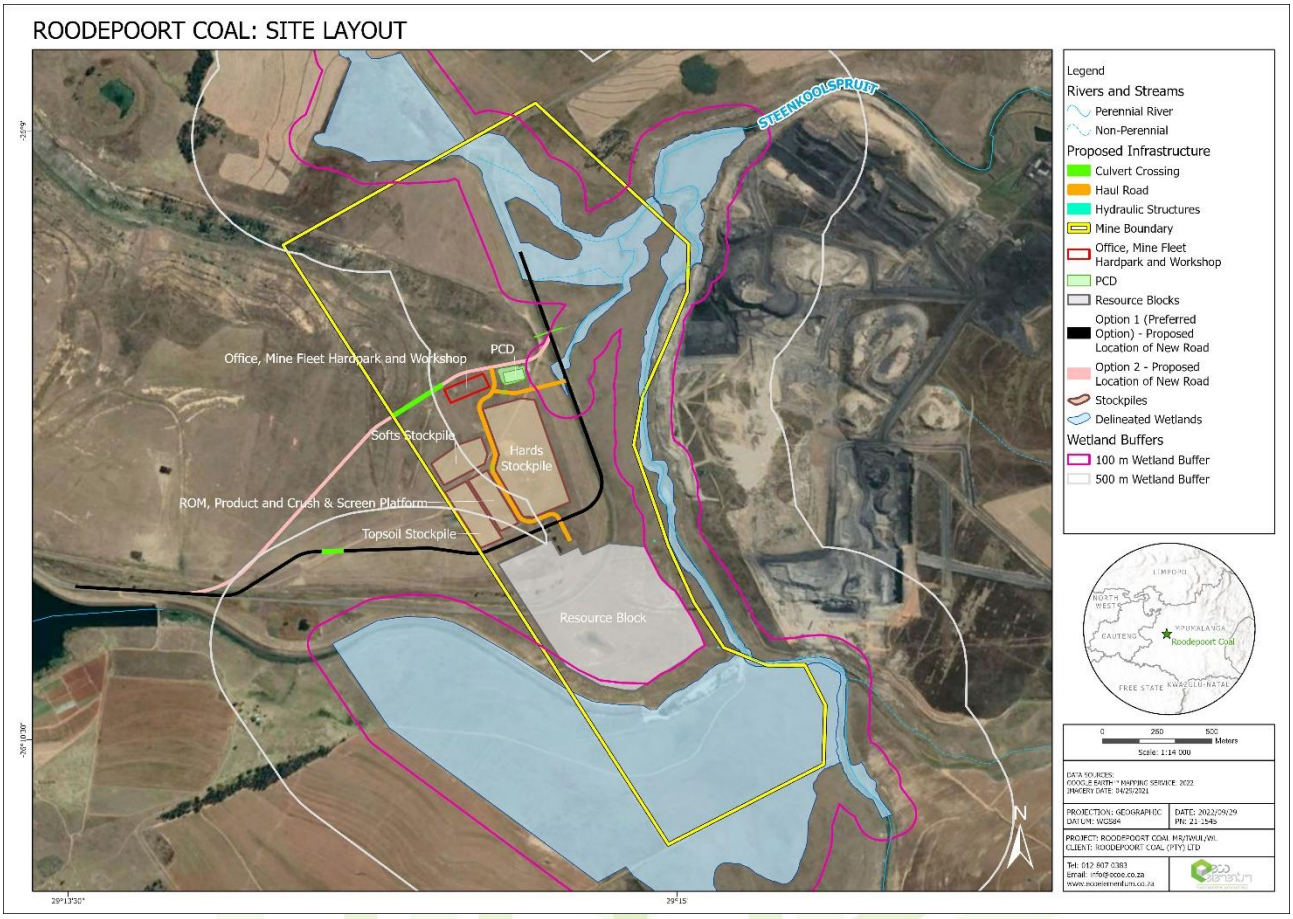

Figure 3.53: Prefered option

3.h 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

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 3.33: Impact Phases

Construction Phase:	**All the construction related activities on site related to Phase 2, until the contractor leaves the site**
Operational Phase:	All activities, including the operation and maintenance of the proposed development. Life of Mine is planned for 3 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.

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

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

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

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

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

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

3.i ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
Heritage									
Mining operations	Opencast mining, Blasting	Damage to cemetery - F01	Construction, operational	Negative	Low-Med	Positive	Low	Conservation buffer of 50 m	Avoid site, Review HIA if development footprints change
Mining Operations	Opencast mining	destruction of potential subsurface cultural material - B01	Construction, operational	Negative	Low	Positive	Low	If impact to the area is planned: ECO to monitor subsurface material	Contact archaeologist if findings are made
Noise									
Site clearance/establishment	Removal of vegetation	Bulldozers operating generating noise	Construction Phase	Negative	Low	Negative	Low	Limit the construction footprint to only the development area Noise barriers such as a berm between sensitive receptors Switch of equipment when not in use.	Demarcate the development area Ensure regular maintenance of construction equipment to ensure noise suppression mechanism are in good working order
Construction related activities	Movement of construction vehicles and heavy machinery	Equipment moving around and construction related noise	Construction Phase	Negative	Low	Negative	Low	Limit the construction footprint to only the development area Noise barriers such as a berm between sensitive receptors Switch of equipment when not in use	Ensure regular maintenance of construction equipment to ensure noise suppression mechanism are in good working order Maintain on-site roads to reduce road related noise
Mining	Material Handling (Loading and unloading of ROM, loading and unloading of stockpiles)	Excavators and truck loading and unloading generated noise	Operational Phase	Negative	Low-Med	Negative	Low	Noise barriers such as a berm between sensitive receptors Switch of equipment when not in use	Ensure regular maintenance of equipment to ensure noise suppression mechanism are in good working order
Mining	Haul trucks moving on the Haul Road	Haul truck moving on the Haul Roads	Operational Phase	Negative	Med	Negative	Low-Med	Noise barriers such as a berm between sensitive receptors	Ensure regular maintenance of equipment to ensure noise suppression mechanism are in good working order Maintain haul roads to reduce road related noise
Mining	Commercial trucks moving on the Access Road	Commercial Trucks moving on the access road	Operational Phase	Negative	Med	Negative	Low-Med	Noise barriers such as a berm between sensitive receptors	Ensure regular maintenance of equipment to ensure noise suppression mechanism are in good working order Maintain the access road to reduce road related noise
Mining	Crushing of Coal	Crusher plant generating Noise	Operational Phase	Negative	Med	Negative	Low-Med	Enclose the crusher to reduce the noise impact on the surrounding area	Enclose the crusher to reduce the noise impact on the surrounding area
Removal of any infrastructure	Movement of construction vehicles and heavy machinery	Demolition equipment generated noise	Decommissioning Phase	Negative	Low-Med	Negative	Low	Regulate the speed of the vehicles Noise barriers such as a berm between sensitive receptors Switch of equipment when not in use	Ensure regular maintenance of equipment to ensure noise suppression mechanism are in good working order Maintain on-site roads to reduce road related noise
Decommissioning, rehabilitation and post-closure	Reshaping of stockpiles and revegetation of the site	Bulldozers shaping the final landform generated noise	Decommissioning /Rehabilitation Phase	Negative	Low-Med	Negative	Low	Noise barriers such as a berm between sensitive receptors Switch of equipment when not in use	Ensure regular maintenance of equipment to ensure noise suppression mechanism are in good working order Maintain on-site roads to reduce road related noise

[1] Significance before Mitigation
[2] Significance after mitigation

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
	Post-Closure Phase rehabilitation								
Ecological Impacts (Wetland, Aquatic Terrestrial)									
Infrastructure, Work Revetments, New access routes, Site clearing for opencast area, Placement of cleared topsoil into allocated stockpiles, Use of heavy machinery	Erosion and sedimentation	Flow alterations	Construction	Negative	Med	Negative	Med	· Avoid wetland areas and their associated buffer zones. · Attenuation of stormwater from any establishment and its associated infrastructure is important to control the velocity of runoff towards the wetland systems. Attenuation structures must be placed between the development and associated infrastructure and the river. · Do not allow surface water or stormwater to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place. · Vegetation clearing must be undertaken as and when necessary in phases. The entire area must not be stripped of vegetation prior to commencing construction/establishment activities. · All demarcated sensitive zones outside of the construction area are strictly off limits during any mining activity. · Exposed soils must be rehabilitated as soon as practically possible to limit the risk of erosion. Erosion control measures must be employed where required. · Bank erosion must be monitored at regular intervals during the construction/establishment (and operational) phase in order to assess whether further river bank protection/stabilisation works are required. · Riparian vegetation bordering on drainage lines, wetlands and rivers will be considered environmentally sensitive and impacts on these habitats should be avoided. · If erosion has taken place, rehabilitation will commence as soon as possible. · All roads need to be maintained and any erosion ditches forming along the road filled and compacted. · Demarcated and bunded stockpiles and waste dumps will also be placed in areas where groundwater and surface water pollution can be avoided.	· Alien vegetation must be cleared prior to clearing/stripping new areas, to ensure alien vegetation is not spread to other areas. An alien invasive plant management plan needs to be compiled and implemented prior to construction to control and prevent the spread of invasive aliens. · A topsoil stripping and stockpiling guideline must be completed to ensure rehabilitation success. · Attenuation measures during construction/establishment of the development and associated infrastructure include, but are not limited to - the use of sand bags, erosion control blankets, and silt fences. · Long term attenuation measures, such as attenuation/infiltration trenches, swales must be established to control stormwater from hardened surfaces so as to Sustainable Urban Drainage Systems (SUDS): All storm water runoff from the site must be supplemented by an appropriate road drainage system that must include open, grass-lined channels/swales rather than simply relying on underground piped systems or concrete V-drains. SUDS will encourage infiltration across the site, provide for the filtration and removal of pollutants and provide for some degree of flow attenuation by reducing the energy and velocity of storm water flows through increased roughness when compared with pipes and concrete V-drains. · Any topsoil removed from the project footprint must be stockpiled separately from subsoil material and be stored suitably for use in rehabilitation activities. · Install sediment barriers (silt catchers and Reno mattresses) along any drainage construction areas to prevent the migration of silt towards the channel. · The construction zone should be clearly demarcated and maintained (e.g. with danger tape, signs etc.) prior to the commencement of construction/establishment activities to ensure that construction vehicles do not unduly disturb riparian areas. Construction activity may not take place closer than 32 m from the watercourses · Stabilise, re-shape and rehabilitate disturbed areas as soon as practically possible (within 3 weeks of disturbance) with indigenous wetland and riparian vegetation. Such rehabilitation should be informed by a suitable replanting and re-vegetation programme, sand bags, silt fencing, etc. A mix of rapidly germinating indigenous vegetation must be used. · Berms/ earthen walls should be vegetated in order to avoid erosion and sedimentation. · Runoff water from the waste dumps, stockpiles and
Increased traffic, Use of heavy machinery, Bank Erosion	Erosion and sedimentation	Flow alterations	Operations	Negative	High	Negative	Med-High		

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
									contaminated stormwater will be channelled into pollution control dams to avoid effects on the aquatic ecosystem. The water in these pollution control dams will be reused during the mining operations. · The runoff will be routinely monitored for acidity and salinity as an early warning for potential increases in salinity or acidic drainage water.
Use of heavy machinery	Accidental spillages of chemicals, cements, oils, etc.	Pollution of watercourse	Construction	Negative	Med	Negative	Med	· Demarcate wetland areas to avoid unauthorised access. · Cut-off trenches must be constructed to prevent any harmful substances from entering the wetland areas. · Materials needed for construction must be stored in a construction camp in the applicable manner · Education of workers is key to establishing good pollution prevention practices. Training programs must provide information on material handling and spill prevention and response, to better prepare employees in case of an emergency. · The proper storage and handling of hazardous substances (hydrocarbons and chemicals) needs to been ensured. · Industry Best Practise Guidelines and Standards needs to be implemented in terms of tailings storage design. Built-in engineering designs such as drainage systems and decanting pools are recognised as mitigation measures.	· No washing of any construction equipment in close proximity to the channel or any wetlands is permitted. · No releases of any substances that could be toxic to fauna or faunal habitats within the channel or any wetland areas is permitted. · Do not locate the construction camp or any depot for any substance within a distance of 200 m from the wetland systems or 100 m from any drainage channels. · Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed and the affected area rehabilitated immediately. · Portable toilets must be placed on impervious level surfaces that are lipped to prevent spillage. The general consensus is that they should be within 30 m to 50 m of a work face hazardous substances must be stored in bunded areas; sand and stone in such a manner to reduce wind and water pollution, etc. · Signs should also be placed at appropriate locations to remind workers of good housekeeping practices including litter and pollution control. All employees handling fuels and other hazardous materials are to be properly trained. Storage containers must be regularly inspected so as to prevent leaks. · Ensure that any rubbish/litter is cleared once a month as to minimise litter near the watercourses. These will need to be cleaned out in accordance with a regular maintenance programme. · Water quality will be monthly monitored at aquatic ecosystems associated with the site activities. This includes sites upstream and downstream of the tailings storage facility so that further mitigation measures can be implemented. · Ensure pollution sources are isolated through clean and dirty water separation and monitor this throughout the lifespan of the Roodepoort Colliery. · All contractors and employees should undergo induction which is to include a component of environmental awareness
Increased traffic, Increased road runoff during rainfall events	accidental spills of hydrocarbon materials Hazardous materials entering the watercourses	Pollution of watercourse	Operational	Negative	High	Negative	Med-High		

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
New access routes, Placement of cleared topsoil into allocated stockpiles	Use of heavy machinery, Bank trampling leading to erosion	Spread of alien invasive vegetation	Construction	Negative	Med	Negative	Low-Med	· An alien invasive management programme must be incorporated into an Environmental Management Programme.	· Ongoing alien plant control must be undertaken during the construction/establishment and operational phase and particularly in the disturbed areas as these areas will quickly be colonised by invasive alien species, especially in the riparian zone, which is particularly sensitive to AIP infestation. · Herbicides must be carefully applied, in order to prevent any chemicals from entering the river. Spraying of herbicides within or near to the wetland areas is strictly forbidden. · Re-instate indigenous vegetation (grasses and indigenous trees) in disturbed areas directly after construction ceases so as to stabilise against erosion and sedimentation.
Hardened surfaces	Increased runoff, Increased traffic	Spread of alien invasive vegetation	Operational	Negative	Med-High	Negative	Med		
Groundwater									
Surface clearing and preparation.	Removal of vegetation.	Increase in surface run-off and therefore decrease in aquifer recharge.	Construction	Negative	Low	Negative	Low	Re-vegetate.	Rehabilitation plan.
Box Cut	Dewatering.	Decrease in water level from the point where development is lower than the water level.	Construction	Negative	Med-High	Negative	Med-High	No management can be incorporated to limit the impacts of dewatering should the box-cut floor be lower than the groundwater level.	Quarterly monitoring of monitoring boreholes.
Topsoil and overburden stockpiling.	Leaching from stockpiles.	Acid generation in the case of carbonaceous material placement.	Operation	Negative	Low-Med	Negative	Low	Should a contamination plume be detected, groundwater abstraction to contain plume.	Quarterly monitoring of monitoring boreholes.
ROM stockpiling.	Leaching from stockpiles.	Acid generation as a result of carbonaceous material.	Operation	Negative	Low-Med	Negative	Low	Should a contamination plume be detected, groundwater abstraction to contain plume.	Quarterly monitoring of monitoring boreholes.
Pollution Control Dams	Seepage should lining fail or dam overflow	Contaminated water in the dams can seep to the aquifer.	Operation	Negative	Low-Med	Negative	Low	Should a contamination plume be detected, groundwater abstraction to contain plume.	Quarterly monitoring of monitoring boreholes.
Hydrocarbon spills.	Plume migration.	Spills from mining vehicles can infiltrate to the aquifer and cause a down gradient plume migration.	Construction & Operation	Negative		Negative		Clean any hydrocarbon spills in the appropriate manner.	Report any hydrocarbon spillage. Ensure spill kits are always available and personnel trained in how to use them.
Opencast mining	Dewatering	The water infiltrating the voids will be removed for safe mining, causing a decrease in the water level.	Operation	Negative	High	Negative	High	No management can be incorporated to limit the impacts of dewatering.	Quarterly Monitoring. Compensate users for losses. Monitor pit inflow rates, Annual Monitoring report, Update Numerical Model.
Closure of the mine	Groundwater rebound	Groundwater decant is expected should the system behave as predicted. Decant is expected to occur on the lowest elevation on the pit boundary.	Closure and Decommissioning	Negative	Low-Med	Negative	Low	Treat decant water before release to the environment	Establish a Passive treatment system in the form of a constructed wetland or similar.

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
Closure of the mine	Groundwater rebound	Pollution Plume spread	Closure and Decommissioning	Negative	Low-Med	Negative	Low-Med	Treat decant water before release to the environment	Establish a Passive treatment system in the form of a constructed wetland or similar.
Surface Water									
Construction activities	Vegetation clearance and site establishment	Sedimentation and pollution of the Watercourse	Construction Phase	Negative	Med-High	Negative	Med	Separate Clean and Dirty Water System	Construct and implement SWMP
Dewatering	Water level drawdown	Reduction in Baseflow	Operational Phase	Negative	Med-High	Negative	Med-High	No mitigation available	N/A
Operational Activities	Hydrocarbon spills Dirty Water release Sediment runoff	Water quality deterioration	Operational Phase	Negative	High	Negative	Med	Separate Clean and Dirty Water System	Construct and implement SWMP
Closure of the mine	Groundwater rebound	Decant of poor quality water	Closure and Decommissioning	Negative	Med-High	Negative	Low-Med	Treat decant water before release to the environment	Establish a Passive treatment system in the form of a constructed wetland or similar.
Air Quality									
Site clearance/establishment	Removal of vegetation	Bulldozers generating fugitive particulate matter emissions including Dust and PM10	Construction Phase	Negative	Low	Negative	Low	Limit the construction footprint to only the development area	Demarcate the development area Implement monitoring program to monitor the off-site impacts
Construction related activities	Movement of construction vehicles and heavy machinery	Fugitive particulate matter emissions including Dust and PM10 from vehicle moving on roads	Construction Phase	Negative	Low	Negative	Low	Limit the construction footprint to only the development area Implement dust suppression specially on windy days	Implement dust suppression activities on the relevant areas Revegetate open areas as soon as possible Implement monitoring program to monitor the off-site impacts
Mining	Material Handling (Loading and unloading of ROM, loading and unloading of stockpiles)	Fugitive particulate matter emissions including Dust and PM10	Operational Phase	Negative	Low-Med	Negative	Low	Water sprays at tipping points Wind breaks at tipping points	Water Sprays at tipping points Implement monitoring program to monitor the off-site impacts
Mining	Wind Erosion	Wind blown fugitive particulate matter emissions including Dust and PM10 from stockpiles	Operational Phase	Negative	Med	Negative	Low-Med	Water sprays at ROM stockpiles Revegetate topsoil and OVB stockpiles	Water sprays at ROM stockpiles Revegetate topsoil and OVB stockpiles Implement monitoring program to monitor the off-site impacts
Mining	Haul trucks moving on the Haul Road	Fugitive particulate matter emissions including Dust and PM10 from vehicles moving on the Haul road	Operational Phase	Negative	Med-High	Negative	Med-High	Water Sprays mitigating 75%	Water sprays spraying >2l/m² on the Haul road Implement monitoring program to monitor the off-site impacts
Mining	Commercial trucks moving on the Access Road	Fugitive particulate matter emissions including Dust and PM10 from vehicles moving on the Access road	Operational Phase	Negative	Med-High	Negative	Med-High	Adding a dust binding additive to the access road to achieve 90% or more mitigation	Adding a dust binding additive to the access road Implement monitoring program to monitor the off-site impacts
Mining	Crushing of Coal	Fugitive particulate matter emissions including Dust and PM10 from the crusher plant	Operational Phase	Negative	Med	Negative	Low-Med	Water sprays or fully enclose the crusher	Water sprays or fully enclose the crusher Implement monitoring program to monitor the off-site impacts

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
Removal of any infrastructure	Movement of construction vehicles and heavy machinery	Fugitive particulate matter emissions including Dust and PM10 from vehicle moving on roads	Decommissioning Phase	Negative	Low-Med	Negative	Low	Regulate the speed of vehicles on site Implement dust suppression activities	Implement a suitable speed limit of construction vehicles Implement dust suppression activities on the relevant areas
Decommissioning, rehabilitation and post-closure	Reshaping of stockpiles and revegetation of the site Post-Closure Phase rehabilitation	Fugitive particulate matter emissions including Dust and PM10 from bulldozers shaping the landform	Decommissioning /Rehabilitation Phase	Negative	Low-Med	Negative	Low	Revegetate areas/slopes with suitable indigenous vegetation	Consult a botanist if needed Implement monitoring programmes to monitor any rehabilitated areas for at least a year after closure
Visual									
Site clearance/establishment	Removal of vegetation	Negative impact on aesthetics - due to the site being more visible	Pre-Construction Phase	Negative	Low	Negative	Low	Limit the construction footprint to only the development area	Demarcate the development area
Construction related activities	Movement of construction vehicles and heavy machinery Presence of laydown areas and construction camp	Dust creation and change in visual/landscape character	Construction Phase	Negative	Low	Negative	Low	Limit the construction footprint to only the development area Regulate the speed of vehicles on site Implement dust suppression activities Laydown areas and construction camps should blend in or be screened from surrounding sensitive receptors	Implement a suitable speed limit of construction vehicles Implement dust suppression activities on the relevant areas Locate laydown areas and construction camps in areas where they would be less visible to the surrounding sensitive receptors, or screen these areas using suitable screening methods
Construction related activities	Night Lighting	Light pollution at night on the identified sensitive receptors	Construction Phase	Negative	Low	Negative	Low	Reduce spill light and glare	Choose lighting types which reduce spill light and glare Only focus lighting to where it is needed When possible, limit construction activities to daylight hours
Mining activity	Presence and operation of open pit mining, stockpiles and ancillary infrastructure	Visual impact on surrounding identified sensitive receptors	Operational Phase	Negative	Med	Negative	Low-Med	Establish visual screens/barriers between the development and the identified sensitive receptors Limit the height of topsoil stockpiles and waste rock dumps where possible Ancillary infrastructure should blend in with the surrounding existing sense of place	Plant indigenous vegetation along the western border of the site boundary Consult a botanist/landscape architect if needed Ancillary infrastructure should be painted natural colours
Mining activity	Movement of construction vehicles and heavy machinery	Dust creation and change in visual/landscape character due to an increased number of vehicles	Operational Phase	Negative	Low-Med	Negative	Low	Limit the operational activities to only the development area Regulate the speed of vehicles on site Implement dust suppression activities	Implement a suitable speed limit of construction vehicles Implement dust suppression activities on the relevant areas
Mining activity	Night lighting	Light pollution at night on the identified sensitive receptors	Operational Phase	Negative	Low-Med	Negative	Low	Reduce spill light and glare	Choose lighting types which reduce spill light and glare Only focus lighting to where it is needed
Removal of any infrastructure	Movement of construction vehicles and heavy machinery	Dust creation and change in visual/landscape character due to an increased number of vehicles	Decommissioning Phase	Negative	Low-Med	Negative	Low	Regulate the speed of vehicles on site Implement dust suppression activities	Implement a suitable speed limit of construction vehicles Implement dust suppression activities on the relevant areas

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
Decommissioning, rehabilitation and post-closure	Reshaping of stockpiles and revegetation of the site Post-Closure Phase rehabilitation	Change in landscape character	Decommissioning /Rehabilitation Phase Post-Closure Phase	Negative	Low-Med	Negative	Low	Revegetate areas/slopes with suitable indigenous vegetation Where possible, reshape the area so that it resembles the pre-construction landscape Remove as much infrastructure as possible Ensure that residual infrastructure remains in good condition where possible	Consult a botanist/landscape architect if needed Implement monitoring programmes to monitor any rehabilitated areas for at least a year after closure
Soils, Land Use, Land Capability and hydropedology									
Site Preparation	Soil stripping	Loss of topsoil	Construction	Negative	High	Negative	Med-High	— Limit earthworks and vehicle movement to demarcated paths and areas. — Limit the duration of construction activities where possible, especially those involving earthwork / excavations. — Access roads associated with the development should have gradients or surface treatment to limit erosion, and road drainage systems should be accounted for.	— Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces and soil stockpiles should be re-vegetated or stabilised as soon as is practically possible. — A storm water management plan should be designed for the site and adhered-to. — During periods of strong winds, stockpiles should be covered with appropriate material (e.g. cloth, tarpaulin).
Site Preparation	Vehicles and equipment, vegetation removal and earthworks.	Erosion and Sedimentation	Construction	Negative	Med-High	Negative	Med	— Limit earthworks and vehicle movement to demarcated paths and areas. — Limit the duration of construction activities where possible, especially those involving earthwork / excavations. — Access roads associated with the development should have gradients or surface treatment to limit erosion, and road drainage systems should be accounted for.	Implement and maintain approved engineered roads, and continuously monitor culverts for blockages and damage. Rectify where required. — Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces and soil stockpiles should be re-vegetated or stabilised as soon as is practically possible. — A storm water management plan should be designed for the site and adhered-to. — During periods of strong winds, stockpiles should be covered with appropriate material (e.g. cloth, tarpaulin).
Site Preparation	Earthworks	Change in Surface Profile	Construction	Negative	Low-Med	Negative	Low-Med	Re-establish surface profile at closure.	Implement the landscape rehabilitation plan as per the approved designs for sloping and rehabilitation.
Site Preparation	Vegetation Removal	Change in Land Use	Construction	Negative	Med-High	Negative	Med-High	Re-establish the area as a functioning wetland at closure.	Implement the landscape rehabilitation plan as per the approved designs for sloping and rehabilitation.
Site Preparation	Vehicles and equipment, vegetation removal and earthworks.	Change in Land Capability	Construction	Negative	Med-High	Negative	Med-High	— Limit earthworks and vehicle movement to demarcated paths and areas. — Limit removal of vegetation to demarcated areas only. — Avoid materials that sterilize the soil.	Demarcate areas that are not allowed to be accessed All chemicals and construction material should be stored within bunded or designated dirty areas within the dirty water catchment.
Site Preparation	Vehicles and equipment, onsite personnel	Soil Contamination	Construction	Negative	High	Negative	Low-Med	Avoid spills and contamination of soil on site	— On-site vehicles should be well-maintained, — Drip trays should be placed under stationary vehicles / plant; — On-site pollutants/hazardous materials should be contained in a bunded area and on an impermeable surface; — Ensure proper control of dangerous substances entering the site; — Adequate disposal facilities should be provided, and A non-polluting environment should be enforced.

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
Ongoing mine management	Continued soil stripping	Loss of Topsoil	Operation	Negative	High	Negative	Med	Avoid soil erosion outside of construction areas Limit bare areas to a minimum.	— The site should be monitored for signs of erosion continually — Bare areas should be kept well vegetated — An operational-phase storm water management plan should be designed for the site and adhered-to.
Ongoing mine management	Bare soil	Erosion and Sedimentation	Operation	Negative	Med-High	Negative	Low-Med	Avoid soil erosion outside of construction areas Limit bare areas to a minimum.	— The site should be monitored for signs of erosion continually — Bare areas should be kept well vegetated — An operational-phase storm water management plan should be designed for the site and adhered-to.
Ongoing mine management	Vehicles and equipment, onsite personnel, chemical storage.	Soil Contamination	Operation	Negative	Med-High	Negative	Low-Med	— Ensure proper control of substances entering the site; — Adequate disposal facilities should be provided, and — A non-polluting environment should be enforced.	— Chemicals should be stored in fully enclosed areas and the car park area should be covered. Both should be on impermeable hardstanding. — Hardstanding should be monitored for cracks. — If chemicals are kept outside of the enclosed area temporarily, this area should be on hardstanding and bunded.
Land Rehabilitation	Vehicles and equipment.	Erosion and Sedimentation	Closure	Negative	Med-High	Negative	Low	— Limit earthworks and vehicle movement to demarcated paths and areas. — Limit the duration of deconstruction activities where possible.	Fence off No-go areas — Access roads associated with decommissioning should have gradients or surface treatment to limit erosion, and road drainage systems should be accounted for. — Exposed surfaces should be re-vegetated or stabilised as soon as is practically possible. — A decommissioning-specific storm water management plan should be designed for the site and adhered-to.
Land Rehabilitation	Vehicles and equipment, onsite personnel.	Soil Contamination	Closure	Negative	Med-High	Negative	Low	Avoid spills and contamination of soil on site	— On-site vehicles should be well-maintained, — Drip trays should be placed under stationary vehicles / plant; — On-site pollutants/hazardous materials should be contained in a bunded area and on an impermeable surface; — Ensure proper control of dangerous substances entering the site; — Adequate disposal facilities should be provided, and A non-polluting environment should be enforced.
Social Economic									
Establishment of underground mine	Mining	Employment opportunities	Construction and Operational Phase	Positive	Med-High	Positive	High	Where reasonable and practical the mine should appoint local contractors; Opportunities for training of workers should be maximised; Ways to enhance local community benefits with a focus on broad based BEE need to be explored; Establish targets for the employment and training; Train workforce for longer term employment; Prevent nepotism/corruption in local recruitment structures; Conditions stipulated by property owners in terms of the construction activities should be implemented and monitored; All activities should be restricted to working areas; workers should wear name tags and clothing to	Implement SLP

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
								ensure that they can be readily identified A specific contact person should be identified to allow community members and property owners to easily direct their queries and concerns and obtain general information regarding the operations; Vehicles used should be clearly marked; Promote employment of women and youth;	
Supplier acquisition	Direct and indirect appointment of local suppliers	Multiplier effect on the local economy	Construction and Operational Phase	Positive	Med-High	Positive	High	Linkages with skills development/ Small, Medium and Micro Enterprises (SMME) development institutions and other mining operations; Preference should be given to capable subcontractors who based within the local municipal area; Monitoring of sub-contractors procurement; Local procurement targets should be formalised in the mines procurement policy.	Development of a register of local SMMEs; SMME skills development as part of mine SLP/LED commitments
Mining operation	Community development	Social upliftment	Construction and Operational Phase	Positive	Med-High	Negative	High	Ensure that there is stakeholder buy-in; Collaboration with other developmental role players (e.g. local and district municipalities, neighbouring mines and NGOs) during implementation of envisaged projects, and where possible aligning envisaged development projects with existing ones;	Aligning LED projects with those of other development role-players Liaison with beneficiaries to ensure needs are met; Expanding its skills development and capacity building programmes for non-employees Monitoring system to regulate Historically Disadvantaged South African procurement Where feasible, training should be NQF Accredited; and A record of training courses completed per individual should be kept.
Mining operation	Mining activities	Impact on health and safety	Construction and Operational Phase	Negative	Med	Negative	Low	Measures suggested minimising the impact of flyrock on surrounding roads and structure; Measures suggested in the Health Impact Assessment to minimize traffic related accidents; Traffic calming measures to prevent speeding Road maintenance; Provide safe road crossing points and fencing of the main road and the mine site	Access control to all project elements, including fencing; Personal Protective Equipment for mine workers; Notification of blasting schedules; Blasting and storage of hazardous materials to adhere to prescribed regulation speed bumps and speed limit installation Community education to sensitize community members to potential traffic and blasting safety risks
Mining operations	Mine area access restrictions	Change in access and movement to resident and livestock	Construction and Operational Phase	Negative	High	Negative	Med	Where possible ensure that access to fields and grazing areas are uninterrupted The Mine should ensure that residents are kept informed on a day-to-day basis of construction progress and of when access will be blocked; Measures to prevent deterioration of roads suggested in Traffic Impact Assessment (e.g. drivers to report road deterioration to the NW Province Department of Transport); Regulation of traffic at intersections and access roads to the site; Ensure that access to key services are uninterrupted	Provide alternative access routes and/or temporary access points during construction and operational activities Road upgrading measures should be investigated and implemented in conjunction with the relevant government department (e.g. repairing and rehabilitating the main roads and sealing the roadway to increase its capacity for Heavy Moving Vehicles);

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
Mine establishment	Change in land use	LOSS OF AND/OR DAMAGE TO AGRICULTURAL LAND AND INFRASTRUCTURE	Construction and Operational Phase	Negative	High	Negative	Med	Ensure that the project design and associated layout seeks to minimise the project footprint, thus minimising the loss of agricultural land; engage with each directly affected landowner; Mitigation measures should be implemented to avoid any negative impact on animals (e.g. fencing off the construction area); Where damage is incurred, suitable remedial action must be negotiated with the affected farmer; Prepare a site Rehabilitation Plan that will be implemented as part of the decommissioning phase.	Should the Mine acquire the full farm and the project footprint only affects a portion of the land, the surrounding usable land should be utilised for agricultural purposes where possible; Remedial action for the temporary loss of cultivated land should be included in the negotiation process with the surrounding landowner; Roodepoort Colliery should discuss the construction schedule and activities with the affected farmers to enable them to plan their farming activities and livestock movement accordingly;
Mine establishment	Influx of job seekers	INCREASED PRESSURE ON MUNICIPAL SERVICES	Construction and Operational Phase	Negative	High	Negative	Med	Liaise openly and frequently with affected stakeholders to ensure they have information about the proposed Koppie Mining Project; and Liaison with district and local municipalities well in advance to ensure needs are met Ensure that municipalities consider expected population influx Promotion of mining methods to allow for surface development	Influx management to make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders.
Mine establishment	Mine operations	Increased Nuisance Factors and Changed Sense of Place	Construction and Operational Phase	Negative	Med	Negative	Med	Minimise all nuisance factors such as noise, air quality, traffic, and visual-Liaise openly and frequently with affected stakeholders to ensure they have information about activities that will generate nuisance factors.	Implement all mitigation measures as specified in the relevant specialist studies; Make available, maintain and effectively implement a grievance/complaint register that is easily accessible to all neighbours and affected stakeholders;
Roll Over Mining	Influx of workers and job seekers	Increased social pathologies	Operation	Negative	High	Negative	Med	Limit, as far as reasonably possible, social ills caused by influx of workers and job-seekers; Discourage influx of job-seekers by prioritising employment of unemployed members of local communities; implement measures to address potential conflict between locals and non-locals.	Maximisation of the proportion of job opportunities allocated to locals; Workers should be clearly identifiable by wearing proper construction uniforms; The appointed contractor should establish clear rules and regulations for access to the site Extensive HIV/AIDS awareness and general health campaign; Create synergies with local government IDP and other companies' SLP/CSR projects to promote infrastructure development if possible.
Mine closure	DEPENDENCY ON MINE FOR SUSTAINING LOCAL ECONOMY	Job losses	Closure and Decommissioning	Negative	High	Negative	Med	Effect retrenchments according to procedures stipulated in approved SLP; The Mine's SLP should provide strategies and measures that prevent job loss; Support economic diversification through development of alternative markets; Alternatives to save jobs/avoid downscaling should be investigated beforehand; Proactively assess and manage the social and economic impacts on individuals, regions and	Develop a Mine Closure Plan; Proactively and effectively implement mine closure plan; Collaborate with adjacent mining companies to develop and implement sustainable community; Develop alternative and sustainable livelihoods; Partner with the relevant government departments, to jointly manage Closure process.

Activity	Aspect	Impact	Phase	+/-	SBM[1]	+/-	SAM[2]	Mitigation measures	Action Plan
								economies where retrenchment and/or closure of the mine are certain; and	
Traffic Assessment									
Increased road traffic	Employees traveling from and to the mine, and haul trucks entering and exiting the mine.	Degradation of road	Construction and Operational phase	Negative	Low-Med	Negative	Low	Improve road surfacing	The section of Road between the mine access road and Road R545 and R547 should be repaired and maintained in an acceptable manor for safe traveling
Blast and Vibration									
Blasting	Opencast Mining	Ground Vibrations	Construction	Negative	Low-Med	Negative	Low	Limit ground vibrations to an acceptable value with a proper blast design, measure and record, evaluate and improve.	Blast Designs and Codes of Practice
Blasting	Opencast Mining	Air blasts	Construction	Negative	Low-Med	Negative	Low	Limit the decibels to an acceptable value with a proper blast design, measure and record, evaluate and improve.	Blast Designs and Codes of Practice

3.j SUMMARY SPECIFIC SPECIALIST RECOMMENDATIONS

List of Studies undertaken	Recommendations of Specialist Reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report
Groundwater Assessment	• Sufficient financial provision should be provided for the treatment of acid mine drainage (AMD) or decant of polluted water. • The impacts on the groundwater regime are inevitable, but with the proper proposed mitigation measures in place the impact can be limited.	X	Section 3.i and within the EMP
Ecological Assessment	• A protection buffer around wetland and sensitive areas of 55 m is recommended; • Ongoing water quality monitoring must take place every month during operational phases; and • Biomonitoring where/if flow conditions allow for effective sampling analysis must take place bi-annually to determine any trends in ecology and hydrology.	X	Section 3.i and within the EMP
Heritage Assessment	• In order to prevent accidental damage to the graves, a fenced-off conservation buffer of 50 m is recommended. Access to the cemetery should also not be refused.	X	Section 3.i and within the EMP
Social-Economic Assessment	• It is recommended that the mitigation measures described in the report be incorporated into the Environmental Management Programme for the proposed mining at Nwanyeketi (Roodepoort) Colliery and, where relevant, into the contract conditions to be issued to the contractors. Measures should also be put in place to monitor and assess the implementation of these mitigation measures and to take corrective action where necessary.	X	Section 3.i and within the EMP
Paleontology	• There is a chance that fossils may occur in below the ground surface in the shales of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr.	X	Section 3.i and within the EMP
Blast and Vibrations	• Small amount of explosive charge per delay should be used when blasting in close proximity to sensitive receptors. • The delays between the rows must not strengthen the shockwave, i.e., single hole firing with electronic detonators. • Blast parallel to the main joint set or geological discontinuities (dolerite dyke intrusions, slips etc.). • Use a pre-split or other highwall control drilling method to isolate the main blast-block from the rest of the rock mass, i.e., create a second free face. • Electronic, single hole firing is the preferred method to reduce the amount of explosive charge per delay.	X	Section 3.i and within the EMP
Soils assessment	• It is recommended that mitigation and management measures be strictly adhered to.	X	Section 3.i and within the EMP
Visual assessment	• It is still highly recommended that the recommended mitigation measures are implemented to help reduce potential cumulative visual impacts on the surrounding sensitive receptors. • It is further recommended that the environmental authorities consider the overall cumulative impact on the areas sense of place before a final decision is made with regard to the optimal number of mining activities within the area.	X	Section 3.i and within the EMP

3.k ENVIRONMENTAL IMPACT STATEMENT

3.k.i The Key Findings of the Environmental Impact Assessment and Positive and Negative Impacts Identified

The impacts that have been rated as medium or high risk after prioritisation must be carefully managed throughout the LOM in order to ensure the project is sustainable from an economic, social and environmental point of view. The project will stimulate the local economy and contribute to the national GDP, which in the current economic climate, is a positive impact. The negative impact on natural resources (groundwater, surface water, air quality and soils) can however not be avoided, but only managed and mitigated to a certain extent. It is therefore of utmost importance that monitoring is undertaken as stipulated within the EMP. The recommended mitigation measure reduce the impact severity and significant when implemented.

Table 3.34: Impacts of Medium to High Risk

Activity	Aspect	Impact	÷	SBM	÷	SAM
Ecological Impacts (Wetland, Aquatic Terrestrial)						
Infrastructure, Work Revetments, New access routes, Site clearing for opencast area, Placement of cleared topsoil into allocated stockpiles, Use of heavy machinery	Erosion and sedimentation	Flow alterations	Negative	Med	Negative	Med
Increased traffic, Use of heavy machinery, Bank Erosion	Erosion and sedimentation	Flow alterations	Negative	High	Negative	Med-High
Use of heavy machinery	Accidental spillages of chemicals, cements, oils, etc.	Pollution of watercourse	Negative	Med	Negative	Med
Increased traffic, Increased road runoff during rainfall events	accidental spills of hydrocarbon materials Hazardous materials entering the watercourses	Pollution of watercourse	Negative	High	Negative	Med-High
Hardened surfaces	Increased runoff, Increased traffic	Spread of alien invasive vegetation	Negative	Med-High	Negative	Med
Groundwater						
Box Cut	Dewatering.	Decrease in water level from the point where development is lower than the water level.	Negative	Med-High	Negative	Med-High
Opencast mining	Dewatering	The water infiltrating the voids will be removed for safe mining, causing a decrease in the water level.	Negative	High	Negative	High
Surface Water						
Construction activities	Vegetation clearance and site establishment	Sedimentation and pollution of the Watercourse	Negative	Med-High	Negative	Med
Dewatering	Water level drawdown	Reduction in Baseflow	Negative	Med-High	Negative	Med-High
Operational Activities	Hydrocarbon spills Dirty Water release Sediment runoff	Water quality deterioration	Negative	High	Negative	Med
Air Quality						
Mining	Haul trucks moving on the Haul Road	Fugitive particulate matter emissions including Dust and PM10 from vehicles moving on the Haul road	Negative	Med-High	Negative	Med-High
Mining	Commercial trucks moving on the Access Road	Fugitive particulate matter emissions including Dust and PM10 from vehicles moving on the Access road	Negative	Med-High	Negative	Med-High
Soils, Land Use, Land Capability and hydropedology						
Site Preparation	Soil stripping	Loss of topsoil	Negative	High	Negative	Med-High
Site Preparation	Vehicles and equipment, vegetation removal and earthworks.	Erosion and Sedimentation	Negative	Med-High	Negative	Med
Site Preparation	Vegetation Removal	Change in Land Use	Negative	Med-High	Negative	Med-High
Site Preparation	Vehicles and equipment, vegetation removal and earthworks.	Change in Land Capability	Negative	Med-High	Negative	Med-High
Ongoing mine management	Continued soil stripping	Loss of Topsoil	Negative	High	Negative	Med
Social Economic						

Activity	Aspect	Impact	+/-	SBM	+/-	SAM
Establishment of underground mine	Mining	Employment opportunities	Positive	Med-High	Positive	High
Supplier acquisition	Direct and indirect appointment of local suppliers	Multiplier effect on the local economy	Positive	Med-High	Positive	High
Mining operation	Community development	Social upliftment	Positive	Med-High	Negative	High
Mining operations	Mine area access restrictions	Change in access and movement to resident and livestock	Negative	High	Negative	Med
Mine establishment	Change in land use	LOSS OF AND/OR DAMAGE TO AGRICULTURAL LAND AND INFRASTRUCTURE	Negative	High	Negative	Med
Mine establishment	Influx of job seekers	INCREASED PRESSURE ON MUNICIPAL SERVICES	Negative	High	Negative	Med
Mine establishment	Mine operations	Increased Nuisance Factors and Changed Sense of Place	Negative	Med	Negative	Med
Roll Over Mining	Influx of workers and job seekers	Increased social pathologies	Negative	High	Negative	Med
Mine closure	DEPENDENCY ON MINE FOR SUSTAINING LOCAL ECONOMY	Job losses	Negative	High	Negative	Med

3.k.ii Final Site Map

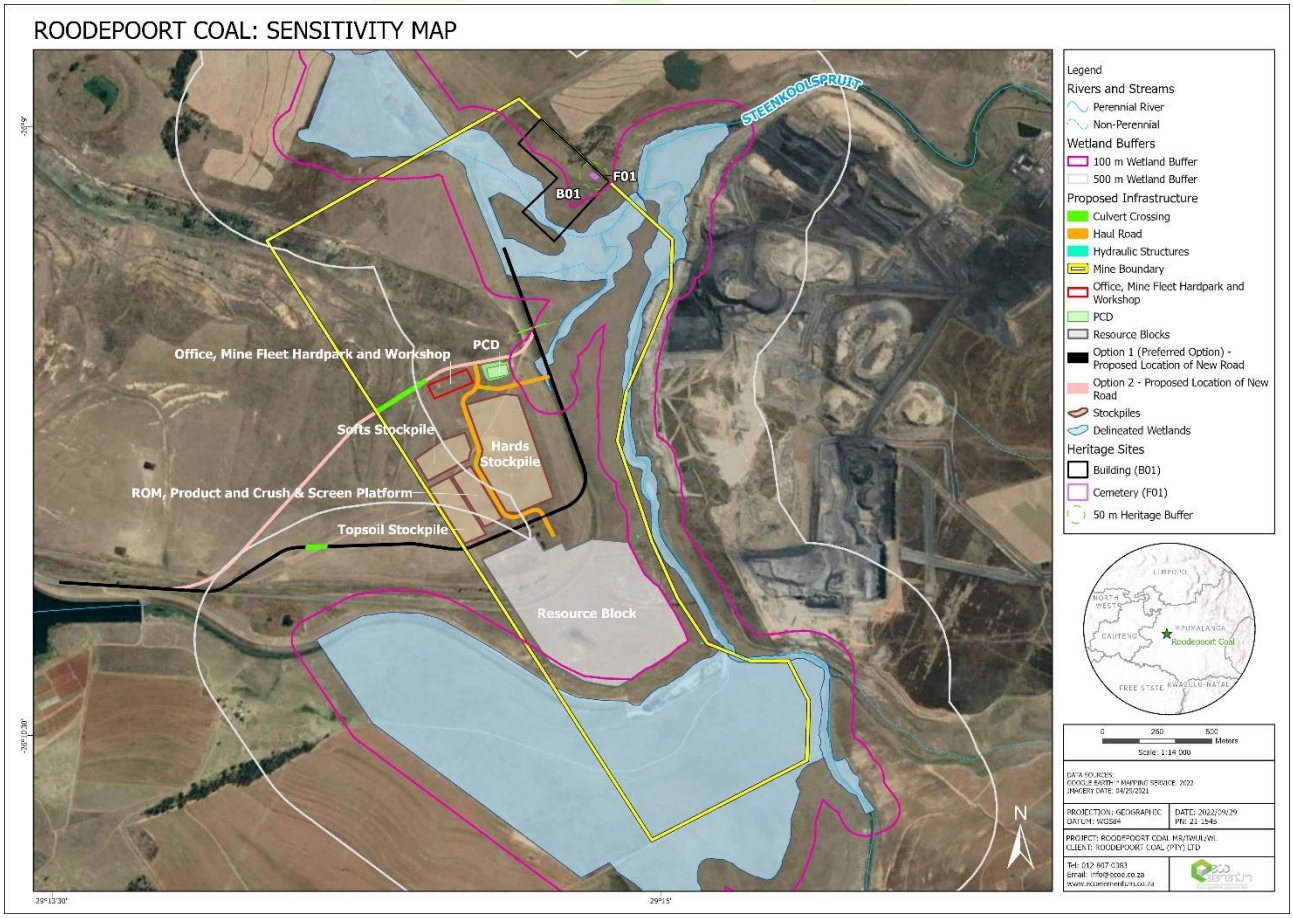

Figure 3.54: Final Site Layout

3.k.iii Summary of Positive and Negative Implications and Risks of the Proposed Activity and Identified Alternatives

Table 3.35: Advantages and Disadvantages regarding beneficiation alternatives

Description	Advantages	Disadvantages
Beneficiation Alternatives		

Description	Advantages	Disadvantages
On site beneficiation plant.	• Additional employment opportunities, higher staff requirements. • Less capital output on hauling of ROM.	• Greater surface area disturbance. • Possible sterilisation of some of the coal resource as larger area is required for infrastructure. • More capital output on infrastructure, for a mine with only a 4 year LOM. • Increased noise from the use of construction and mining machinery on surface during operations. • Higher closure rehabilitation costs.
Offsite beneficiation (preferred method)	• Smaller footprint associated with surface disturbance. • Reduced impact on dust, noise and air quality. • Reduced closure rehabilitation costs. • The coal resource can be optimally mined as infrastructure will not sterilise the resource. • Less capital output on infrastructure.	• Less employment opportunities. • More capital output on ROM hauling.

Table 3.36: Advantages and Disadvantages regarding Resource Alternatives

Description	Advantages	Disadvantages
Resource Alternatives		
Mining of the Northern Resource Block.	• Additional resource increases LOM, employment, and financial gain	• Extensive costs for dewatering as the Water table is higher than the Coal Seam Floor. • Additional impact on wetland and surrounding habitat. • Increased risk of increased water liability from historical mine workings. • Disturbance of areas currently being rehabilitated.
Mining only the Southern Resource Block	• Economically viable as more coal will be efficiently extracted. • Groundwater risk is limited. • Groundwater inflow can be managed effectively at a lower cost • Significantly smaller impact to wetland and surrounding habitat..	• Shorter LOM, employment and smaller financial gain.

3.I IMPACT MANAGEMENT OBJECTIVES AND IMPACT MANAGEMENT OUTCOMES

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts, assess their significance and implement appropriate mitigation and management measures to either avoid, minimise and/or remediate the associated impacts where they cannot completely be avoided.
- 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.

3.m FINAL PROPOSED ALTERNATIVES.

The infrastructure and mining layout is constrained by the mining right boundary and the location of other mining houses. The resource location and sensitive areas on the site further restrict the layout options.

Two (2) layouts were considered:

- The first layout (Figure 3.7) included a road realignment with a slightly lower curvature that the original road, with a Mining Block to the North of the proposed Mining Right area. This option sterilised an additional resource that could potentially be mine in the future due to the location of the road realignment, and also would have excessive influx of groundwater from the old mined out areas into the open pit, which would be very costly to manage.

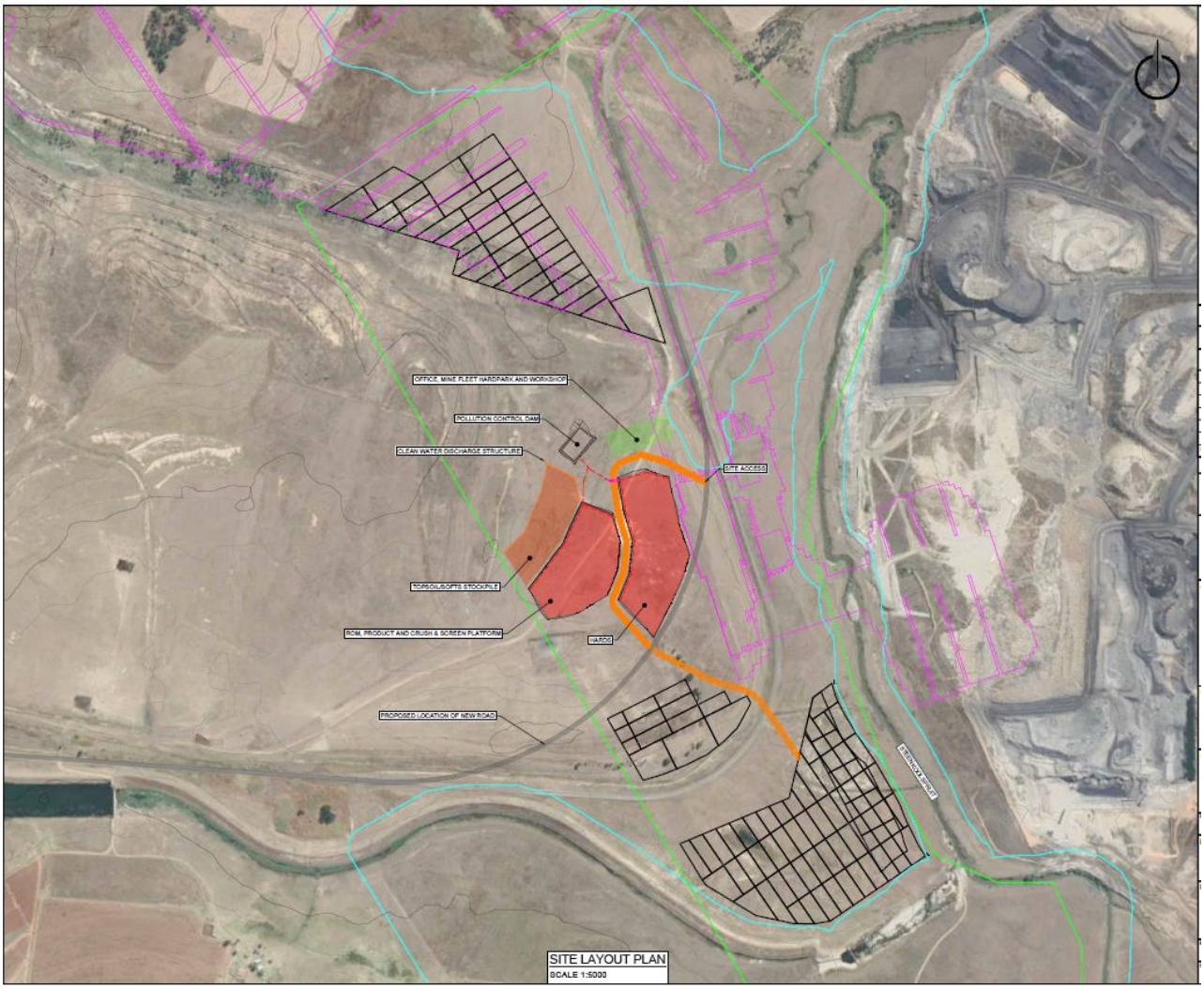

Figure 3.55: Alternative option

- The second option (Figure 3.56), which is the preferred option, had a road realignment that ensured no sterilization of future resources, and also excluded the Northern Pit, as a more financially viable option.

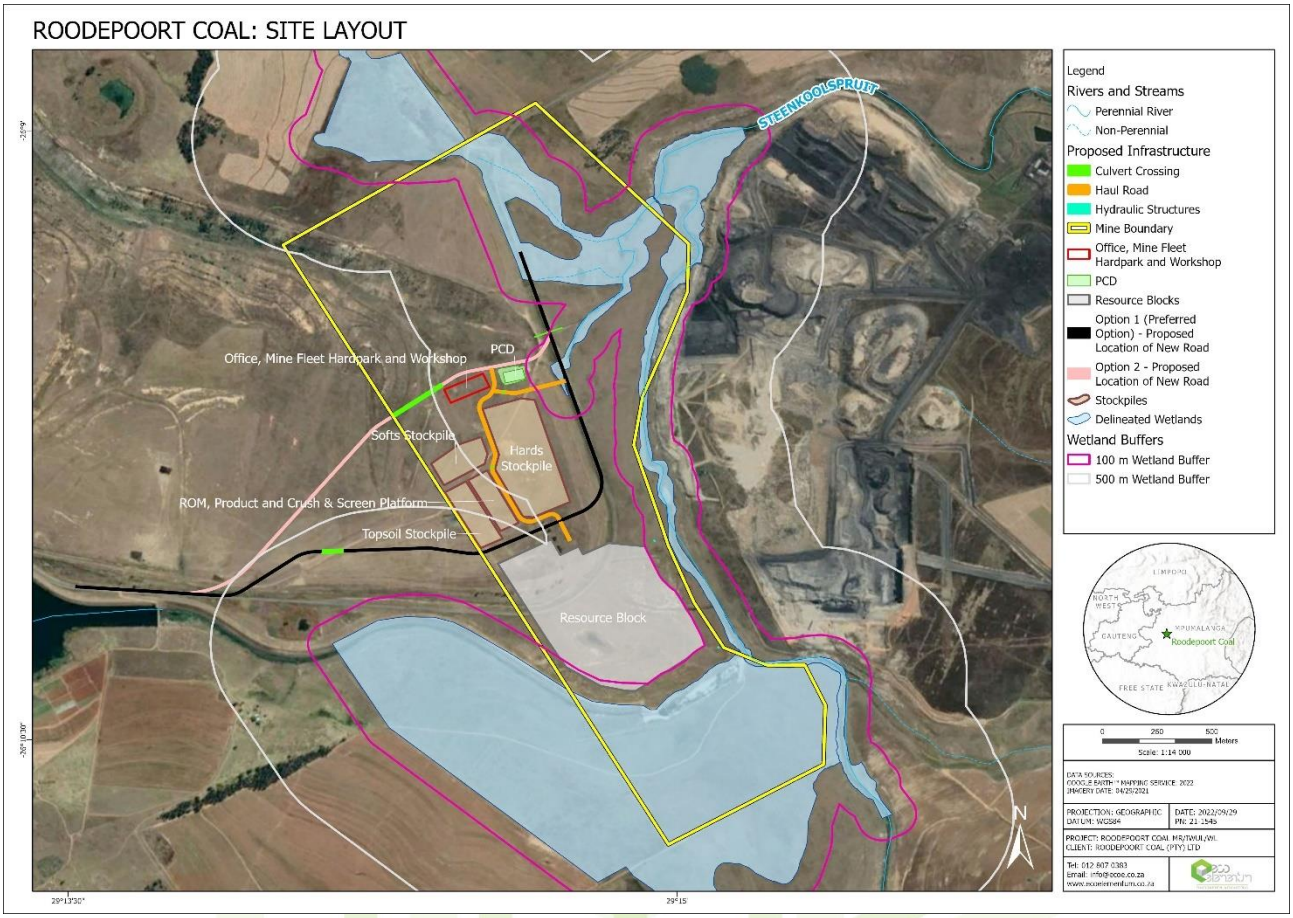

Figure 3.56: Prefered option

3.n ASPECTS FOR INCLUSION AS CONDITIONS OF THE AUTHORISATION

- Adhere to all recommendation and management measures contained in the EMP.
- All relevant permits and authorisation must be obtained prior to construction commencing.
- Adhere to all monitoring requirements.
- A water use license must be obtained prior to any water uses undertaken on site.
- The heritage recommendations are based on the specific project activities and extents as indicated by the figures of this report. Should the proposed surface impact areas be changed, a qualified archaeologist must conduct a pedestrian survey on the new area and amend the report accordingly.
- Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible.
- Since archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the construction phase, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority must be contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).Improved methods of handling the potential decant should be investigated, approved and set in place prior to mine closure.
- All acoustic screening measures must be in place before commissioning the mining activities.
- Any development must occur outside of the recommended 50 m wetland buffer zone.
- No off-road driving, hunting, poaching, or fires should be permitted on the property.
- An Alien Invasive eradication plan should be compiled, approved and implemented.

- A social management plan and social monitoring plan must be developed to manage and monitor the implementation of SLP related measures and recommend corrective measures, where required.
- The site should be monitored for erosion and for spills that could lead to contamination of the environment Signs of erosion and soil contamination should be monitored visually. The vegetative cover and fertility levels of stockpiled soil should also be monitored.
- Ongoing water quality monitoring must take place every month during operational phases; and
- Biomonitoring where/if flow conditions allow for effective sampling analysis must take place bi-annually to determine any trends in ecology and hydrology.
- Once mining commences a proper operational blast design and code of practice must be compiled, implemented, monitored, evaluated and improved.

3.0 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

Limitations of the EIA

At the time of submission of the Draft EIA, the full Air Quality, Noise, Groundwater, and Traffic Impact Reports were not available, and the information used in this report is preliminary information from the specialists.

Assumptions and Limitations of Specialist Studies

Table 3.37 below details the assumptions and limitations of some of the specialist studies undertaken.

Table 3.37: Specialist Assumptions and Limitations

List of Studies	Assumptions and Limitations
Ecological and Wetland Assessment	It is difficult to apply pure scientific methods within a natural environment without limitations, and consequential assumptions need to be made. The following constraints may have affected this assessment: • A hand-held Garmin eTrex 30 were used to delineate the watercourses had an accuracy of 3 m to 6 m • The findings, results, observations, conclusions and recommendations provided in this report are based on the author's best scientific and professional knowledge as well as available information regarding the perceived impacts on the watercourses and biodiversity; and • The assessment in determining the present ecological state (PES) of the identified system was based on a single site visit. Site visits should ideally be conducted over differing seasons in order to better understand the vegetation, hydrological and geomorphologic processes driving the characteristics of the watercourse. In order to obtain a comprehensive understanding of the dynamics of the aquatic ecosystem in an area, ecological assessments should always consider investigations at different time scales (across seasons/years) and through replication, as river systems are in constant change;.
Heritage Assessment	• It should be noted that an area of roughly 100 ha along the south-western border of the proposed Mining Right area was requested to be excluded from the study and was therefore not inspected. This area, however, is completely located within an area previously disturbed by mining activities and is not considered to be sensitive from a heritage perspective.
Paleontology	• Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The site visit and walk through on 20 June 2022 by palaeontologists Rick Tolchard and Bailey Weiss confirmed that there are no fossils

List of Studies	Assumptions and Limitations
	on the surface. The sands of the Quaternary period would not preserve fossils. It is not known if there are fossils below the surface.
Visual Assessment	ASSUMPTIONS • The core study area can be defined as an area with a radius of not more than 10 km from the structures and a total study area with a radius of 15 km from the structures. This is because the visual impact of structures beyond a distance of 10 km would be so reduced that it can be considered negligible even if there is direct line of sight. • It is assumed that there are no alternative locations for the structures and that the visual assessment, therefore, assessed only the proposed site. • The assessment was undertaken during the planning stage of the project and is based on the information available at that time. • The heights of some of the proposed infrastructure were not available at the time of the study. Therefore, these heights were generalized for the visual assessment. • Only the infrastructure expected to cause the most visual impact was included in the visual analysis. LIMITATIONS • Visual perception is by nature a subjective experience, as it is influenced largely by personal values. For instance, what one viewer experiences as an intrusion in the landscape, another may regard as positive. Such differences in perception are greatly influenced by culture, education and socio-economic background. A degree of subjectivity is therefore bound to influence the rating of visual impacts. In order to limit such subjectivity, a combination of quantitative and qualitative assessment methods were used. A high degree of reliance has been placed on GIS-based analysis viewsheds, visibility analyses, and on making transparent assumptions and value judgements, where such assumptions or judgements are necessary. • The viewshed generated in GIS cannot be guaranteed as 100% accurate. Some viewpoints, which are indicated on the viewshed as being inside of the viewshed, can be outside of the viewshed. This is due to the change of the natural environment by surrounding activities as well as natural vegetation that play a significant role and can have a positive or negative influence on the viewshed. • The modelling of visibility is merely conceptual. Being based on the ALOS DSM and land cover data, it does not fully take into account the real-world effect of buildings, trees etc. that could shield the structures from being visible or could have changed over time. The viewshed analysis therefore signifies a worst-case scenario.
Social-Economic Assessment	• It was assumed that the motivation for, and the ensuing planning and feasibility studies of the project were done with integrity, and that the information provided to date by the independent EAP (Eco Elementum) was accurate. • This Report and assessment are dependent on the accuracy of the publicly available secondary information; such as Statistics South Africa (StatsSA, 2011 and community survey, 2016). Where possible, the information was verified during a site visit. The data was considered sufficient for the purpose of this study; The study is based on data obtained from the community survey, 2016, which may not reflect accurate information; • Primary data sourced from directly and indirectly affected landowners who were willing to participate in key informant interviews. The information collected cannot be widely generalised as the individual landowners' situations may differ • Due to the COVID-19 pandemic, community meetings could not be conducted; • It should be noted that the social environment is a dynamic, constantly changing entity. It is therefore not always possible to predict all social impacts to a very high

List of Studies	Assumptions and Limitations
	level of accuracy. Care has been taken to identify the most likely and significant impacts in the most appropriate way for the current local context; • Social impacts can be experienced by affected communities on an actual or a perceptual level. It is therefore not always possible to quantify social impacts properly; • It should be noted that predictions concerning the characteristics of the receiving socio-economic environment at the time of decommissioning are subject to a large margin of error, thus significantly reducing the accuracy of impact assessment- the specialist has attempted to assess (where possible) the impact during the decommissioning phase; • Individuals view possible social impacts differently due to their association with the anticipated impact. Impacts could therefore be perceived and rated differently than those contained in the community Health Assessment Report. Further public participation can be used to refine findings; and • Socio-economic impacts associated with the eventual decommissioning of the Colliery at the end of its life are briefly discussed but are not subject to detailed assessment. This omission is motivated by the fact that predictions concerning the characteristics of the receiving socio-economic environment at the time of decommissioning (30 years in the future) are subject to a large margin of error, thus significantly reducing the accuracy of impact assessment.

3.p REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

3.p.i Reasons Why the Activity Should Be Authorized or Not

The project can be recommended for approval with conditions contained in this report due to the following reasons:

- The mining industry is identified as one of the key components toward Rapid Economic Growth in order to reduce poverty and minimise unemployment Growth (State of the Nation Address, 2019). This project will create employment for at least another 4 years.
- The mining sector contributes significantly to the GDP (22% of the provincial economy).
- The area ear marked for mining has been disturbed previously and sensitive areas will be avoided.
- The Groundwater and water decant is of very poor quality as a baseline, and through the rehabilitation and closure objectives, the Groundwater quality can be improved from the current pre-mining state, which will in turn improve the surface water quality where decant is currently taking place.
- The Development of a Storm Water Management Plan will ensure that dirty footprint is controlled and managed to avoid contamination of the Wilge River.
- The recommendations of the specialist studies form the basis of the EMP and allowed for monitoring and management for impacts identified.

3.p.ii Conditions that must be included in the authorisation

3.p.ii.1 Specific conditions to be included into the compilation and approval of EMPr

- Adhere to all recommendation and management measures contained in the EMP.
- All relevant permits and authorisation must be obtained prior to construction commencing.
- Adhere to all monitoring requirements.
- A water use license must be obtained prior to any water uses undertaken on site.

- The heritage recommendations are based on the specific project activities and extents as indicated by the figures of this report. Should the proposed surface impact areas be changed, a qualified archaeologist must conduct a pedestrian survey on the new area and amend the report accordingly.
- Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible.
- Since archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the construction phase, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority must be contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).Improved methods of handling the potential decant should be investigated, approved and set in place prior to mine closure.
- All acoustic screening measures must be in place before commissioning the mining activities.
- Any development must occur outside of the recommended 50 m wetland buffer zone.
- No off-road driving, hunting, poaching, or fires should be permitted on the property.
- An Alien Invasive eradication plan should be compiled, approved and implemented.
- A social management plan and social monitoring plan must be developed to manage and monitor the implementation of SLP related measures and recommend corrective measures, where required.
- The site should be monitored for erosion and for spills that could lead to contamination of the environment Signs of erosion and soil contamination should be monitored visually. The vegetative cover and fertility levels of stockpiled soil should also be monitored.
- Ongoing water quality monitoring must take place every month during operational phases; and
- Biomonitoring where/if flow conditions allow for effective sampling analysis must take place bi-annually to determine any trends in ecology and hydrology.
- Once mining commences a proper operational blast design and code of practice must be compiled, implemented, monitored, evaluated and improved.

3.p.ii.2 Rehabilitation requirements

Rehabilitation of the project will aim to:

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

3.q PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The life of Mine is estimated at 4 years. The EA and Waste Management License (WML) are being sought for a period of 10 years.

3.r UNDERTAKING

The EAP herewith confirms

a. The correctness of the information provided in the reports ☒
b. The inclusion of comments and inputs from stakeholders and I&APs ; ☒
c. The inclusion of inputs and recommendations from the specialist reports where relevant; and ☒
d. The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒

Signed: _____ 2022

3.s FINANCIAL PROVISION

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master	Multiplication	Weighting	Amount
				Rate	factor	factor 1	(Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	R 18.36	1	1	R -
2 (A)	Demolition of steel buildings and structures	m2	500	R 255.82	1	1	R 127 910.00
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	R 376.99	1	1	R -
3	Rehabilitation of access roads	m2	1290	R 45.78	1	1	R 59 056.20
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	R 444.30	1	1	R -
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	R 242.34	1	1	R -
5	Demolition of housing and/or administration facilities	m2	100	R 511.63	1	1	R 51 163.00
6	Opencast rehabilitation including final voids and ramps	ha	10.00	R 368 200.17	0.52	1	R 1 914 640.88
7	Sealing of shafts adits and inclines	m3	0	R 137.33	1	1	R -
8 (A)	Rehabilitation of overburden and spoils	ha	14.37	R 178 800.11	1	1	R 2 569 357.58
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	R 222 692.31	0.8	1	R -
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0.78	R 646 804.03	0.8	1	R 403 605.71
9	Rehabilitation of subsided areas	ha	0	R 149 733.48	1	1	R -
10	General surface rehabilitation	ha	19.12	R 141 639.86	1	1	R 2 708 154.12
11	River diversions	ha	0	R 141 639.86	1	1	R -
12	Fencing	m	4310	R 161.56	1	1	R 696 323.60
13	Water management	ha	2.12	R 53 855.46	0.67	1	R 76 388.05
14	2 to 3 years of maintenance and aftercare	ha	26.42	R 18 849.42	1	1	R 498 001.68
15 (A)	Specialist study	Sum	3	R 60 000.00	1	1	R 180 000.00
15 (B)	Specialist study	Sum	1	R -	1	1	R -
					Sub Total 1		**R 9 284 600.82**
1	Preliminary and General		R 9 748 830.87		**weighting factor 2** 1.05		**R 1 169 859.70**
2	Contingencies		928460.0825				**R 928 460.08**
					Subtotal 2		**R 11 382 920.61**
					VAT (15%)		**R 1 593 608.89**
					Grand Total		**R 12 976 529.50**

3.s.i Explain how the aforesaid amount was derived.

The NEMA regulations require that the closure costs be calculated according to real rates.

In order to calculate the closure cost using the third-party contractor rates, each of the closure actions from the report were broken down into specific units (i.e. roads, power lines, buildings, discard dump, Dirty Water Storage Facilities etc.) within specific categories (i.e. Decommissioning, Closure, Rehabilitation and Care and Maintenance).

A bill of quantity was determined for each of the units and applied to the third-party contractor rates to determine a closure cost per unit. The unit costs determined the category costs and the category costs resulted in a preliminary closure cost also called Sub-Total 1. Contractors costs include a mobilisation and project management fee which represents 12% of the Subtotal 1 and is calculated into a Subtotal 2. A contingency of 10% was included on Subtotal 2 to obtain a Financial Liability Cost in Subtotal 3. Finally, a 15% VAT was added to Subtotal 3 to obtain a subtotal 4. Subtotal 3 is regarded as the Final closure liability of the mine.

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

This amount can and will be provided for from operation expenditure.

3.t DEVIATIONS FROM THE APPROVED SCOPING REPORT

3.t.i Deviations from The Methodology for Impact and Risk Assessment

The inclusion of a road realignment was not included in the Scoping Report, and has now been accounted for.

3.t.ii Motivation for The Deviation

After optimising the resource and mining schedule it was found that moving the road would be the best option financially. The road will also be upgraded and maintained in the process, as it is currently in a state of disarray.

3.u OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

3.u.i Compliance with The Provisions of Sections 24(4) (A) And (B) Read with Section 24 (3) (A) And (7) Of NEMA, The EIA Report

3.u.i.1 Impact on the Socio-Economic Conditions of Any Directly Affected Person

Employment opportunities	Positive	High
Multiplier effect on the local economy	Positive	High
Social upliftment	Negative	High
Change in access and movement to resident and livestock	Negative	Med
Loss of and/or damage to agricultural land and infrastructure	Negative	Med
Increased pressure on municipal services	Negative	Med
Increased Nuisance Factors and Changed Sense of Place	Negative	Med
Increased social pathologies	Negative	Med
Job losses	Negative	Med

Also refer to the Social Impact Assessment attached as Appendix 3 and Section 3.g.iv.1.a.

3.u.i.2 Impact on Any National Estate Referred to in Section 3(2) Of the National Heritage Resources Act

Damage to cemetery - F01	Positive	Low
destruction of potential subsurface cultural material - B01	Positive	Low

Refer to the Heritage Impact Assessment attached as Appendix 3 and Section 3.g.iv.1.a.

3.v OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4) (A) & (B) OF THE ACT

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

The alternatives assessed and the impacts associated with the alternatives assessed have been fully presented in Section 3.g.vii and Section 3.g.ix

LIST OF APPENDICES

- **Appendix 1 – EMP**
- **Appendix 2 – Proof of Public Participation**
- **Appendix 3 – Specialist Reports**
- **Appendix 4 – Maps**
- **Appendix 5 – Site Layout and infrastructure**
- **Appendix 6 – EAP CV**
- **Appendix 7 - DMR Correspondence**
- **Appendix 8 – GN1147 Closure**