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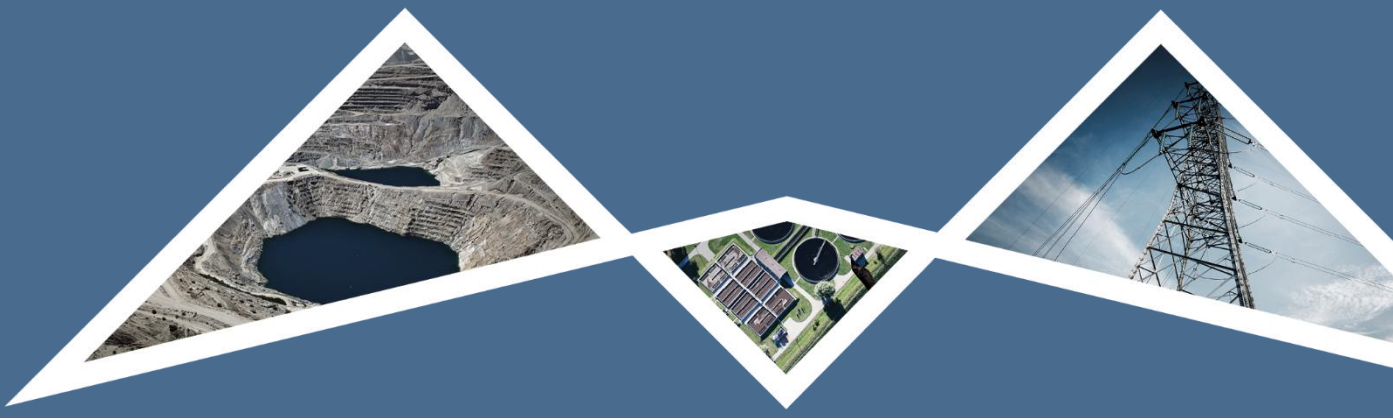
ENVIRONMENTAL SCOPING REPORT

RUSTENBURG CHROME MINE EXPANSION PROJECT
NW30/5/1/2/2/336 MR



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ACRONYMS AND ABBREVIATIONS

AQSR	:	Air Quality Sensitive Receptors
CA	:	Competent Authority
CARA	:	Conservation of Agricultural Resources Act, 1983
CBA	:	Conservation Biodiversity Area
CMA	:	Catchment Management Agency
DESTEA	:	Department of Economic, Small Business Development, Tourism & Environment
DFFE	:	Department of Forestry, Fisheries and Environment
DMRE	:	Department of Mineral Resources and Energy
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
ECA	:	Environmental Conservation Act
EAP	:	Environmental Assessment Practitioner
EAPASA	:	Environmental Assessment Practitioners Association of South Africa
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services (Pty) Ltd
EN	:	Endangered
EMPr	:	Environmental Management Programme
ESA	:	Ecological Support Area
GA	:	General Authorisation
GN	:	Government Notice
HIA	:	Heritage Impact Assessment
I&AP	:	Interested and Affected Party
IDP	:	Integrated Development Plan
IEM	:	Integrated Environmental Management
LOM	:	Life of Mine
MAE	:	Mean Annual Evaporation
MAP	:	Mean Annual Precipitation
MAR	:	Mean Annual Runoff
MPRDA	:	Minerals and Petroleum Resources Development Act, 2002
MR	:	Mining Right
NEMA	:	National Environmental Management Act, 1998
NEM:AQA	:	National Environmental Management: Air Quality Act, 2004
NEM:WA	:	National Environmental Management: Waste Amendment Act, 2008
NEMBA	:	National Environmental Management: Biodiversity Act, 2004
NHRA	:	National Heritage Resources Act, 1999

NT	:	Near Threatened
NWA	:	National Water Act, 1998
PAOI	:	Project Area of Influence
PCD	:	Pollution Control Dam
PPP	:	Public Participation Process
Re	:	Remaining Extent
SAHRA	:	South African Heritage Resources Agency
SANS	:	South African National Standards
SCC	:	Species of Conservation Concern
SDF	:	Spatial Development Framework
SLP	:	Social & Labour Plan
SPLUMA	:	Spatial Planning and Land Use Management Act
SWMP	:	Stormwater Management Plan
TDS	:	Total Dissolved Solids
TSF	:	Tailings Storage Facility
WMA	:	Water Management Area
WML	:	Waste Management License
WRD	:	Waste Rock Dump
WULA	:	Water Use License Application
WUL	:	Water Use Licence

GLOSSARY OF TERMS

This section provides a catalogue of terms and definitions, which may be used in this report and, or other documents drafted for the project.

Table 1: Glossary of terms

Term	Definition
Alien Invasive Species	Species of plants, animals or other organisms that are not indigenous to a region and which easily spread and destroy the indigenous plant species, taking over an area and causing biological and socio-economic harm.
Buffer	A strip of land surrounding a wetland, riparian area, point of interest, etc. in which activities are controlled or restricted
Clearing/Clearance	Clearing/Clearance refers to the removal of vegetation through permanent eradication and in turn no likelihood of regrowth. 'Burning of vegetation (e.g. fire-breaks), mowing grass or pruning does not constitute vegetation clearance, unless such burning, mowing or pruning would result in the vegetation being permanently eliminated, removed or eradicated'.

Term	Definition
Competent Authority	An organ of state charged by the National Environmental Management Act (NEMA) with evaluating the environmental impact of an activity and, where appropriate, with granting or refusing an environmental authorisation in respect of that activity.
Conservation Plan Areas (C-Plan Areas)-	A tool developed by the Environmental Provincial Department to identify sensitive areas. The main purpose of this tool is to: serve as the primary decision support tool for the biodiversity component of the Environmental Impact Assessment (EIA) process. inform protected area expansion and biodiversity stewardship programmes in the province; and serve as a basis for development of Bioregional Plans in municipalities within the province. Some of the aspects that inform the identification of C-Plan Areas include Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESA's), Watercourses, Ridges, Protected Areas, etc
Critical Biodiversity Area	Areas that are deemed important to conserve ecosystems and species. For this reason, these areas require protection.
Cultural significance	Means aesthetic, architectural, historical, scientific, social, spiritual, linguistic, or technological value or significance.
Development	Means the building, erection, construction or establishment of a facility, structure, or infrastructure, including associated earthworks or Quarries, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or quarries, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.
Duty of Care	Every person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environmental is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution and degradation of the environment."
Decommissioning	Means to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily recommissioned.
Environment	the surroundings within which humans exist and that are made up of— (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Ecological Support Area	Areas that support the ecological functioning of protected areas or CBAs or provide important ecological infrastructure.

Term	Definition
Environmental Assessment Practitioner	Individual responsible for the planning, management, coordination or review of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instruments introduced through regulations and such person being registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA).
Environmental Authorisation	This is a decision by a Competent Authority to authorise a listed activity in terms of the National Environmental Management Act (NEMA). The authorisation means that a project, either in totality or partially, can commence subject to certain conditions. The Competent Authority has a right to refuse to grant authorisation for a project in totality or partially.
Environmental Impact Assessment Process:	An environmental assessment process that is undertaken in line with Listing Notice 2 the NEMA EIA Regulations with the aim of obtaining Environmental Authorisation.
Environmental Management Programme:	A programme with set objectives and timeframes that seek to achieve a required end state and describes how activities that have or could have an adverse impact on the environment will be mitigated, controlled, and monitored.
Flora	Plant life that occurs in a specific geographical region and/habitat.
Fauna	Animal life that occurs in a specific geographical region and/habitat.
Heritage Resource	Means any place or object of cultural significance.
Indigenous Vegetation	Plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Interested and Affected Party	In relation to an application for Environmental Authorisation, this refers to an interested and affected party whose name is recorded in the register opened for that application in terms of regulation 42 of the NEMA EIA Regulations. This party will ideally be interested in the development but also affected by the proposed application and have a certain interest in the application.
Project Area of Influence	The Project Area of Influence (PAOI) is a term normally used by specialists to indicate the area that may be influenced by the activities or may influence the activities. This area may extend beyond the study area.
Public Participation Process	In relation to the assessment of the environmental impact of any application for an environmental authorisation, means a process by which potential Interested and Affected Parties are given opportunity to comment on, or raise issues relevant to, the application.
Regulated area of a watercourse:	The outer edge of the 1:100-year flood line and /or delineated riparian habitat whichever is the greatest measured from the middle of a river, spring, natural channel, lake or dam. In the absence of a determined 1:100-year flood line or riparian area, the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act).

Term	Definition
	500m radius from the delineated boundary of any wetland or pan.
Riparian Area	A Habitat that includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.
Species of Conservation Concern	IUCN Red List definition: Threatened species, and other species of significant conservation importance: Extinct, Extinct in the Wild, Near Threatened, Data Deficient. In South Africa, the following additional categories are added: Rare, Critically Rare.
Study Area	The study area normally refers to the area where new activities and or infrastructure is planned and this is the area that is studied by specialists and the Environmental Assessment Practitioner (EAP) to identify bio-physical and socio-economic sensitivities that may be impacted by or that may impact the proposed project.
Threatened or Protected Species	These refers to either plants or animals that are at a threat of Extinction or are protected due to their high conservation value or national importance.
Watercourse	(a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.
Wetland	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.

EXECUTIVE SUMMARY

Environmental Impact Management Services (Pty) Ltd (EIMS) has been appointed as the Environmental Assessment Practitioner (EAP) for Rustenburg Chrome Mines (Pty) Ltd. EIMS will manage the environmental authorisation and consultation processes for proposed infrastructure and activities at RCM's existing mining operations near Kroondal in the Rustenburg Local Municipality, North West Province.

An application was submitted to the Department of Mineral and Petroleum Resources (DMPR), for the proposed new infrastructure and activities. The following new infrastructure and activities are being applied for:

- Mining areas:
    - Opencast mining (total new opencast = ~ 262,6 ha):
        - Expansion of the existing opencast pit - to the west (Area 4 (Exploration Phase 1) – ~8,5 Ha);
        - New opencast pits - further to the west of the existing opencast area (Area 8 – ~26 Ha (Exploration Phase 2), and Area 9 - ~ 28,5 Ha (Exploration Phase 3) to the east (Area 5 – ~11,5 Ha); further to the north-east (Area 6 – ~87,5 Ha) and to the south (Area 7 a~121,6 Ha).
    - Underground mining (total new underground = ~211,5 ha):
        - New underground: 2 new underground mining areas located to the north of the mining right boundary.
- Infrastructure:
    - New processing plant ~0,6 Ha.
    - New Run of Mine (ROM) stockpile ~0,5 Ha.
    - New concentrate stockpile ~0,3 Ha.
    - New waste rock stockpile ~20,2 Ha.
    - New topsoil stockpile ~10,3 Ha.
    - Expansion of the mine tailings storage facility (TSF) ~10,2 Ha.
    - New pollution control dams and associated silt traps total of 5,1 Ha.
    - New water management infrastructure (including berms, channels, culverts, etc).

EIMS will compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) and Waste Management License (WML) in accordance with the National Environmental Management Act – NEMA (Act 107 of 1998)- Listed activity: Listing Notice 1, Activities 9, 10, 12, 13, 19, 21D, 24, 27, 46 & 48; Listing Notice 2, Activity 6, 15 and Activity 17; and Listing Notice 3, Activities 4, 10, 12, 14, 18, 22 & 23 as well as the National Environmental Management: Waste Act – NEMWA (Act 59 of 2008) – Category A: Activities 12 & 13 and Category B: Activities 10 and 11.; and
- Water Use Licence (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses: Section 21 (a), (c), (g), (i) and (j). A separate application for a Water Use Licence (WUL) has been lodged with the Department of Water and Sanitation (DWS).

PURPOSE OF THE SCOPING REPORT

The purpose of the scoping process is to:

- Identify the policies and legislation that are relevant to the activity;
- To motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- To identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking;
- Where appropriate, to identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process including cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- To identify the key issues to be addressed in the assessment phase;
- To agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required, as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- To identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

PUBLIC PARTICIPATION PROCESS

According to Section (2)(4)(f) of NEMA, the participation of all Interested and Affected Parties (I&APs) must be promoted and all potential I&APs must be informed early and in an informative and proactive way regarding applications that may affect their lives or livelihood. To give effect to the above sections, it is essential to ensure that there is an adequate and appropriate opportunity for Public Participation (PP) in decisions that may affect the environment. The Public Participation Process (PPP) for the proposed project has been undertaken in accordance with the requirements of NEMA in line with the principles of Integrated Environmental Management (IEM). The PPP commenced between the 24th April 2025 and 1st of May 2025 with an initial notification and call to register as interested and affected parties (I&APs). The comments received from I&APs during the initial call to register and commenting period so far have been captured in Public Participation Report in Appendix 2.

Comments received during this Scoping Report review period will also be collated and added to the Public Participation Report which will be submitted to the Competent Authority (CA). Should the CA accept the Scoping Report, an Environmental Impact Assessment (EIA) Report including an Environmental Management Programme (EMPr), will also be compiled and presented for public comment as part of this EIA process during which time further stakeholder engagement will take place.

This Scoping Report will be available for public review and comment for a period of 30 days from the 12th of March 2026. Contact details are provided below:

- Environmental Impact Management Services (Pty) Ltd (EIMS)
- P.O. Box 2083 Pinegowrie 2123
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PROJECT ALTERNATIVES AND ENVIRONMENTAL IMPACT ASSESSMENT

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the EIA process. According to the above-mentioned, an alternative is defined as *"…in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:*

- *(a) property on which or location where it is proposed to undertake the activity;*
- *(b) type of activity to be undertaken;*
- *(c) design or layout of the activity;*
- *(d) technology to be used in the activity;*
- *(e) operational aspects of the activity; and*
- *(f) includes the option of not implementing the activity."*

The alternatives discussed in this report are the No-Go Option; Layout or Design Alternatives, Activity Alternatives and Process Alternatives. The preferred option under each category of alternatives is discussed in detail in **Section 5** of this report.

Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria include the nature, extent, duration, magnitude / intensity, reversibility, probability, public response, cumulative impact, and irreplaceable loss of resources.

The most significant risks and impacts identified were those that remain high in terms of significance even post mitigation measures being considered. The following preliminary identified impacts were determined to have a potentially high or medium-high final significance at this stage:

- Air pollution as a result from dust generation activities (i.e. blasting, hauling, crushing, and stockpiling);
- Destruction, loss and fragmentation of the vegetation community;
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching);
- Clearing of vegetation leading to soil erosion and loss of topsoil;
- Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting during
- Continuous stripping of topsoil for opencast mining, leading to ongoing land degradation, including erosion;
- Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.
- Dewatering impacts on ground water table;
- Impacts on groundwater quality during mining; an
- Reduced availability of arable land for farming due to mining expansion into southern areas.

The negative impacts, in particular, will be further interrogated and assessed during the EIA phase of the project. Potential preliminary mitigation measures have been identified and will be refined based on input from the Environmental Assessment Practitioner (EAP), public consultation, and specialist assessments during the EIA phase of the project, which may lower the final significance scores. The associated EMPr will identify appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive aspects.

The following EIA-phase specialist studies are to be conducted:

- Soils and Agricultural Impact Assessment or Compliance Statement;
- Air Quality Assessment;
- Noise Impact Assessment;
- Groundwater Assessment;
- Hydrological Assessment;
- Terrestrial Biodiversity Assessment;
- Aquatics and Wetland Assessment;
- Heritage Impact Assessment;
- Palaeontology Impact Assessment; and
- Closure and Rehabilitation Plan and Engineering Designs that will include Geotechnical Assessments.

1 INTRODUCTION

Environmental Impact Management Services (Pty) Ltd (EIMS) has been appointed as the Environmental Assessment Practitioner (EAP) for Rustenburg Chrome Mines (Pty) Ltd. EIMS will manage the environmental authorisation and consultation processes for proposed infrastructure and activities at RCM's existing mining operations near Kroondal in the Rustenburg Local Municipality, North West Province. Minelock Environmental Engineers, on behalf of their client, Rustenburg Chrome Mines (Pty) Ltd (hereafter referred to as RCM / "the applicant") has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to undertake the necessary environmental authorisation and associated consultation processes for proposed new infrastructure and activities on their existing mining operations near Kroondal in the Rustenburg Local Municipality in the North West Province.

The applicant owns and operates RCM underground and opencast chrome mining operations and have two mining rights: NW30/5/1/2/2/336 MR and NW30/5/1/2/2/274 MR.

The previous Environmental Management Programme (EMPr) for NW30/5/1/2/2/336 MR was approved in 2008 and subsequently Lanxess Chrome Mining (Pty) Ltd (Lanxess) (now RCM), was granted a new order Mining Right in April 2013 for the Lanxess Chrome Mine (LCM) operations (Mining Right Number 34/2013 MR). LCM was granted a new order mining right for The NW30/5/1/2/2/274 MR in 2008.

In 2015, the mine submitted and was granted an amendment to its existing Mining Right (NW30/5/1/2/2/336 MR) and Environmental Authorisation to the Department of Mineral Resources. The update included the proposed open pit operation within the mining right area as well as the extension of the underground operations as part of a transfer of rights with neighbouring mines. This amendment was made in accordance with the provisions of Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), and did not include listed and waste management activities. It was understood that the applications were made prior to the National Environmental Management Act, 1998 (Act No. 107 of 1998) came into effect). In 2017, LCM submitted and was granted and Integrated Environmental Authorisation (EA) application in terms of NEMA and a Waste Management License (WML) application in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA) for the listed activities in both Acts and associated regulations. (Ref No. NW30/5/1/2/3/2/1/336EM). An Integrated Water Use License (IWUL) Licence No. 07/A22H/ACIGJ/9460), was also applied for and granted in 2020, by the Department of Water and Sanitation (DWS) for all the water uses listed in terms of Section 21 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

LCM then proceeded to apply for and was granted a WML in 2022 for the establishment or reclamation of a residue stockpile or residue deposit (for the reclamation / reprocessing of tailings from the Tailings Storage facility (TSF)), and the disposal of any quantity of hazardous waste to land for the deposition of processed tailings onto the TSF.

The last amendment application by LCM (now called Rustenburg Chrome Mines (Pty) Ltd (RCM) the 'holder' of the EA, was Part 1 Amendment to the EA in terms of Regulation 29 of the Environmental Impact Assessment (EIA) Regulations, 2014 in August 2025. RCM is in the process of selling a portion of the mining and surface rights to Glencore Operations South Africa (Pty) Ltd (Glencore) and Merafe Ferrochrome and Mining (Pty) Ltd. The buyer is acquiring the rights to reduce the time taken to travel to the face at its Kroondal Mine and increase the mining facetime which will in turn increase productivity. RCM's current Environmental Authorisation must be amended to exclude the current infrastructure and activities on Portion 62 of the Farm Rietfontein 338 JQ (previously Portion 11 of the Farm Rietfontein 338 JQ). Glencore wishes to develop additional facilities on the acquisition area to complement the existing facilities which will aid in the life of mine plan.

An application was submitted to the Department of Mineral and Petroleum Resources (DMPR), for the proposed new infrastructure and activities. The following new infrastructure and activities are applied for:

- Mining areas:
    - Opencast mining (total new opencast = ~ 262,6 ha):

        - Expansion of the existing opencast pit - to the west (Area 4 (Exploration Phase 1) – ~8,5 Ha);
        - New opencast pits - further to the west of the existing opencast area (Area 8 – ~26 Ha (Exploration Phase 2), and Area 9 - ~ 28,5 Ha (Exploration Phase 3) to the east (Area 5 – ~11,5 Ha); further to the north-east (Area 6 – ~87,5 Ha) and to the south (Area 7 a~121,6 Ha).
    - Underground mining (total new underground = ~211,5 ha):
        - New underground: 2 new underground mining areas located to the north of the mining right boundary.

- Infrastructure:
    - New processing plant ~0,6 Ha.
    - New Run of Mine (ROM) stockpile ~0,5 Ha.
    - New concentrate stockpile ~0,3 Ha.
    - New waste rock stockpile ~20,2 Ha.
    - New topsoil stockpile ~10,3 Ha.
    - Expansion of the mine tailings storage facility (TSF) ~10,2 Ha.
    - New pollution control dams and associated silt traps total of 5,1 Ha.
    - New water management infrastructure (including berms, channels, culverts, etc).

EIMS will compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) and Waste Management License (WML) in accordance with the National Environmental Management Act – NEMA (Act 107 of 1998)- Listed activity: Listing Notice 1, Activities 9, 10, 12, 13, 19, 21D, 24, 27, 46 & 48; Listing Notice 2, Activity 6, 15 and Activity 17; and Listing Notice 3, Activities 4, 10, 12, 14, 18, 22 & 23 as well as the National Environmental Management: Waste Act – NEMWA (Act 59 of 2008) – Category A: Activities 12 & 13 and Category B: Activities 10 and 11; and
- Water Use Licence (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses: Section 21 (a), (c), (g), (i) and (j). A separate application for a Water Use Licence (WUL) has been lodged with the Department of Water and Sanitation (DWS).

2 REPORT STRUCTURE

This report has been compiled in accordance with the 2014 NEMA EIA Regulations, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in Table 2 below.

Table 2: Report structure

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(1)(a):	Details of – (i) The Environmental Assessment Practitioner (EAP) who prepared the report; and (ii) The expertise of the EAP, including a curriculum vitae;	2.2 Appendix 1
Appendix 2(1)(b):	The location of the activity. Including – (i) The 21-digit Surveyor General code of each cadastral land parcel; (ii) Where available, the physical address and farm name; (iii) Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	2.4
Appendix 2(1)(c):	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	2.4
Appendix 2(1)(d):	a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) description of the activities to be undertaken, including associated structures and infrastructure;	3
Appendix 2(1)(e):	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;	4
Appendix 2(1)(f):	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	5

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(1)(g):	a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including- (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	6, 6.1, 8 and 9
Appendix 2(1)(h):	a plan of study for undertaking the environmental impact assessment process to be undertaken, including- (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; (ii) a description of the aspects to be assessed as part of the environmental impact assessment process;	11

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	(iii) aspects to be assessed by specialists; (iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists; (v) a description of the proposed method of assessing duration and significance; (vi) an indication of the stages at which the competent authority will be consulted; (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and (viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process; (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	
Appendix 2(1)(i):	an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	13
Appendix 2(1)(j)	an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	14
Appendix 2(1)(k):	where applicable, any specific information required by the competent authority; and	
Appendix 2(1)(l):	any other matter required in terms of section 24(4)(a) and (b) of the Act.	None at this stage
Appendix 2(2):	here a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a scoping report, the requirements as indicated in such notice will apply.	None at this stage

2.1 PURPOSE OF THE REPORT

The Scoping and EIA process must be undertaken in accordance with the 2014 EIA Regulations. The main objectives of the current Scoping Phase, in terms of the regulatory requirements stipulated in *Appendix 2* of the 2014 EIA Regulations, are to:

- identify the relevant policies and legislation relevant to the activity;
- motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an identification of impacts and risks and ranking process of such impacts and risks;
- identify and confirm the preferred site, through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- identify the key issues to be addressed in the assessment phase;
- agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Once the scoping process is complete, a Final Scoping Report must be prepared detailing the scope of the EIA required for the proposed activities. This Scoping Report for public review has been compiled in accordance with the requirements set out in Appendix 2 of the 2014 EIA Regulations, as amended, which outlines the contents of a Scoping Report and provides the requirements necessary for undertaking the Public Participation Process. A final Scoping Report will be prepared and submitted to the competent authority (DMPR) for review and decision making. The competent authority must within 43-days of submission of the Final Scoping Report accept the scoping report and advise the applicant to proceed or continue with the tasks in the plan of study (Section 11) or refuse environmental authorisation. It must be noted that the acceptance may be issued with recommendations and/or requirements for the EIA Phase.

2.2 DETAILS AND EXPERTISE OF THE EAP

EIMS has been appointed as the independent EAP and to assist in preparing and submitting the EA and WUL applications, Scoping and EIA Reports, and undertaking a Public Participation Process (PPP) in support of the proposed project. The contact details of the EIMS consultant and EAPs who compiled this Report are indicated in Table 3.

Table 3: Details of the Environmental Assessment Practitioners

Role:	Senior EAP- report compilation	Principal EAP- report compilation, and review
Name:	Monica Niehof	Liam Whitlow
Tel No:	+27 11 789 7170	
Fax No:	+27 86 571 9047	
Qualifications and experience	BSc Hons Environmental Management 13 years consulting experience	BSc Hons Environmental Management 24 years consulting experience
Professional Registrations:	Registered Environmental Assessment Practitioner with Environmental Assessment Practitioner Association of South Africa – EAPASA (Reg. No: 2024/8835).	Registered Environmental Assessment Practitioner with Environmental Assessment Practitioner Association of South Africa – EAPASA (Reg. No: 2019/222).

EIMS is a private and independent environmental management consulting firm that was founded in 1993. EIMS has in excess of 32 years' experience in conducting EIAs, including many EIAs for mines and mining related projects. Please refer to the EIMS website (www.eims.co.za) for company details and examples of EIA documentation currently available.

2.3 SPECIALIST CONSULTANTS

One of the objectives of a Scoping Report is to identify the required specialist assessment to be undertaken during the EIA Phase. Based on a review of the National Web-Based Environmental Screening Tool Report, EAPs Site Sensitivity Verification and review of available information, the following specialist inputs have been pre-identified as necessary assessments required during the EIA phase:

- Agriculture Potential, Soils and Hydropedology;
- Geohydrology;
- Hydrology and Flood lines;
- Aquatic Biodiversity and Wetland;
- Terrestrial Biodiversity;
- Air Quality;
- Noise;
- Archaeological and Cultural Heritage; and
- Palaeontology.

Engineering geotechnical inputs will also be obtained to inform the design of the TSF, WRD, PCDs and other infrastructure.

A closure assessment including a cost assessment will also be included as part of the studies conducted during the EIA phase.

The specialist studies listed above will involve the gathering of data relevant to identifying and assessing preliminary environmental impacts that may occur as a result of the proposed project. These preliminary impacts were assessed according to pre-defined impact rating methodology (Section 9.1). Preliminary mitigation / management measures to minimise potential negative impacts or enhance potential benefits are put forward

in this Scoping Report and will be adjusted where relevant during the EIA phase once detailed assessments are concluded and input from the public has been considered.

2.4 DESCRIPTION OF THE PROPERTY

Table 4 provides a description of the property details of the proposed expansion areas as well as the distance to the nearest towns. The proposed project will be located within the NW 30/5/1/2/2/336MR and NW 30/5/1/2/2/274MR mining rights boundaries. Refer to Figure 1 for the locality of the project.

Table 4: Locality details

Property	**RCM is situated 7km east of Kroondal and 11km south-east of Rustenburg, within the Rustenburg Local Municipality. The RCM has been operational since 1958.**			
Property Name, 21-digit Surveyor General Code and Ownership	Farm Name	Portion	LPI Code	Ownership Type
	Rietfontein 338 JQ	1 RE	T0JQ00000000033800000	Private Company
	Rietfontein 338 JQ	1	T0JQ00000000033800001	Private Company
	Rietfontein 338 JQ	10	T0JQ00000000033800010	Private Company
	Rietfontein 338 JQ	11	T0JQ00000000033800011	Private Company
	Rietfontein 338 JQ	14	T0JQ00000000033800014	Private Company
	Rietfontein 338 JQ	15	T0JQ00000000033800015	Trust
	Rietfontein 338 JQ	32	T0JQ00000000033800032	Private Company
	Rietfontein 338 JQ	34	T0JQ00000000033800034	Private Company
	Brakspruit 299 JQ	12	T0JQ00000000029900012	Private Company
	Brakspruit 299 JQ	17	T0JQ00000000029900017	Private Company
	Brakspruit 299 JQ	18	T0JQ00000000029900018	Private Company
	Brakspruit 299 JQ	19	T0JQ00000000029900019	Private Company
	Klipfontein 300 JQ	RE/2	T0JQ00000000030000002	Government
	Spruitfontein 341 JQ	101	T0JQ00000000034100101	Private Company
	Spruitfontein 341 JQ	RE/16	T0JQ00000000034100016	Private Company
Application Area (Ha)	~ 500 Ha			
Magisterial District	Bojanala Platinum District Municipality			
Distance and direction from nearest towns	~7 Km East of Kroondal			
Surrounding land uses	Mining, Agriculture, National Road, Individual homesteads and other residential.			

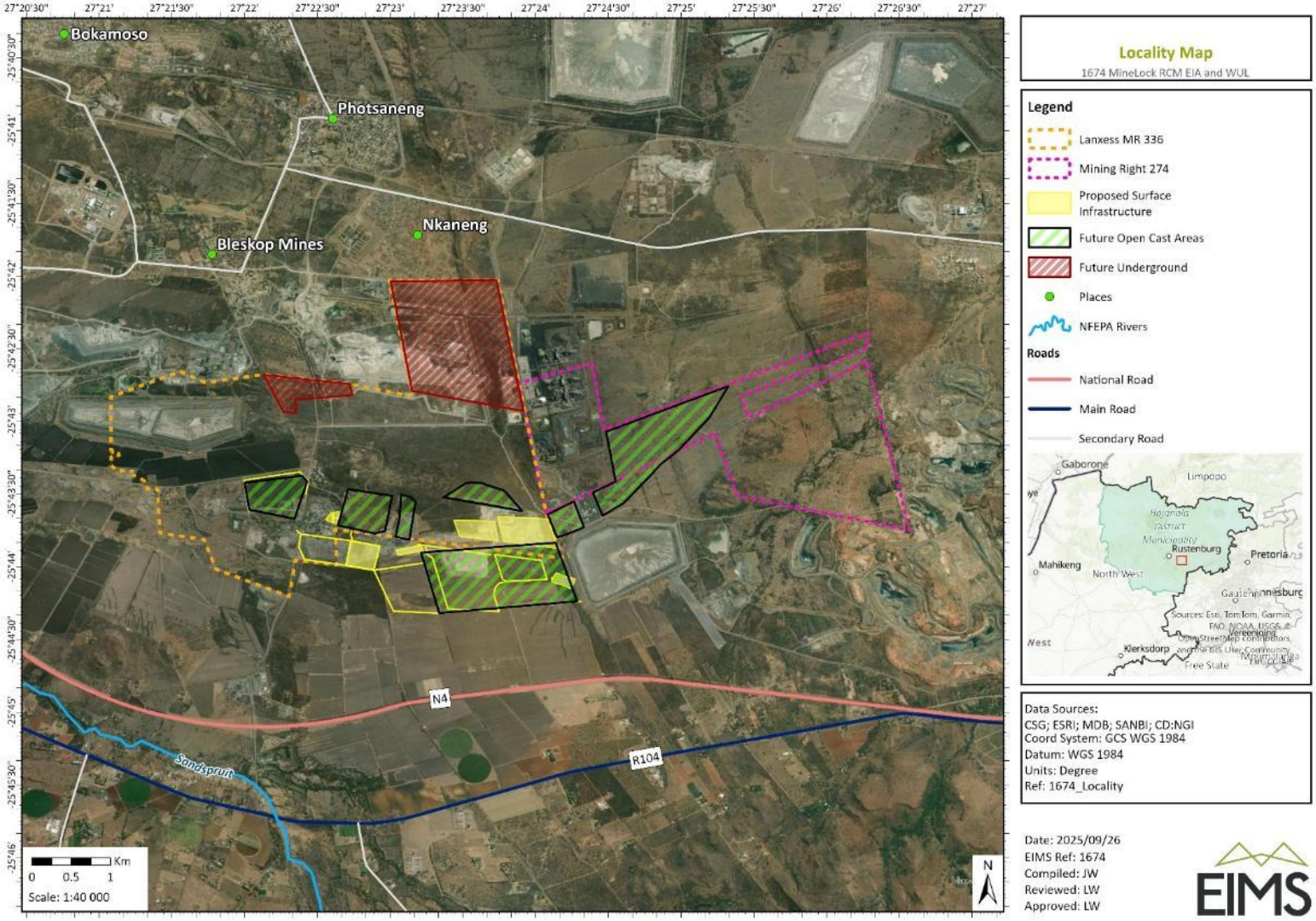


Figure 1: Locality map indicating the location of the proposed new infrastructure in relation to RCMs' mining rights areas.

3 DESCRIPTION AND SCOPE OF THE PROPOSED EXPANSION PROJECT

This section provides a detailed description for the proposed project. Most of the key information presented in this chapter was obtained from the applicant. The aim of the project description is to describe the proposed activities planned to take place at the RCM study area. Furthermore, the project description is designed to facilitate the understanding of the proposed project related activities which are anticipated to lead to the preliminary impacts identified and assessed in this Scoping Report, and for which management measures have been, or will be designed.

3.1 PROJECT DESCRIPTION

The study area falls within the Rustenburg Local Municipality Wards 32, 33, and 45 (Bojanala District Municipality) administrative area. Refer to Table 4 above for the property descriptions.

The Applicant owns and operates the Rustenburg Chrome Mine and intends expanding the mining areas and developing additional infrastructure that has not previously been authorised.

The current operations at RCM include *inter alia*:

- Underground mining operations;
- Opencast mining areas;
- Rehabilitated Pepsi Dam, Lined Dam, 2 x existing Pollution Control Dams (PCDs);
- Tailings Storage Facility (TSF);
- Waste Rock Dump (WRD);
- Gravity plant area; and
- Heavy Medium Separation (HMS) plan.

The following new infrastructure and activities are being applied for:

- Mining areas:
    - Opencast mining (total new opencast = ~ 262,6 ha):
        - Expansion of the existing opencast pit - to the west (Area 4 (Exploration Phase 1) – ~8,5 Ha);
        - New opencast pits - further to the west of the existing opencast area (Area 8 – ~26 Ha (Exploration Phase 2), and Area 9 - ~ 28,5 Ha (Exploration Phase 3) to the east (Area 5 – ~11,5 Ha); further to the north-east (Area 6 – ~87,5 Ha) and to the south (Area 7 a~121,6 Ha).
    - Underground mining (total new underground = ~211,5 ha):
        - New underground: 2 new underground mining areas located to the north of the mining right boundary.
- Infrastructure:
    - New processing plant ~0,6 Ha.
    - New Run of Mine (ROM) stockpile ~0,5 Ha.
    - New concentrate stockpile ~0,3 Ha.
    - New waste rock stockpile ~20,2 Ha.

- New topsoil stockpile ~10,3 Ha.
- Expansion of the mine tailings storage facility (TSF) ~10,2 Ha.
- New pollution control dams and associated silt traps total of 5,1 Ha.
- New water management infrastructure (including berms, channels, culverts, etc).

All the proposed activities will occur within the existing mining right boundaries and some outside, of which the application to include in the mining right is currently being applied for. Refer to Figure 2 for a layout of the existing infrastructure and activities, and Figure 3 a layout of the proposed infrastructure and activities within the mining right boundary [1]. A portion of the existing mining right (MR336) owned by the applicant will be sold and transferred to Glencore Kroondal Mine for inclusion in their mining right (254MR). An amendment application for the transfer have been submitted to DMPR. This area is also indicated in Figure 3.

[1] *The project description and layout is subject to change as the planning process progresses and may be refined based on the outcomes of the Environmental Impact Assessment (EIA) phase, including findings from the impact assessment and specialist studies.*

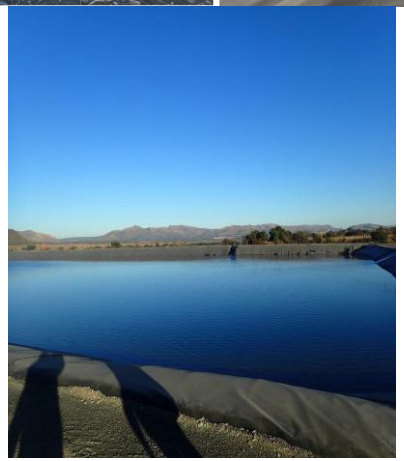
Table 5: Description of expansion and proposed infrastructure and activities applied for.

Component	Description/ contextualisation	Photographic reference
Underground Mining	Two areas are proposed to expand the underground mining areas (refer to figure 2). The total footprint of these areas are ~211,5 Ha. The underground mining method to be used will be the standard bord and pillar system. A board and pillar method of mining is preferred and the systematic placing and sizing of pillars provides the necessary support for the hanging wall (roof). Mine poles are used when the need arises. The pillar dimensions and bord widths are such that a safety factor of 1.6 is maintained. Primary extraction will be carried out by using drill rigs to drill the faces and conventional explosives. Access to the underground chrome reserves will be gained by means of existing surface declines that were developed from the reef outcrop. Run of Mine clearance is facilitated by a series of existing conveyor belts fed by underground LHD loaders. It is calculated that the production rate will be 30 000 to 40 000 tons per month with a total LoM of 14 years. The tonnages mined per month is 900 000 tonnes/annum or approximately 80 000 tonnes/month. At RCM the surface strike length is 4.5 km and the reef dips at 9 degrees in a northerly direction. All current mining is carried out underground at a depth between 120 and 300 metres and it is assumed that mining in the proposed area will be at the same depth.	

Component	Description/ contextualisation	Photographic reference
Open Cast Mining	Opencast mining (total new opencast = ~ 262,6 ha): • Expansion of the existing opencast pit - to the west (Area 4 (Exploration Phase 1) – ~8,5 Ha); • New opencast pits - further to the west of the existing opencast area (Area 8 –~26 Ha (Exploration Phase 2), and Area 9 - ~ 28,5 Ha (Exploration Phase 3) to the east (Area 5 – ~11,5 Ha); further to the north-east (Area 6 – ~87,5 Ha) and to the south (Area 7 a~121,6 Ha). Access to the shallow resource will be by an opencast cut 1374m in strike length and down to a vertical depth between up to 140m (Area 6) below surface. Waste will be stockpiled on the current mined out opencast area. As the opencast mining progresses, the voids created will be backfilled with overburden from the progressive opencast mining, and then overlain by the various soil horizons and rehabilitated. The design of the highwall has been adapted to fit the topography and crown pillar position. The overall highwall angle is 60°. The highwall designs will be shown and included in the EIA phase report. There will be free digging up to ±14 metres below ground surface (mbgs) where after open pit blasting operations will take over, mining 100 m x 300 m block sizes at 10 m cuts, utilising the Load-Haul-Dump, or LHD method, with excavators and dump trucks. The open pit mining sequence will start on the eastern side of the proposed pit area and progress towards the west. The final void area will be at the western extent of the open pit. Waste rock and topsoil will be stockpiled separately to the south of the open pit area. As the open pit mining progresses, the voids created will be backfilled with overburden from the progressive open pit mining, and then overlain by the various soil horizons and rehabilitated. The	

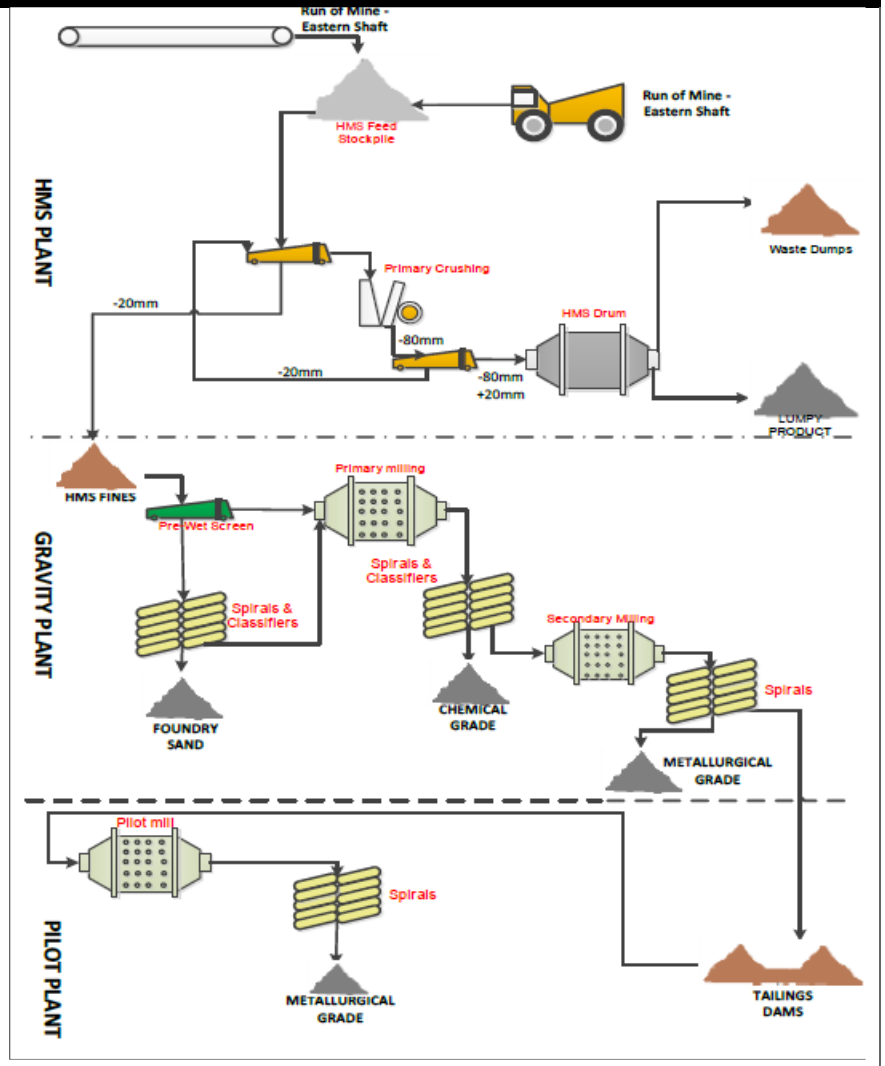
Component	Description/ contextualisation	Photographic reference
	design of the highwall has been adapted to fit the topography and crown pillar position with an angle of 60°. In order to access the ore the topsoil and subsoils will be stripped and placed on a stockpile for the first cut. The inter burden likewise will be placed on a stockpile to allow the ore to be extracted. Inter burden from cut 2 onwards will be used to backfill the previous cut, while soil and subsoil from cut 3 onwards will be used to rehabilitate previously filled cuts. At the end of the life of mine the material from cut 1 will be used to fill the final void with the subsoil and topsoil from these areas will be placed as final cover over the area remaining.	
Mineral Deposit	Currently the LG6 and LG6A chromitite layers of the Rustenburg Layered Suite of the Bushveld Complex are being mined at RCM. During the proposed opencast operations the LG6, LG6A, LG7 and MG1 will be mined. The area of RCMs current mining right can be seen in Figure 2 and 3. The extent of this area is ha. RCM produce four products namely; lumpy ore, metallurgical grade chrome ore, foundry grade chrome ore and chemical grade chrome ore. 1. Lumpy (metallurgical) ore with typically 38 – 41% Cr2O3 and a specified size distribution is sold to the ferrochrome industry where it is processed together with Coal in an electric furnace to form ferrochrome. Ferrochrome is the master alloy used in the production of a wide range of corrosion and heat resistant stainless steel. 2. Metallurgical grade chrome ore with 44% chrome is sold to the local ferrochrome Industry where it is processed together with coal in an electric furnace to form ferrochrome.	

Component	Description/ contextualisation	Photographic reference
	3. Foundry grade chrome ore with a Cr_2O_3 content of typically 46.5% and a strictly specified grain size distribution is used for the manufacture of casting moulds in foundries. The same material is also used in the production of refractory materials. 4. Chemical grade chrome ore with a typical Cr_2O_3 content of 46.0% is the raw material for the production of sodium dichromate processed by RCM in their other operations (chemical plants), which is the main constituent of all chrome chemicals. RCM's largest customer for this product is Bayer with their dichromate production in Germany and Argentina. The main products produced from it by Bayer are chrome tanning salts, chrome pigments and chromic acid.	

Component	Description/ contextualisation	Photographic reference
Water management infrastructure	New Pollution Control Dams (PCD) with silt traps will be constructed. These will be lined according to the Department of Water and Sanitation requirements. The exact number and designs and sizes will be confirmed once all the specialist studies and designs have been concluded and the quality of the water will be similar to existing PCDs as they are used for the same purposes. The bottom centre photograph in the column to the right is a picture of an existing PCD at RCM. New pollution control dams and associated silt traps total of ~5,1 Ha in extent. Two new unlined clean stormwater channels are proposed to be developed (an example of an existing clean water channel at the mine can be seen in the column to the right (top left). One channel will be ~1370m in length and the other one ~2750m in length. New dirty water channels that will be lined will be constructed surrounding the existing TSF and the new /expansion TSF area and will be linked to the new opencast area (Area 7). New lined dirty water channels will also be constructed around the new opencast and WRD areas.	
Run of mine stockpile	New Run of Mine (ROM) stockpile ~0,5 Ha in extent. Stockpiles: Stockpiling of material before use or transport. (Bunded). ■ ROM	

Component	Description/ contextualisation	Photographic reference
	■ Lumpy Ore ■ Crusher Fines ■ HMS Fines ■ CO1	
Concentrate stockpile	New concentrate stockpile ~0,3 Ha in extent.	
Overburden stockpile	Overburden stockpile ~20,2 Ha in extent. An additional overburden dump will be required alongside the open pit for overburden removed during mining. This proposed dump will have a footprint of approximately ~20,2 ha and a height of 30 m.	
Topsoil stockpile	An additional topsoil stockpile will be located between next to the overburden dump on the previously mined and rehabilitated opencast area. This will be screened off by trees. This proposed stockpile will measure, have a footprint of approximately ~10,3 Ha. and a height of 25 m.	

Component	Description/ contextualisation	Photographic reference
Tailings storage facility	The TSF will be expanded to the East of the current TSF. Under operational conditions, sludge generated from ore processing is disposed of to the TSF with a cyclone deposition method. Runoff water from the mine and plant areas flows to a Return Water Dam (RWD), from where water is abstracted and reused in the processing plants. Supernatant water on the TSF is recovered via a penstock and also pumped to the RWD for reuse. The current rehabilitation. Expansion of the mine tailings storage facility (TSF) ~10,2 Ha in extent.	
Processing plant	New processing plant ~0,6 Ha in extent. Processing facilities: • Crusher; • Settlers; • HMS (Heavy Medium Separator); • Gravity plant; • New reclamation plant. • Beneficiation. • Crushing and screening. • HMS Plant: The coarse fraction >19mm is fed into a heavy media separation plant in order to separate the remaining	

Component	Description/ contextualisation	Photographic reference
	waste from lumpy ore which is then sold as lumpy ore into the ferrochrome industry. • Gravity Plant: The fine fraction of ROM (<19mm) is upgraded to foundry sand (CO4) and chemical grade (CO1) by milling, screening spiralling and hydroclassification. Regrinding of the waste material leaving from the foundry sands and chemical grade circuits and subsequently re-classification, results in the metallurgical grade products (CO6). Plant for the reclamation of 12 year old tailings dam. Processing The Mine's processing plant treats LG6 ore to produce the four chrome products by means of Heavy Medium Separation (HMS) in the HMS Plant and Gravity Concentration in the Gravity and Pilot Plants. The HMS plant has a capacity of 3 600 tons per day and the gravity plant has a capacity of 1 800 tons per day. This processing plant will remain in operation and will not be impacted by the proposed activities. The processing activities are summarised in The figure in the column to the right. Schematic of processing at the mine (Digby Wells, 2015). All products are sold to external clients. Chemical grade is also sold to other RCM business sites for the production of chrome chemicals.	
Ancillary services	Powerlines, solar plant, roads/access/haul roads etc.	

Component	Description/ contextualisation	Photographic reference
	• Haul roads and service road – Approximately 5 km of haul roads, 25 m wide to accommodate two lanes of traffic. The haul roads connect the existing road network with the new open pit as well as the stockpile areas. • A service or access road will be constructed to provide access to open pit operation. These roads will most likely be gravel and 8m wide (less than 1ha). • A small workshop, office block and parking area will be built in the area of the open pit. • Hazardous storage facilities or upgrading of those.	

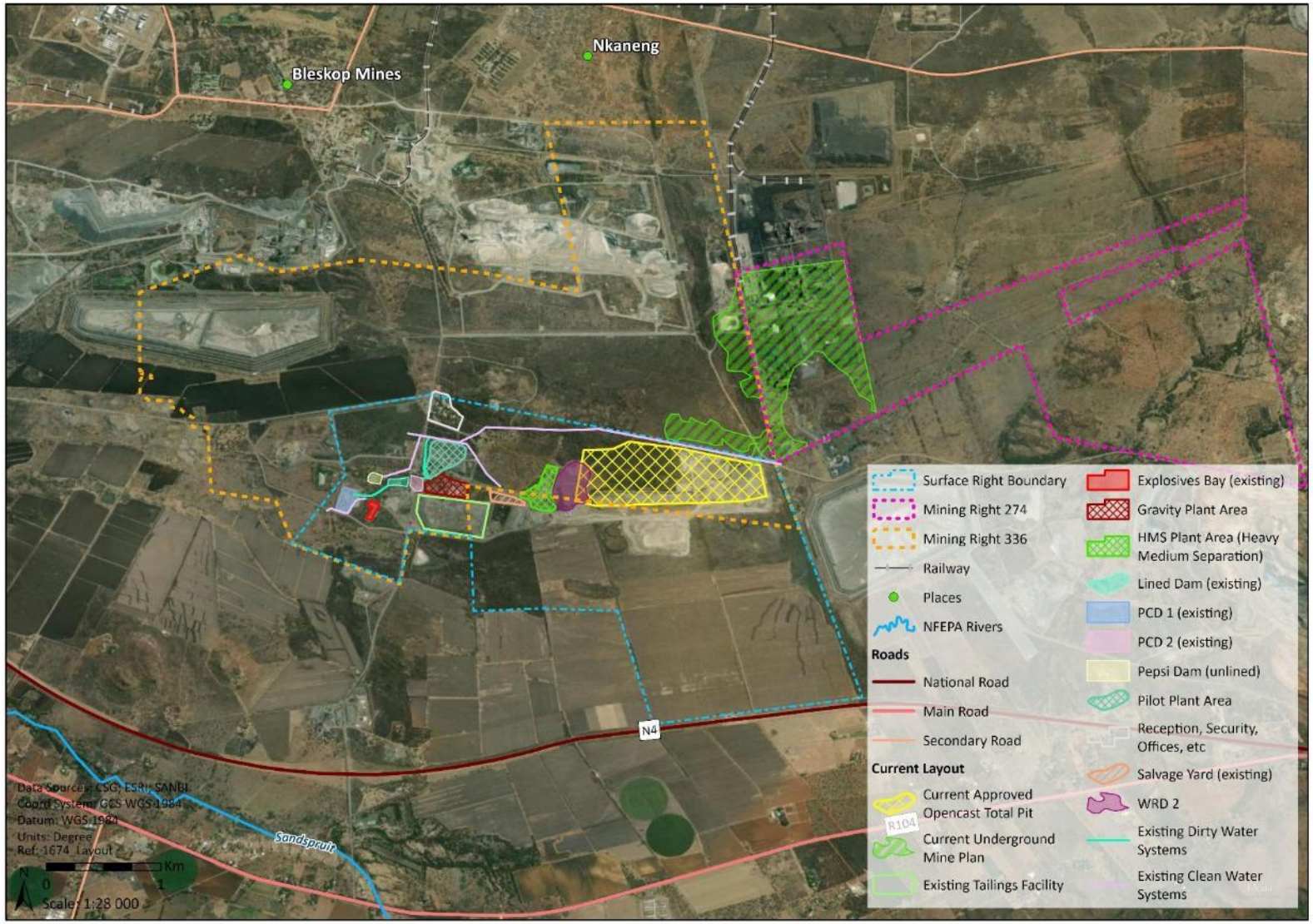


Figure 2: Layout of the existing infrastructure and activities within the mining right boundary.

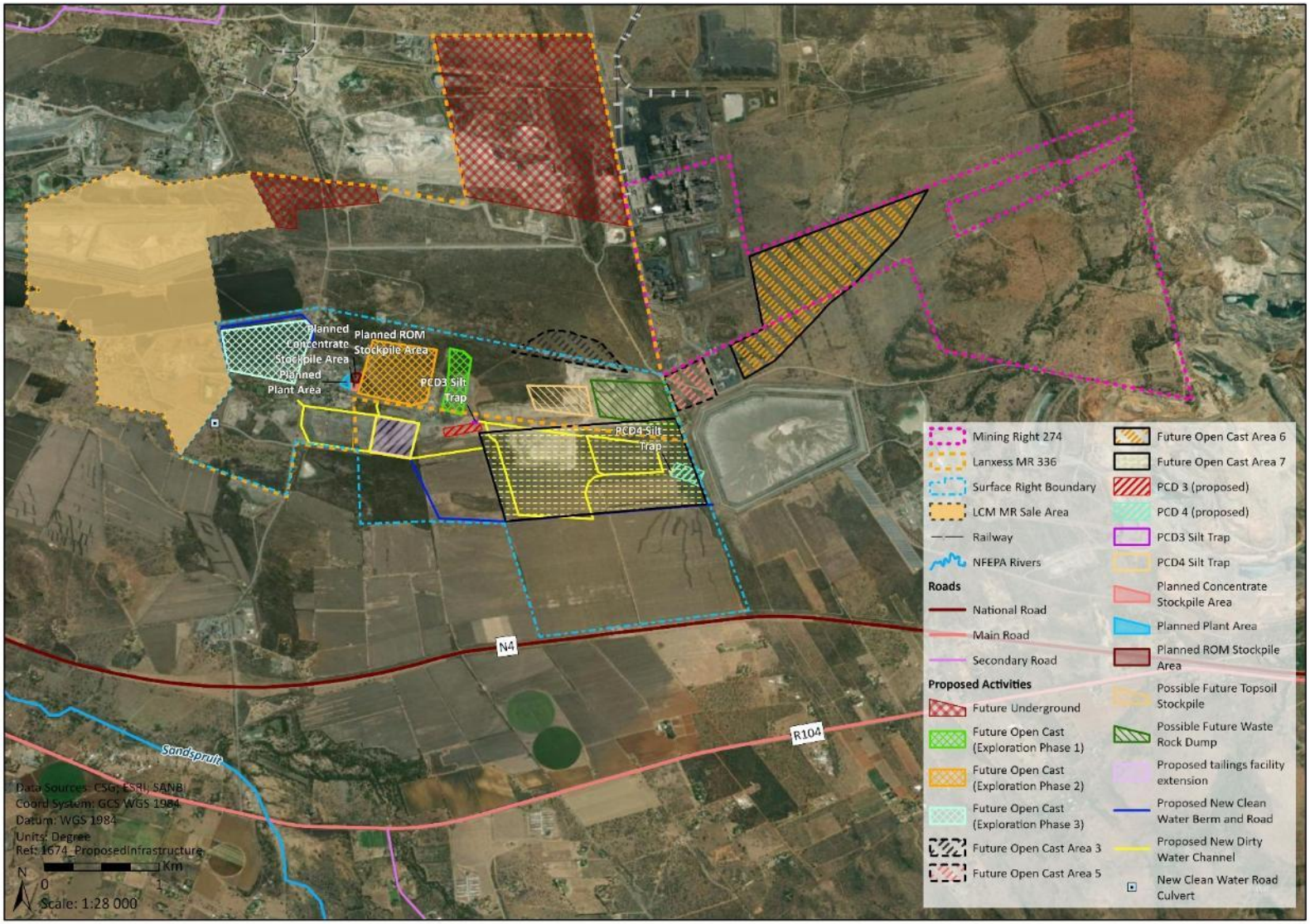


Figure 3: Layout of the proposed infrastructure and activities within the mining right boundary

3.1.1 LISTED AND SPECIFIED ACTIVITIES TRIGGERED

In terms of Section 24(2) of NEMA, the Minister and/or any MEC in concurrence with the Minister may identify activities which require authorisation as these activities may negatively affect the environment. Environmental Impact Assessment (EIA) Regulations were promulgated in 2014 and amended in 2021 in terms of Section 24(5) and Section 44 of the National Environmental Management Act (NEMA), Act 107 of 1998 and consist of the following:

- *Regulation 982* provide details on the processes and procedures to be followed when undertaking an Environmental Authorisation process (also referred to as the EIA Regulations);
- *Listing Notice 1* (Regulation 983, as amended) defines activities which will trigger the need for a Basic Assessment process;
- *Listing Notice 2* (Regulation 984, as amended) defines activities which trigger an Environmental Impact Assessment (EIA) process. If activities from both R 983 and R 984 are triggered, then an EIA process will be required; and
- *Listing Notice 3* (Regulations 985, as amended) defines certain additional listed activities for which a Basic Assessment process would be required within identified geographical areas. (Refer to Figure 4).

The above regulations were assessed to determine whether the proposed project will trigger any of the above listed activities, and if so, which Environmental Authorisation Process would be required. The triggered listed activities presented in Table 6 and the applicant will require an Environmental Authorisation (EA) and Waste Management License (WML) in terms of GNR 984 Listing Notice 2 of the NEMA EIA Regulations 2014 as amended. A Scoping and EIA process is required in line with all the requirements of the NEMA EIA Regulations, 2014, as amended.

Table 6: Relevant NEMA listed activities relevant to the proposed development

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
GNR 983 Listing notice 1		
Activity 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.	Clean water or Storm Water
Activity 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;	Dirty water, Waste Water, Sewage, Effluent, Etc.

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	or (b) where such development will occur within an urban area.	
Activity 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; (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 the development and where indigenous vegetation will not be cleared. [Activity 12 amended by GN 517/2021]	Mining infrastructure such as Roads, PCDs, TSF, WRD, OC or UG Pits within a watercourse or within 32m of a watercourse.
Activity 13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.	PCDs
Activity 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;	Infrastructure in close proximity or inside the floodline and or water course or traversing the watercourse (wetland or river).

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	(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."	
Activity 21D	Any activity including the operation of that activity which requires an amendment or variation to a right or permit in terms of section 102 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment. [Activity 21D inserted by GN 517/2021]	Amending the MR, MWP, EMPr through Section 102
Activity 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/access roads.
Activity 27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Clearance of vegetation for new or expanded infrastructure and open cast pits.
Activity 46	The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes where the existing infrastructure- (i) has an internal diameter of 0,36 metres or more; or (ii) has a peak throughput of 120 litres per second or more; and (a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or (b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more; excluding where such expansion- (aa) relates to the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge	Clean water or Storm Water expansion.

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	or slimes within a road reserve or railway line reserve; or (bb) will occur within an urban area.	
Activity 48	The expansion of- (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion 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 expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion 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 23 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves. [Activity 48 amended by GN 706/2018]	Dirty water, Waste Water, Sewage, Effluent etc. expansion.
GNR 984 Listing notice 2		
Activity 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	WULA for Section 21a), c), g), i) and j) activities.

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.	
Activity 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.	Clearance to construction opencast pits and other infrastructure.
Activity 17	Any activity including the operation of that activity which requires a mining right in terms of 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. [Activity 17 substituted by GN 715/2021].	The activity needs a mining right. The mining right boundary will be extended to include new areas.
GNR 985 Listing Notice 3		
Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres.	Haul roads / access roads.
Activity 10	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.	New storage and handling of a dangerous goods e.g. diesel.
Activity 12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	Clearance to construction opencast pits and other infrastructure within a Critical Biodiversity Area (CBA).
Activity 14	"The development of- (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or	Mining infrastructure such as Roads, PCDs, TSF, WRD, OC or UG Pits within a watercourse or within 32m of a watercourse.

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour."	
Activity 18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.	The expansion of haul and or access roads.
Activity 22	The expansion and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage facilities or infrastructure will be expanded by 30 cubic metres or more but no more than 80 cubic metres.	Expansion of storage and handling of a dangerous goods e.g. diesel.
Activity 23	The expansion of- (i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs- (a) within a watercourse; (b) in front of a development setback adopted in the prescribed manner; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.	Mining infrastructure such as Roads, PCDs, TSF, WRD, OC or UG Pits within a watercourse or within 32m of a watercourse.

The listed activities that are triggered by the project in terms of GN921 (as amended) promulgated under the National Environmental Management Waste Act (Act 59 of 2008 - NEMWA) are specified in Table 7 below.

Table 7: Applicable NEMWA Activities relevant to the proposed development

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
Category A, Activity 12	The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).	TSF
Category A, Activity 13	The expansion of a waste management activity listed in Category A or B of this Schedule which does not trigger an additional waste management activity in terms of this Schedule.	TSF

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
Category B, Activity 10	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).	Waste Rock Dump and /TSF
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 Rock Dump and /TSF

The Department of Mineral and Petroleum Resources (DMPR) has been identified as the CA for both the NEMA and NEM:WA listed activities triggered by the project. A separate application for a Water Use Licence (WUL) has also been lodged with the Department of Water and Sanitation (DWS) for the water use triggers.

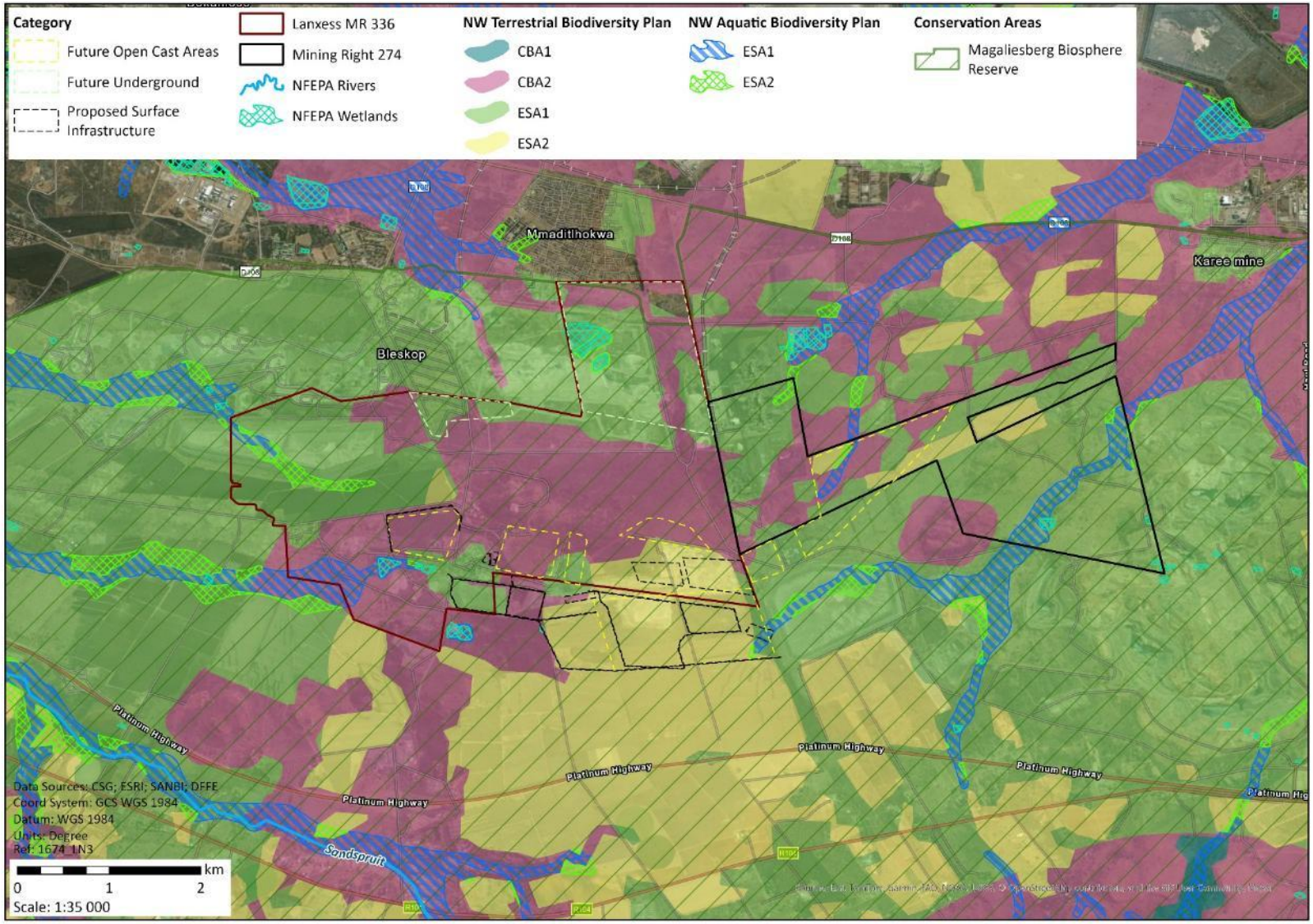


Figure 4: Listing Notice 3 areas.

4 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, which is the DMPR, in accordance with the requirements of the NEMA EIA Regulations 2014, as amended. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards, guidelines and treaties on an international, national, provincial and local level, which should be considered in order to assess the potential applicability of these for the proposed activity. The key legislation applicable to this project is discussed in the subsections below. The contents of this report are based on a review of the information that was available at the time of the compilation of the report. The discussion in this chapter is by no means an exhaustive list of the legal obligations of the applicant in respect of environmental management for the proposed project.

4.1 APPLICABLE NATIONAL LEGISLATION

The legal framework within which the proposed project operates is governed by many Acts, Regulations, Standards and Guidelines on a national level. Legislation applicable to the project includes (but is not limited to) those discussed below.

4.1.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The constitution of any country is the supreme law of that country. The Bill of Rights in Chapter 2 Section 24 of the Constitution of South Africa Act (Act No. 108 of 1996) makes provisions for environmental issues and declares that: *"Everyone has the right -*

a) to an environment that is not harmful to their health or well-being; and

b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

i. prevent pollution and ecological degradation;

ii. promote conservation; and

iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

The State must therefore respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities. The Constitution therefore recognises that the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must cooperate with, consult and support one another if the State is to fulfil its constitutional mandate. The applications for an Integrated Environmental Authorisation and Waste Management Licence in terms of NEMA and NEMWA, and an Integrated Water Use License in terms of the NWA, for the proposed expansion project will ensure that the environmental right enshrined in the Constitution contributes to the protection of the biophysical and social environment.

4.1.2 THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002

The MPRDA aims to "make provision for equitable access to, and sustainable development of, the nation's mineral and petroleum resources". The MPRDA outlines the procedural requirements that need to be met to acquire mineral and petroleum rights in South Africa. The MPRDA further governs the sustainable utilisation of South Africa's mineral resources.

Several amendments have been made to the MPRDA. These include, but are not limited to, the amendment to Section 102 which concerns the amendment of rights, permits, programmes and plans, to requiring the written permission from the Minister for any amendment or alteration; and the Section 5A(c) requirement that landowners or land occupiers receive twenty-one (21) days' written notice prior to any activities taking place on their properties. One of the most recent amendments requires all mining related activities to follow the full

NEMA process as per the 2014 EIA Regulations, which came into effect on 4 December 2014 as was last amended in 2022.

In support of the Integrated EA and WML application specifically, the applicant is required to conduct an EIA process comprising of the preparation of environmental Scoping and EIA Reports, an EMPr, as well as Interested and Affected Party (I&AP) consultations, all of which must be submitted to the DMPR for adjudication. This report has been compiled in accordance with Regulation 49 of the MPRDA Regulations and Regulation 21 and Appendix 2 of the EIA Regulations (2014, as amended) in order to satisfy the criteria for a Scoping Report. This Scoping Report pertains to the integrated NEMA EA and NEMWA WML application for the proposed RCM project.

4.1.3 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA. In South Africa, EIAs became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now Department of Forestry, Fisheries and the Environment – DFFE) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended several times between 2010 and 2022. The NEMA EIA Regulations, 2014, as amended, are applicable to this project.

The objective of the EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the listed activities that are triggered by the proposed project. The purpose of these procedures is to provide the competent authority with adequate information to make informed decisions which ensure that activities which may impact negatively on the environment to an unacceptable degree are not authorised, and that activities which are authorised are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIAs in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity (refer to Figure 5).

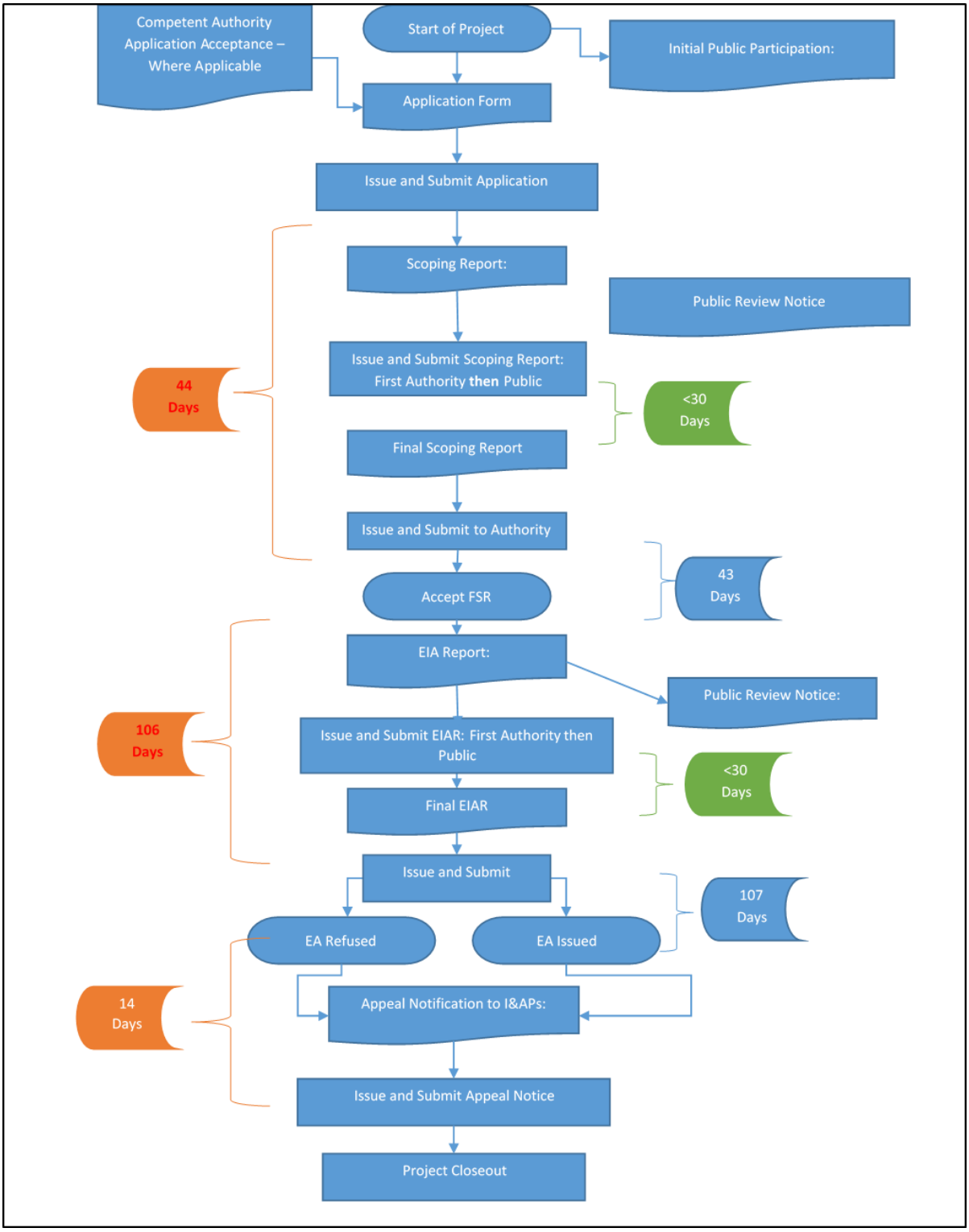


Figure 5: EIA process diagram.

An environmental Scoping and Impact Assessment process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and Impact Assessment studies accordingly provide a mechanism for the comprehensive assessment of activities that are likely to have more significant environmental impacts. Figure 5 provides a graphic representation of all the components of a full EIA process.

Section 24P of the NEMA requires that an applicant for an environmental authorisation relating to prospecting, mining or production must, before the Minister responsible for mineral resources issues the EA, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning

management of negative environmental impacts. Therefore, the potential environmental liabilities associated with the proposed activity must be quantified and the method of financial provision indicated in line with the NEMA Financial Provision Regulations (2015). The financial provision costs will be presented in the EIA Report. The listed activities, the proposed project triggers, and consequently requires authorisation prior to commencement, are detailed in Section 3.1.1 (Table 6).

NEMA is the main Environmental Legislation in South Africa and other Specific Environmental Management Acts (SEMA's) support its objectives. Examples of SEMA's include the following:

- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008);
- National Water Act, 1998 (Act No. 36 of 1998);
- National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004); and
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).

Some specific Environmental Management Legislation is discussed in Section 4.1. The key principles of NEMA as outlined in Chapter 3 can be summarised as follows:

- sustainability must be pursued in all developments to ensure that biophysical and socio-economic aspects are protected; or
- there must be equal access to environmental resources, services and benefits for all citizens including the disadvantaged and the vulnerable. Adverse environmental impacts shall be distributed fairly among all citizens;
- environmental governance must include the participation of all interested and affected parties who must be catered for to allow their effective participation;
- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably; and

The polluter pays principle must be applied in all cases where any person has caused pollution or undertaken any action that led to the degradation of the environment.

4.1.3.1 LISTED ACTIVITIES

In terms of section 24(2) of NEMA, the Minister and or any MEC in concurrence with the Minister may identify activities that require authorisation as these activities may negatively affect the environment. The Act requires that in such cases the impacts must be considered, investigated and assessed before their implementation, and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity. The NEMA EIA Regulations guide the processes required for the assessment of impacts of Listed Activities.

The requirement for the undertaking of Environmental Impact Assessments and Basic Assessments began in 1997 with the promulgation of the EIA Regulations under the Environment Conservation Act, 1989 (ECA) (Act No. 73 of 1989). These were followed by the 2006, 2010 and 2014 regulations. Table 8 is a summary of the progression of the EIA regulations to date.

Table 8: Summary of the South African EIA regulations from inception to date

EIA Regulations	Government Gazette
EIA Regulations promulgated in terms of the ECA, Act No 73 of 1989	GNR 1182 & 1183: Government Gazette No 18261, 5 September 1997
Amendment of the ECA EIA Regulations	GNR 670 and GNR 672 of 10 May 2002, Government Gazette No 23401

EIA Regulations	Government Gazette
2006 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 385, 386 and 387 Government Gazette No 28753, Pretoria, 21 April 2006
2010 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 543, 544, 545 and 546 Government Gazette No 33306, Pretoria, 18 June 2010
2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 982, 983, 984 and 985 Government Gazette No 38282, Pretoria, 04 December 2014
Current **Amendment of the 2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998**	GNR 982, 983, 984 and 985 Government Gazette No 44701, Pretoria, 2021 as amended

The scoping and EIA process for the proposed RCM project is undertaken in terms of the NEMA EIA Regulations, 2014, as amended. Please refer to Table 6 for a list of the anticipated Listed Activities triggered by the proposed project.

4.1.3.2 THE NATIONAL WEB-BASED ENVIRONMENT SCREENING TOOL, 2019

A Screening Tool Report was generated from the DFFE Screening tool as per the requirements of Regulation 16 (1)(b)(v) of the EIA Regulations 2014, as amended, and was included in the Application for EA and WML. The screening Tool provided a list of specialist studies for consideration and inclusion in the process. The Screening Tool identified environmental sensitivities are presented in Table 9Table 9.

Table 9: Screening Tool environmental sensitivities.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture	X			
Animal species			X	
Aquatic Biodiversity	X			
Archaeological and Cultural Heritage		X		
Civil Aviation		X		
Defence Theme				X
Palaeontology			X	
Plant Species Theme				X
Terrestrial Ecology/ Biodiversity	X			

In this regard, a Site Sensitivity Verification Report (SSVR) has been compiled to consider the recommendations of the DFFE Screening Tool Report and to provide a rationale for the selection of specialist studies included in the assessment report. Although the specialist studies will be undertaken during the EIA phase, the EAP has already undertaken a site sensitivity verification (Appendix 3) and the EAPs' assessments/theme and sensitivity ratings identified by the Screening Tool are summarized in Table 10 below.

Table 10: SSVR findings and motivation.

Screening Tool identified specialist	Level of sensitivity	Suggested Sensitivity	Required level of assessment	Motivation
Agricultural Impact Assessment	Very High	Very High	Full Impact Assessment	The site is located within a mining area, and will not have a significant direct impact on agricultural potential. However, the proposed activities may have an impact on agricultural activities to the south and south-west of the project area. Therefore a specialist will need to do a site verification and Full Impact Assessment.
Landscape/Visual Impact Assessment	N/A	Very low	None	The proposed expansion of the mine is located within a mining area and is almost surrounded by other mining activities. There are also not many sensitive receptors in the area.
Archaeological and Cultural Heritage Impact Assessment	High	High	Full Impact Assessment	Required by the National Heritage Resources Act, 1999 (Act No. 25 of 1999).
Palaeontology Impact Assessment	Medium	Low	Desktop Impact Assessment	The desktop baseline assessment of the specialist during the scoping phase, indicated that the sensitivity of the study area in terms of Palaeontological Resources is low.
Terrestrial Biodiversity Impact Assessment	Very High	Very High	Full impact assessment.	The study area is fragmented and impacted on by mining and agriculture and the sensitivity is closer to medium or low. However, it was decided that a full impact assessment will be conducted by a specialist during the EIA phase, as required by the specialist protocols.
Aquatic Biodiversity Impact Assessment	Very High	Very High	Full Impact Assessment	Some wetlands and a flood line have been located by the EAP and was confirmed by the appointed specialists.
Hydrology Assessment	N/A	Very High	Stormwater Management Plan and Flood line delineation.	Drainage lines have been identified by the EAP adjacent to the site.
Noise Impact Assessment	N/A	Very High	Full Impact Assessment	The nature of the activities involves elevated sound levels and may have a significant acoustic output, thereby impacting nearby sensitive receptors such as fauna and homesteads or residential areas.

Screening Tool identified specialist	Level of sensitivity	Suggested Sensitivity	Required level of assessment	Motivation
Radioactivity Impact Assessment	N/A	N/A	None	The nature of the tailings is not such that it contains significant amounts of radioactivity and assessment is not required.
Traffic Impact Assessment	N/A	Very Low	None	The activities may generate a slight increase of traffic during the construction phase, however, during the operational phase traffic will not increase drastically.
Geotechnical Assessment	N/A	N/A	As part of the engineering design process	A geotechnical assessment is required to assess impacts e.g. subsidence and pollution. This will be considered as part of the engineering designs for infrastructure and underground and open cast mining activities.
Climate Impact Assessment	N/A	N/A	None	The nature of the activity is not such that it will have a significant additional impact on climate. The impact of 'gaseous emissions' from vehicles and equipment/machinery will be assessed as part of the Air Quality Impact Assessment. Climate change predictions will be assessed as part of the other relevant specialist studies e.g. hydrology etc.
Health Impact Assessment	N/A	N/A	None	The additional impacts, specifically health impacts are not significant in terms of the existing operations and the EAP is of the opinion that these impacts (such as air quality and noise levels) can be mitigated to acceptable levels.
Socio-Economic Assessment	N/A	N/A	None	As part of the dynamic Social and Labour Plan (SLP) socio-economic assessments are done and it is recommended that the SLP be updated to include the new activities. However, it is not required as part of the EIA process.
Ambient Air Quality Impact Assessment	N/A	N/A	Full Impact Assessment	The nature of the activities involves elevated fugitive emissions including dust and particulate matter as well as gaseous emissions. These may have significant negative impacts on air quality etc. if not assessed and mitigated appropriately.

Screening Tool identified specialist	Level of sensitivity	Suggested Sensitivity	Required level of assessment	Motivation
Seismicity Assessment	N/A	N/A	None	Enough data available to the mine of the area (previous studies maybe) to determine whether activities will have significant impacts.
Geotechnical Assessment	N/A	N/A	As part of the engineering design process.	A geotechnical assessment is required to assess impacts e.g. subsidence and pollution. This will be considered as part of the engineering designs for infrastructure and underground and open cast mining activities.
Plant Species Assessment	Low	Low	Compliance Statement	This will be included in the full terrestrial biodiversity impact assessment.
Animal Species Assessment	Medium	Low	Compliance Statement by specialist.	Habitats on site are severely degraded or modified and provide little to no suitable habitat for indigenous species. The ongoing mining practices result in dust fall, in addition to all other pollution. High levels of human presence provide a constant deterrent, along with the ongoing mining practices which result in noise pollution, in addition to all other pollution. The compliance statement will be included in the full terrestrial biodiversity impact assessment.

4.1.4 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

The National Environmental Management: Waste Act, no 59 of 2008 (NEMWA) came into effect on the 1st of July 2009. The Waste Act places a general duty on a holder of waste to avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger the health or the environment or cause a nuisance through noise, odour or visual impacts; prevent any employee or any person under his or her supervision from contravening the Act; and prevent the waste from being used for an unauthorised purpose. Section 16 of the NEMWA must also be considered which states the following:

1. A holder of waste must, within the holder's power, take all reasonable measures to-

   a) "*Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;*

   b) *Reduce, re-use, recycle and recover waste;*

   c) *Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;*

   d) *Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;*

   e) *Prevent any employee or any person under his or her supervision from contravening the Act; and*

   f) *Prevent the waste from being used for unauthorised purposes.*"

These general principles of responsible waste management will be incorporated into the requirements in the EMPr to be implemented for this project.

Waste can be defined as either hazardous or general in accordance with Schedule 3 of the NEMWA (2014) as amended. "Schedule 3: Defined Wastes" has been broken down into two categories – Category A being hazardous waste; and Category B being general waste. In order to attempt to understand the implications of these waste groups, it is important to ensure that the definitions of all the relevant terminologies are defined:

- Hazardous waste: means "*any waste that contains organic or inorganic elements or compounds that may, owning to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles*."
- Residue deposits: means "*any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right*."
- Residue stockpile: means "*any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act*."
- General waste: means "*waste that does not pose an immediate hazard or threat to health or to the environment and includes – domestic waste; building and demolition waste; business waste; inert waste; or any waste classified as non-hazardous waste in terms of the regulations made under Section 69*."

Furthermore, the NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities. The proposed RCM Rustenburg waste management activities in terms of Category B of GN R. 921 which states that "*a person who wishes to commence, undertake or conduct an activity listed under this Category, must conduct an environmental impact assessment process, as stipulated in the environmental impact assessment regulations made under section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as part of a waste management licence application*."

The listed waste activities that are triggered by the RCM Rustenburg project, and which form the basis of this waste management licence application, are presented in Table 11.

Table 11: List of waste activities that are triggered by the proposed project

Waste Category and Number	Description
Category A12	The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).
Category A13	The expansion of a waste management activity listed in Category A or B of this Schedule which does not trigger an additional waste management activity in terms of this Schedule.
Category B10	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).
Category B11	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or

Waste Category and Number	Description
	production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

4.1.4.1 NEMWA WASTE CLASSIFICATION AND MANAGEMENT REGULATIONS, 2013

These regulations pertain to waste classification and management, including the management and control of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation which is relevant to the proposed project. The purpose of these Regulations is to –

- Regulate the classification and management of waste in a manner which supports and implements the provisions of the Act;
- Establish a mechanism and procedure for the listing of waste management activities that do not require a Waste Management Licence;
- Prescribe requirements for the disposal of waste to landfill;
- Prescribe requirements and timeframes for the management of certain wastes; and
- Prescribe general duties of waste generators, transporters and managers.

Waste classification, as presented in Chapter 4 of these regulations, entails the following:

- Wastes listed in Annexure 1 of these Regulations do not require classification in terms of SANS 10234;
- Subject to sub regulation (1), all waste generators must ensure that the waste they generate is classified in accordance with SANS 10234 within one hundred and eighty (180) days of generation;
- Waste must be kept separate for the purposes of classification in terms of sub regulation (2), and must not be mixed prior to classification;
- Waste-must be re-classified in terms of sub regulation (2) every five (5) years, or within 30 days of modification to the process or activity that generated the waste, changes in raw materials or other inputs, or any other variation of relevant factors;
- Waste that has been subjected to any form of treatment must be re-classified in terms of sub regulation (2), including any waste from the treatment process.; and
- If the Minister reasonably believes that a waste has not been classified correctly in terms of sub regulation (2), he or she may require the waste generator to have the classification peer reviewed to confirm the classification.

Furthermore, Chapter 8 of the Regulations stipulates that unless otherwise directed by the Minister to ensure a better environmental outcome, or in response to an emergency so as to protect human health, property or the environment –

- Waste generators must ensure that their waste is assessed in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal set in terms of section 7(1) of the Act prior to the disposal of the waste to landfill;
- Waste generators must ensure that the disposal of their waste to landfill is done in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7(1) of the Act; and
- Waste managers disposing of waste to landfill must only do so in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7 (1) of the Act.

4.1.4.2 NEMWA NATIONAL NORMS AND STANDARDS FOR THE DISPOSAL OF WASTE TO LANDFILL, 2013 (GN R. 636)

Once the waste has been assessed and waste type determined, these Norms and Standards can be used to determine the minimum requirements for the landfill and containment barrier design. This will distinguish between Class A, Class B, Class C, or Class D landfills and the associated containment barrier requirements. Although these Norms and Standards prescribe the containment barrier or liner design for each determined waste type, the recent amendments in chapter 3 of the regulations to the planning and management of residue stockpiles and residue deposits, a competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of the regulations. The recommendation should be founded on a risk analysis based on the characteristics and classification in regulation 4 and 5 of these Regulations, towards determining the appropriate mitigation and management measures.

The RCM TSF barrier system(s) will be determined in consultation with the authorities and will be in compliance with these norms and standards.

4.1.4.3 NEMWA REGULATIONS REGARDING THE PLANNING AND MANAGEMENT OF RESIDUE STOCKPILES AND RESIDUE DEPOSITS AND ASSOCIATED AMENDMENT

These Regulations, which pertain to the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation, were published in 2015 and were amended in 2018. The Regulations and associated amendment relate to the assessment of impacts and the analyses of risks relating to the management of residue stockpiles and residue deposits, and involve the following:

- The identification and assessment of environmental impacts arising from the establishment of residue stockpiles and residue deposits must be done as part of the environmental impact assessment conducted in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- A risk analysis based on the characteristics and the classification set out in regulation 4 (characterisation of residue stockpiles and residue deposits) and 5 (classification of residue stockpiles and residue deposits) of these regulations must be used to determine the appropriate mitigation and management measures; and
- A competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of these Regulations.

The planning and management of the RCM residue deposits will be subject to these regulations. In this regard, the containment barrier design (including requirements for a liner and nature of the liner), will be addressed in accordance with chapter 3 of these Regulations and their associated amendments.

4.1.5 THE NATIONAL WATER ACT, 1998

The National Water Act, 1998 (Act 36 of 1998 – NWA) makes provision for two types of applications for water use licences, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed licence on the resource quality, and that such assessment be subject to the NEMA EIA Regulations. These water use processes are described in Figure 6. A person may use water if the use is –

- Permissible as a continuation of an existing lawful water use (ELWU);
- Permissible in terms of a general authorisation (GA);
- Permissible under Schedule 1; or
- Authorised by a licence.

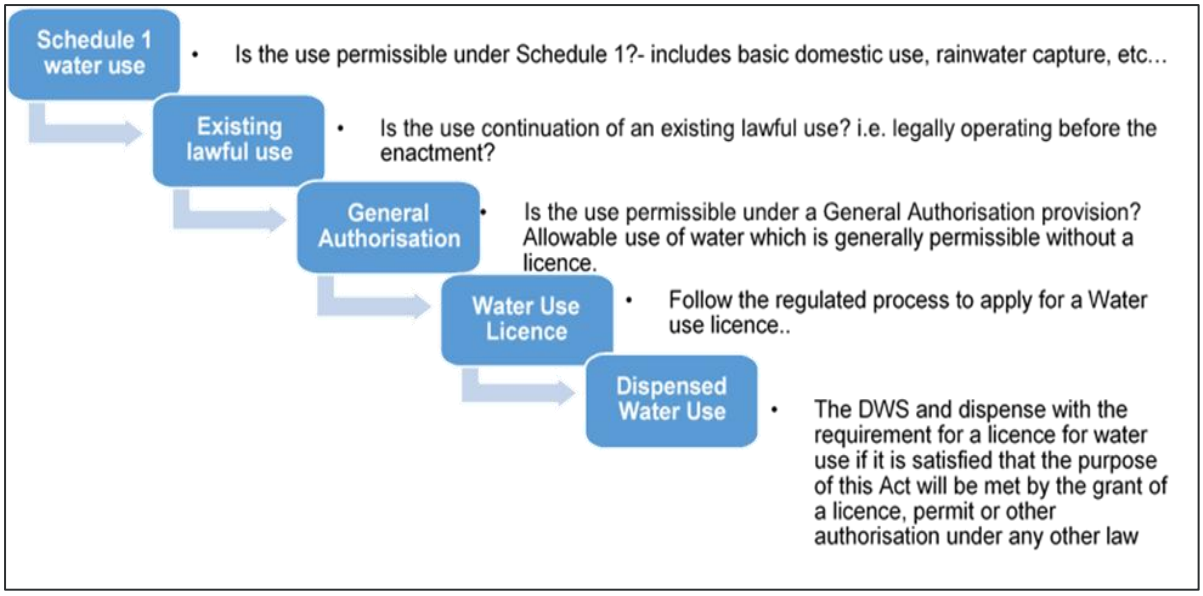


Figure 6: Authorisation processes for new water uses.

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved and managed in ways that take into account:

- Meeting basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest; facilitation social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and drought.

The NWA defines 11 water uses in Section 21 of the Act. A water use may only be undertaken if authorised by the Department of Water and Sanitation (DWS). The water uses for which an authorisation or licence can be issued include:

- Taking water from a water resource;
- Storing water;
- Impeding or diverting the flow of water in a watercourse;
- Engaging in a stream flow reduction activity contemplated in section 36;
- Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;

- Disposing of waste in a manner which may detrimentally impact on a water resource;
- Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- Altering the bed, banks, course or characteristics of a watercourse;
- Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- Using water for recreational purposes.

The regulated area of a watercourse for section 21 activities of the Act water uses is similarly defined in terms of the Act as follows:

- The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or
- A 500 m radius from the delineated boundary (extent) of any wetland or pan.

A review of the NWA Section 21 activities was undertaken to assess if the proposed development triggers any activity. Based on the information provided by the developer, the proposed development triggers Section 21 a, Section 21c, Section 21i, Section 21g and Section 21j) of the NWA. Subsequently, a Water Use License Application is concurrently underway for the project with the Department of Water and Sanitation, North West Region.

4.1.5.1 THE NATIONAL WATER ACT, GOVERNMENT NOTICE 704, 1999

GN 704 (Government Gazette 20118 of June 1999) was established to provide regulations on the use of water for mining and related activities aimed at the protection of water resources. The five main principal conditions of GN 704 applicable to this project are:

- Condition 4 – which defines the area in which, mine workings or associated structures may be located, with reference to a watercourse and associated flooding. Any residue deposit, dam, reservoir together with any associated structure or any other facility should be situated outside the 1:100 year flood-line. Any underground or opencast mining, prospecting or any other operation or activity should be situated or undertaken outside of the 1:50 year flood-line. Where the flood-line is less than 100 metres away from the watercourse, then a minimum watercourse buffer distance of 100 metres is required for infrastructure and activities;
- Condition 5 – which indicates that no residue or substance which causes or is likely to cause pollution of a water resource may be used in the construction of any dams, impoundments or embankments or any other infrastructure which may cause pollution of a water resource;
- Condition 6 – which describes the capacity requirements of clean and dirty water systems. Clean and dirty water systems must be kept separate and must be designed, constructed, maintained and operated to ensure conveyance the 1:50 year peak flow. Clean and dirty water systems should not spill into each other more frequently than once in 50 years. Any dirty water dams should have a minimum freeboard of 0.8m above full supply level;
- Condition 7 – which describes the measures which must be taken to protect water resources. All dirty water or substances which may cause pollution should be prevented from entering a water resource (by spillage, seepage, erosion, etc.) and ensure that water used in any process is recycled as far as practicable; and

- Condition 10 – which describes the requirements for operations involving extraction of material from the channel of a watercourse. Measures should be taken to prevent impacts on the stability of the watercourse, prevent scour and erosion resulting from operations, prevent damage to in-stream habitat through erosion, sedimentation, alteration of vegetation and flow characteristics, construct treatment facilities to treat water before returning it to the watercourse, and implement control measures to prevent pollution by oil, grease, fuel and chemicals.

Based on preliminary assessment, it is unlikely that the proposed activities will be located within the 1:100 year floodline of a watercourse, or within 100m from the edge of a watercourse (i.e. wetlands). This will be confirmed in the EIA phase once the wetland delineations have been completed.

4.1.5.2 CATCHMENT MANAGEMENT STRATEGIES

South Africa is divided into six Water Management Areas (WMAs). The delegation of water resource management from central government to catchment level is achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA progressively develops a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA. This is to ensure that on a regional scale, water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The main instrument that guides and governs the activities of a WMA is the Catchment Management Strategy (CMS) which, while conforming to relevant legislation and national strategies, provides detailed arrangements for the protection, use, development, conservation, management and control of the region's water resources. The proposed development site is situated on the boundary between quaternary catchments A22H and A21K.

In a parallel application, RCM is currently applying for a Water Use License to ensure that any water resources (surface and groundwater as well as wetlands) affected by the proposed project activities are licensed and managed in accordance with the relevant water and environmental legislation. The Catchment Management Strategy/ies will further be investigated during the EIA phase.

4.1.6 THE NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004

The National Environmental Management Biodiversity Act (Act No. 10 of 2004 – NEMBA) provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA as well as the protection of species and ecosystems that warrant national protection. Within the framework of this act, various regulations are promulgated which provide specific requirements and management measures relating to protecting threatened ecosystems, threatened or protected species as well as the control of alien and invasive species. A summary of these regulations is presented below.

4.1.6.1 THE LIST OF ECOSYSTEMS THAT ARE THREATENED AND NEED OF PROTECTION, 2011

The NEMBA provides for listing of threatened or protected ecosystems in one of the following categories:

- Critically Endangered (CR) ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;
- Endangered (EN) ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;
- Vulnerable (VU) ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and
- Protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.

The extent to which these regulations apply will be determined as a result of the EIA phase terrestrial biodiversity specialist assessment.

4.1.6.2 THE THREATENED OR PROTECTED SPECIES REGULATIONS, 2007

The purpose of these regulations is to -

- further regulate the permit system set out in Chapter 7 of the Biodiversity Act insofar as that system applies to restricted activities involving specimens of listed threatened or protected species;
- provide for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders;
- provide for the regulation of the carrying out of a specific restricted activity, namely hunting;
- provide for the prohibition of specific restricted activities involving specific listed threatened or protected species;
- provide for the protection of wild populations of listed threatened species; and
- provide for the composition and operating procedure of the Scientific Authority.

The extent to which these regulations apply will be determined as a result of the EIA phase terrestrial biodiversity specialist assessment.

4.1.6.3 THE ALIEN AND INVASIVE SPECIES LIST, 2020

This Act is applicable since it protects the quality and quantity of arable land in South Africa. Loss of arable land should be avoided and declared Weeds and Invaders in South Africa are categorised according to one of the following categories, and require control or removal:

- *Category 1a Listed Invasive Species*: Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combated or eradicated;
- *Category 1b Listed Invasive Species*: Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled;
- *Category 2 Listed Invasive Species:* Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be; and
- *Category 3 Listed Invasive Species*: Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

Based on desktop information including the National Web-Based Environmental Screening Tool Report, the study area was assessed to be located within a Critical Biodiversity Area (CBA) 2. A Terrestrial Biodiversity Assessment (flora, fauna and avifaunal) is considered necessary and will be undertaken during the EIA Phase. The study will assist in identifying any Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Areas, Conservation Targets and Ecological drivers of the ecosystem as well as alien and invasive species. Where sensitive species or ecosystem drivers were identified, relevant mitigation measures will be put forward to prevent or minimise the impacts. The findings and impact assessment will be discussed during the EIA Phase. It must be noted that permits for protected species under the NEMBA may also be required.

4.1.7 THE NATIONAL FORESTS ACT, 1998

A licence is required for the removal of protected trees in terms of the NFA, (Act 84 of 1998). It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals. This will be covered by the Terrestrial Biodiversity Impact Assessment during the EIA Phase and the findings, implications and recommendations will be discussed in the EIA Report.

4.1.8 THE NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT

The National Environmental Management Protected Areas Act (Act No. 57 of 2003 – NEMPAA) is intended to "provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes" and creating a "national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity".

The NEMPAA defines various kinds of protected areas, namely: "special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments; world heritage sites; marine protected areas; specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act 84 of 1998); and mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act 63 of 1970)".

According to the protected area spatial datasets from SAPAD (2024) and SACAD (2024), the PAOI is located within the Magaliesberg Biosphere Reserve 'Transition' zones, and approximately 8 km north of the Magaliesburg Protected Natural Environment. This will be assessed during the EIA phase as part of the terrestrial biodiversity study.

4.1.9 THE NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT, 2004

The National Environmental Management: Air Quality Act (Act No. 39 of 2004 as amended – NEMAQA) is the main legislative tool for the management of air pollution and related activities. The Object of the Act is:

- To protect the environment by providing reasonable measures for –

i. the protection and enhancement of the quality of air in the republic;

ii. the prevention of air pollution and ecological degradation; and

iii. securing ecologically sustainable development while promoting justifiable economic and social development; and

iv. Generally, to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

The NEMAQA mandates the Minister of Environment to publish a list of activities which result in atmospheric emissions and consequently cause significant detrimental effects on the environment, human health and social welfare. All scheduled processes as previously stipulated under the Air Pollution Prevention Act (APPA) are included as listed activities with additional activities being added to the list. The updated Listed Activities and Minimum National Emission Standards were published on the 22nd November 2013 (Government Gazette No. 37054).

According to the NEMAQA, air quality management control and enforcement is in the hands of local government with District and Metropolitan Municipalities as the licensing authorities. Provincial government is primarily responsible for ambient monitoring and ensuring municipalities fulfil their legal obligations, with national government primarily as policy maker and co-ordinator. Each sphere of government must appoint an Air Quality Officer responsible for co-ordinating matters pertaining to air quality management. Given that air quality management under the old Act was the sole responsibility of national government, local authorities have in the past only been responsible for smoke and vehicle tailpipe emission control.

Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of the NEMAQA Published under GN 893 in GG 37054 of 22 November 2013 were assessed to determine if the proposed development triggers any of the identified activities. Based on the assessment, the proposed activities at the RCM Rustenburg mine does not trigger any Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of the NEMAQA. However, any changes to the project description which may trigger such listed activities must be assessed thoroughly for the applicant to check applicability for an Atmospheric Emission Licence (AEL).

National Ambient Air Quality Standards (NAAQS) were determined based on international best practice for particulate matter less than 10 and 2.5 µm in aerodynamic diameter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2),

nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb) and benzene. The NAAQS were published in the Government Gazette (no. 32816) on 24 December 2009 for PM_{10} and other pollutants (South Africa, 2009). The $PM_{2.5}$ NAAQS were published in 2012 (South Africa, 2012).

The NEMAQA also provides for the monitoring and reporting of GHG emissions. The National Greenhouse Gas Emission Reporting Regulations (South Africa, 2017) were published in terms of Section 53 (aA), (o) and (p) of NEM: AQA on 3 April 2017 and amended on 11 September 2020 (South Africa, 2020). The purpose of these Regulations is to implement a single national reporting system for the transparent reporting of GHG emissions.

The National Pollution Prevention Plans Regulations were published in March 2014 (Government Gazette 37421) and tie in with the National Greenhouse Gas (GHG) Emission Reporting Regulations which took effect on 3 April 2017. In summary, the Regulations aim to prescribe the requirements that pollution prevention plans of greenhouse gases declared as priority air pollutants, need to comply with in terms of the NEMAQA. The Regulations specify who needs to comply, and by when, as well as prescribing the content requirements.

The National Dust Control Regulations are promulgated under the NEMAQA and the purpose of these Regulations is to prescribe general measures for the control of dust in all areas. Dustfall is assessed for nuisance impact and not for inhalation health impact. The National Dust Control Regulations (Department of Environmental Affairs, 2013) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dustfall rates are measured (using American Standard Testing Methodology (ASTM) D1739:1970 or equivalent) at and beyond the boundary of the premises where dust originates. In addition to the dustfall limits, the National Dust Control Regulations prescribe monitoring procedures and reporting requirements. Dust that may be created from the project (including but not limited to the construction and mining phase) will be managed in accordance with these Regulations.

According to the NEMAQA, air quality management control and enforcement is in the hands of local government with District and Metropolitan Municipalities as the licensing authorities. Provincial government is primarily responsible for ambient monitoring and ensuring municipalities fulfil their legal obligations, with national government primarily as policy maker and co-ordinator. Each sphere of government must appoint an Air Quality Officer responsible for co-ordinating matters pertaining to air quality management. Given that air quality management under the old Act was the sole responsibility of national government, local authorities have in the past only been responsible for smoke and vehicle tailpipe emission control.

4.1.10 CLIMATE CHANGE ACT 22, 2024

The Climate Change Act sets out the functions of the Presidential Climate Commission, which includes providing advice on the Republic's climate change response to ensure the realisation of the vision for effective climate change response and the long-term just transition to a climate-resilient and low-carbon economy and society.

The Climate Change Bill aligns with Council's strategic objective of a stakeholder-aligned national energy transition that achieves South Africa's decarbonisation targets whilst maintaining energy security and affordable access for all South Africans. The Climate Change Bill recognises that South Africa has a vital role to play in the global effort to reduce greenhouse gas emissions and that Southern Africa is especially vulnerable to those impacts of climate change which require urgent and appropriate adaptation responses. RCM will be required to comply with greenhouse gas reporting requirements

4.1.11 THE NATIONAL HERITAGE RESOURCES ACT (NHRA)

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, "*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…*" The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the NEMA, MPRDA and the Development Facilitation Act (FDA) legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a

development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008).

The NEMA 23(2)(b) states that an integrated environmental management plan should, "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*". A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken into account of in the EIA Regulations under the NEMA relates to the Specialist Report requirements (Appendix 6 of EIA Regulations 2014, as amended).

The MPRDA defines 'environment' as it is in the NEMA and, therefore, acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the NHRA that are to be impacted on by activities governed by the MPRDA. Section 40 of the same Act requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA.

Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

- the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50 m in length;
- any development or other activity which will change the character of a site—
    - (i) exceeding 5 000 m^2 in extent; or
    - (ii) involving three or more existing erven or subdivisions thereof; or
    - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- the re-zoning of a site exceeding 10 000 m^2 in extent; or
- any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development

According to the national web-based environmental screening tool (DFFE Screening Tool Report), the proposed development is located within an area of Low Heritage Sensitivity with small patches of High relative archaeological and cultural heritage theme sensitivity. An assessment of the NHRA and preliminary project information revealed that the proposed development will most likely trigger Section 38(1) of the NHRA. Therefore, a Heritage Impact Assessment is required and will be undertaken in the EIA Phase. The South African Heritage Resources Agency (SAHRA), the North West Provincial Heritage Resources Authority (NWPHRA) and Association of Southern African Professional Archaeologists (ASAPA) are I&APs in the project and will be provided with a copy of the report for review and comment.

4.1.12 ENVIRONMENT CONSERVATION ACT (ECA)

The Environment Conservation Act (Act 73 of 1989 – ECA) was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the Act and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These Regulations serve to control noise and general prohibitions relating to noise impact and nuisance.

4.1.12.1 THE NATIONAL NOISE CONTROL REGULATIONS, 1992

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Provincial noise control regulations have been promulgated in Gauteng, Free State and Western Cape Provinces.

The NCRs will need to be considered in relation to the potential noise that may be generated mainly during the construction phase of the proposed project. The two key aspects of the NCRs relate to disturbing noise and noise nuisance.

Section 4 of the Regulations prohibits a person from making, producing or causing a disturbing noise, or allowing it to be made produced or caused by any person, machine, device or apparatus or any combination thereof. A disturbing noise is defined in the Regulations as "*a noise level which exceeds the zone sound level or if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more*."

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as "*any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person".* The South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with these Regulations.

The nature of the activities involves elevated sound levels and may have a significant acoustic output, thereby impacting nearby sensitive receptors such as fauna and homesteads or residential areas.

4.1.12.2 THE NOISE STANDARDS

There are a few South African scientific standards (SABS) relevant to noise from mines, industry and roads. They are:

- South African National Standard (SANS) 10103:2008 – 'The measurement and rating of environmental noise with respect to annoyance and to speech communication';
- SANS 10210:2004 – 'Calculating and predicting road traffic noise';
- SANS 10328:2008 – 'Methods for environmental noise impact assessments';
- SANS 10357:2004 – 'The calculation of sound propagation by the Concave method';
- SANS 10181:2003 – 'The Measurement of Noise Emitted by Road Vehicles when Stationary'; and
- SANS 10205:2003 – 'The Measurement of Noise Emitted by Motor Vehicles in Motion'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. With regards to SANS 10103:2008, the recommendations are likely to inform decisions by authorities, but non-compliance with the standard will not necessarily render an activity unlawful per se.

It is noted that Draft Environmental Noise Standards were published under the NEMAQA, in June 2024. These recommended Environmental Noise Standards reference the SANS 10103 (2008).

The nature of the activities involves elevated sound levels and may have a significant acoustic output, thereby impacting nearby sensitive receptors such as fauna and homesteads or residential areas.

4.1.13 THE CONSERVATION OF AGRICULTURAL RESOURCES ACT (CARA)

The law on Conservation of Agricultural Resources (Act 43 of 1983) aims to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. In order to achieve the objectives of this Act, control measures related to the following may be prescribed to land users to whom they apply:

- The cultivation of virgin soil;
- The utilisation and protection of land which is cultivated;
- The irrigation of land;
- The prevention or control of waterlogging or salination of land;
- The utilisation and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of the vegetation;
- The grazing capacity of veld, expressed as an area of veld per large stock unit;
- The maximum number and the kind of animals which may be kept on veld; The prevention and control of veld fires;
- The utilisation and protection of veld which has burned;
- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;
- The protection of water sources against pollution on account of farming practices;
- The construction, maintenance, alteration or removal of soil conservation works or other structures on land; and
- Any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved.

Further, different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine. Preliminary impacts on the soil, biodiversity and water resources have been identified with regards to the proposed development, and mitigation and management measures recommended. These will be updated during the EIA phase of this project as and where necessary.

4.1.14 THE SUB-DIVISION OF AGRICULTURAL LAND ACT, 1970

In terms of the Subdivision of Agricultural Land Act (Act 70 of 1970), any application for change of land use must be approved by the Minister of Agriculture, and while under the Conservation of Agricultural Resources Act (Act 43 of 1983) no degradation of natural land is permitted. Rezoning of certain properties from agricultural use to mining use may be required.

4.1.15 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (SPLUMA)

The Spatial Planning and Land Use Management (Act 16 of 2013 – SPLUMA) is set to aid effective and efficient planning and land use management, as well as to promote optimal exploitation of minerals and mineral

resources. The SPLUMA was developed to legislate for a single, integrated planning system for the entire country. Therefore, the Act provides a framework for a planning system for the country and introduces provisions to cater for development principles; norms and standards; inter-governmental support; Spatial Development Frameworks (SDFs) across national, provincial, regional and municipal areas; Land Use Schemes; and municipal planning tribunals. Furthermore, the SPLUMA strengthens the position of mining right holders when land needs to be rezoned for mining purposes. The affected mine properties will require zoning as mining use.

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4.1.16 MINE HEALTH AND SAFETY ACT

The Mine Health and Safety Act, 1996 (Act No. 29 of 1996) aims to protect the health and safety of employees and other persons at mines by promoting a culture of safety, enforcing risk management, and ensuring participation of all stakeholders. It requires employers to provide and maintain a safe working environment, conduct risk assessments, implement control measures, and establish health and safety policies, codes of practice, and emergency plans. Employers must also provide training, conduct occupational hygiene monitoring, and maintain medical surveillance records. Employees are obligated to comply with safety measures, report hazards, and may refuse dangerous work without penalty. The Act further mandates the formation of health and safety committees, reporting of incidents, and oversight by the Mine Health and Safety Council, with penalties for non-compliance.

4.1.17 OCCUPATIONAL HEALTH AND SAFETY ACT

The Occupational Health and Safety Act (Act 85 of 1993 - OHSA) provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith. Worker safety will form part of the contractor's safety requirements and be guided by the OHSA. This would entail a full health and safety file including but not limited to pre-mobilization medical assessments, work environment and task specific risk assessments and method statements etc. The project will be required to comply with the OHSA and or Mine Health and Safety Act (dependent on the specific aspect of the production operations). Therefore safety of all personnel will be guided by overarching South African legislation.

The Major Hazard Installation Regulations (GNR 692 of 30 July 2001) are promulgated under the OHSA and apply to employers, self-employed persons and users, who have on their premises, either permanently or temporarily, a major hazard installation or a quantity of a substance which may pose a risk that could affect the health and safety of employees and the public.

A "major hazard installation" (MHI| means an installation-

- where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or
- where any substance is produced, processed, used, handled or stored in such a form and quantity that it has the potential to cause a major incident.

No MHI assessment is anticipated for the proposed development.

4.1.18 NATIONAL VELD AND FOREST FIRE ACT

The National Veld and Forest Fire Act 101 of 1998 is a key piece of legislation in South Africa aimed at reforming the legal framework surrounding veld and forest fires. Its primary purpose is to prevent and manage wildfires through coordinated efforts, particularly in rural and fire-prone areas. The Act encourages the formation of Fire Protection Associations (FPAs), which are legally recognized bodies that facilitate local collaboration among landowners, municipalities, and other stakeholders to predict, prevent, and suppress veldfires. These associations play a vital role in fire management by offering training, support, and technical expertise to their members.

For private developers and landowners, the Act imposes several important obligations. They are legally required to take reasonable precautions to prevent fires from starting or spreading from their property. This includes maintaining firebreaks, ensuring that controlled burns are conducted safely and in accordance with regulations, and joining or cooperating with local FPAs. Failure to meet these responsibilities can result in legal liability, especially if negligence leads to damage or loss caused by a fire. In such cases, landowners may face civil claims for damages, making it essential for them to understand and comply with the Act's provisions.

In essence, the Act not only promotes proactive fire management but also establishes a framework for accountability. Private developers and landowners must be vigilant and informed, as their actions—or lack thereof—can have significant legal and financial consequences. By participating in FPAs and adhering to fire safety regulations, they contribute to a safer and more resilient environment for their communities and the broader ecosystem.

4.1.19 NATIONAL RADIOACTIVE WASTE DISPOSAL INSTITUTE ACT 53 OF 2008

In terms of this Act the generators of radioactive waste are responsible for technical, financial and administrative management of such waste within the national regulatory framework at their premises and when such waste is transported to an authorised waste disposal facility. The generators of radioactive waste are responsible for technical, financial and administrative management of such waste within the national regulatory framework at their premises and when such waste is transported to an authorised waste disposal facility.

Generators of radioactive waste must:

- develop and implement site-specific waste management plans based on national policy;
- provide all relevant information on radioactive waste as required by the chief executive officer;
- demonstrate compliance with any conditions of a radioactive waste disposal certificate;
- provide site access to staff of the Institute for inspection against any conditions of the radioactive waste disposal certificate.

Although it is not anticipated that the proposed development will trigger any requirements under the NRWDIA it is recommended that the National Nuclear Regulator (NNR) is contacted and requested to advise on any specific requirements or obligations.

4.1.20 THE HAZARDOUS SUBSTANCES ACT, 1973 (ACT NO. 15 OF 1973)

The Hazardous Substances Act, 1973 (Act No. 15 of 1973) in South Africa regulates substances that can cause harm to human health. It categorizes these substances based on their risk level and controls their manufacture, sale, use, and disposal. The Act also provides for inspections, enforcement measures, and penalties for violations. The Act defines hazardous substances as materials or mixtures that can cause harm to human health, ranging from mild irritation to severe illness or death.

The Act addresses the control of substances that can cause injury, ill-health, or death due to their hazardous properties. This includes substances found in mine tailings, which often contain cyanide, arsenic, mercury and other heavy metals. The Act aims to regulate the handling, use, and disposal of these substances to protect human health and the environment.

4.2 OTHER APPLICABLE ACTS AND GUIDELINES

Other applicable acts and guidelines include various provincial and local guidelines and plans which are further described below.

4.2.1 NATIONAL POLICY AND PLANNING CONTEXT

4.2.1.1 THE MINING AND BIODIVERSITY GUIDELINES, 2013

The Mining and Biodiversity Guidelines (2013) was developed by the Department of Mineral Resources, the Chamber of Mines, the SANBI and the South African Mining and Biodiversity Forum, with the intention to find a balance between economic growth and environmental sustainability. The Guideline is envisioned as a tool to "foster a strong relationship between biodiversity and mining, which will eventually translate into best practice within the mining sector. It provides a tool to facilitate the sustainable development of South Africa's mineral resources, in a way that enables regulators, industry and practitioners to minimise the impact of mining on the country's biodiversity and ecosystem services. It provides the mining sector with a practical, user- friendly manual for integrating biodiversity considerations into the planning processes and managing biodiversity during the operational phases of a mine, from exploration through to closure. The Guideline provides explicit direction in terms of where: mining-related impacts are legally prohibited; biodiversity priority areas may present high risks for mining projects; and biodiversity may limit the potential for mining.

In identifying biodiversity priority areas, which have different levels of risk against mining, the guideline categorises biodiversity priority areas into four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service point of view as well as the implications for mining in these areas:

A) Legally protected areas, where mining is prohibited;

B) Areas of highest biodiversity importance, which are at the highest risk for mining;

C) Areas of high biodiversity importance, which are at a high risk for mining; and

D) Areas of moderate biodiversity importance, which are at a moderate risk for mining.

The study area location will be assessed against the Mining and Biodiversity Guidelines (2013) spatial dataset to determine which categories it falls within.

4.2.1.2 INTERIM GUIDANCE ON THE MANAGEMENT OF NORM TAILINGS AND WASTE ROCK

The National Nuclear Regulator (NNR) exercises regulatory control related to nuclear safety and security for all the activities and facilities as defined in the NNR Act. The process waste generated at a mining and minerals processing facility, also known as slurry, is naturally radioactive because of the associated radionuclides in the uranium and thorium decay series that accompany the metals that are mined. The slurry, also referred to as Naturally Occurring Radioactive Material (NORM) residue, is pumped to containment areas for permanent or temporary storage and thus qualifies as radioactive waste facilities named NORM tailings dams, also interchangeably referred to as Tailings Storage Facilities (TSF).

This document provides guidance for the implementation of the requirements as set out in the draft General Nuclear Safety Regulations on the management of NORM tailings and waste rock. Due to the lengthy promulgation process for regulations, and the fact that the guidance provided is based on draft regulations, the Executive has resolved to issue this document as interim guidance. This document will be revised once the regulations in question have been promulgated.

The guidance is applicable to all NORM facilities which carry out activities and operations involving NORM tailings and waste rock containing uranium, thorium and their progeny. This guide extends to both authorised facilities regulated by the NNR and prospective applicants who wish to handle, process and dispose of NORM tailings and waste rock in terms of the provisions of the NNR Act and associated regulations.

This guideline contains information that provide guidance in terms of best practice in terms of EIA aspects that is related to mining and specifically mineral processing. While the best practice guidance must to be taken into account, this document does not take the place of legal advice in a specific situation governed by legislation.

Key aspects of an NNR-approved Closure Plan include:

- Decommissioning Strategy: The plan specifies the methods for dismantling the facility, removing or treating radioactive materials, and decontaminating equipment and site surfaces.
- Environmental Protection: It includes measures to prevent or mitigate environmental damage from decommissioning activities, such as controlling dust, managing waste, and protecting water resources.
- Public and Worker Safety: The plan outlines procedures for protecting the health and safety of workers involved in decommissioning and the public who may be affected by the process.
- Long-Term Stewardship: The plan addresses the long-term management of any residual risks or contamination, ensuring that the site remains safe for the future.
- Financial Assurance: It demonstrates that sufficient financial resources are available to implement the closure plan and manage any long-term liabilities.
- Regulatory Compliance: The plan must be developed in accordance with the NNR's regulations and guidance documents.

The NNR will be contacted to provide comments on the exact requirements for the EIA phase and beyond in terms of Tailings.

4.2.2 PROVINCIAL POLICY AND PLANNING CONTEXT

4.2.2.1 NORTH WEST BIODIVERSITY SECTOR PLAN

The North West Biodiversity Sector Plan (READ, 2015) classifies areas within the province on the basis of their contributions to reaching the associated conservation targets within the province. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole.

CBAs are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).

ESAs are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA1 and ESA2. These present fine scale habitat and biodiversity area baseline requirements and associated land management objectives or outcomes. The highest categorisation level is often referred to as an 'Irreplaceable Critical Biodiversity Area' which usually represents pristine natural habitat that is very important for conservation.

The main proposed infrastructure is located within a CBA 2 area according to the North West Terrestrial Biodiversity plan, while the temporary laydown area is located within an ESA 1. A section of the southern most escape road crosses into an ESA 1 area of the North West Aquatic Biodiversity plan.

4.2.2.2 THE MAGALIESBERG BIOSPHERE MANAGEMENT PLAN

The Magaliesberg Biosphere Management Plan (2015) (hereafter MBMP (2015)) states that the Transition Zones are to be co-operative where various activities are allowed such as settlements, agriculture, mining, support

services and infrastructure. However, the focus of this area is for collaboration of various stakeholders to increase environmental public awareness, education and specialist training aimed at reducing the impact on the Magaliesberg area while also enhancing community benefits and promoting sustainable development practices (MBMP, 2015). The evaluation criteria for development/activity proposals within the Transitional Area as described in Annexure 1 of the Magaliesberg Biosphere Management Plan should be considered.

4.3 MUNICIPAL POLICY AND PLANNING CONTEXT

The Bojanala Platinum District Municipality Environmental Management Framework (EMF) (2018) (hereafter referred to as the BPDM EMF (2018)) aims to provide a decision support tool regarding environmental impact matters of proposed developments and human activities. An EMF is an Integrated Environmental Management (IEM) tool that assists competent authorities with their decisions regarding the granting or refusal of environmental authorisations by also providing geographical context of the environmental impacts that could occur as a result of the proposed development.

The BPDM EMF (2018) covers the local municipalities of Rustenburg, Moretele, Madibeng, Kgetlengrivier and Moses Kotane in the North West Province. The site falls within the outer area of the Magaliesberg Biosphere Reserve Transitional Area (Zone), as such, the BPDM EMF (2018) requires that the management authority of the Magaliesberg Biosphere is consulted for new developments. The Magaliesberg Biosphere Management Authority drafted land use guidelines that are to be considered in the EIA process.

The Rustenburg Local Municipality Integrated Development Plan (IDP) is a strategic planning instrument intended to guide and inform budgeting, planning, management and the decision-making process. The priorities and objectives are aimed at addressing strategic challenges within the Rustenburg Local Municipality (RLM). The Rustenburg IDP identifies a diversified economic growth, vibrant rural development and job creation as one of the key mayoral strategic priorities (IDP 2022-2027 and 2025/26 IDP Review). More detail will be provided in the EIA Phase of the application.

The Rustenburg Spatial Development Framework (SDF) is a policy document that is designed to guide spatial planning and development within the RLM and is mandated in terms of Section 12(1) of SPLUMA. The document is intended to guide and inform decisions regarding land use and development within the RLM, and to give effect to the goals, objectives and visions of the municipal IDP. The proposed mining activities and infrastructure are located within an Industrial and Mining Development Zone of the SDF. More detail will be provided int eh IEA Phase of the application.

5 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITY

The needs and desirability analysis component of the "Guideline on need and desirability in terms of the EIA Regulations (Notice 819 of 2014)" includes, but is not limited to, describing the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question, and how the proposed development's ecological impacts will result in socio-economic impacts (e.g., on livelihoods, loss of heritage site, opportunity costs, etc.). This section of the report provides the need and desirability for the proposed project.

Table 12 presents the needs and desirability analysis undertaken for the project.

Table 12: Needs and desirability analysis for the proposed TSF

Ref No.	Question	Answer
1	Securing ecological sustainable development and use of natural resources	
1.1	How were the ecological integrity considerations taken into account in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management Framework, Spatial Development Framework (SDF) and global and international responsibilities.	A number of specialist studies will inform this application and include: • Agriculture Potential, Soils and Land Capability; • Geohydrology; • Hydrology and Flood lines; • Aquatic and Wetland (including hydropedology); • Terrestrial Biodiversity; • Air Quality; • Noise; • Heritage; and • Palaeontology. The conclusions of these studies will be included in the EIA report. Further, the mitigations and mitigations stemming from the specialists assessments will be included in the EMPr for implementation.
1.2	How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to baseline ecological information in Section 8, and the preliminary impact assessment in Section 9 of this report. Further details will be provided in the EIA report.
1.3	How will this development pollute and / or degrade the biophysical environment? What measures were explored to either avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	
1.4	What waste will be generated by this development? What measures were explored to avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and / or recycle the waste? What	Significant amounts of waste will not be generated during the operational phase, apart from the tailings material and the waste rock itself. During construction, the types of waste generated include sewage waste,

Ref No.	Question	Answer
	measures have been explored to safely treat and/or dispose of unavoidable waste?	biodegradable wastes, and non-biodegradable solid waste as well as general construction waste. Waste has been identified as an impact and assessed in Section 9. However, it is anticipated that the following measures can be utilised to reduce the impact of the waste on the receiving environment: • Waste must be stored correctly; • All hazardous waste such as oil must be stored separately and disposed of at a registered facility; and • Proof of disposal must be kept by the Applicant.
1.5	How will this project disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	A heritage impact assessment will be conducted as part of the EIA phase of the project. Refer to section 8.4.3 for baseline information and to Section 9 for preliminary identified impacts and assessment of the impacts.
1.6	How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to the impact assessment in Section 9 of this report. As a result of the fact that this project entails only added infrastructure and an increase in the scope of existing mining activities, it is anticipated that this project will not lead to a significant impact or depletion of non-renewable resources, as long as all the potential impacts are thoroughly assessed during the EIA phase and appropriate mitigation measures are implemented. A Water Use License Amendment Application will also be submitted to the Department of Water and Sanitation to ensure the sustainable use of water at the mine.
1.7	How will this project use and / or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and / or impacts on the ecosystem jeopardise the integrity of the resource and / or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	Refer to the impact assessment in Section 9 of this report.

Ref No.	Question	Answer
1.7.1	Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e., de-materialised growth)?	The proposed project is only to allow for the continuation of mining at the existing mine operations and is not a new mine.
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The proposed project will not, at this stage, involve the use of the natural resources apart from the infrastructure and expanded opencast areas to be cleared. Specialist studies and an impact assessment will be conducted during the EIA phase to assess the impacts on the biophysical and socio-economic environment. Refer to Section 9 for the preliminary assessment.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed project is only to allow for the continuation of mining at the existing mine operations and is not a new mine.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts:	
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The limitations and/or gaps in knowledge are presented in Section 12.
1.8.2	What is the level of risk associated with the limits of current knowledge?	The level of risk is considered low at this stage.
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	At this stage it is anticipated that this project will not lead to a significant impact on the receiving environment. Refer to the impact assessment in Section 9 of this report.
1.9	How will the ecological impacts resulting from this development impact on people's environmental right in terms following?	
1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	The proposed activities are anticipated to have low negative ecological impacts. Refer to the impact assessment in Section 9 in this report.

Ref No.	Question	Answer
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	A medium to low impact on third party wellbeing, livelihoods and ecosystem services is currently foreseen. Refer to the impact assessment in Section 9 of this report.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	The proposed activities are anticipated to have generally low negative ecological impacts. Refer to the impact assessment in Section 9 in this report.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Refer to Section 6 – where details of the alternatives are given and considered.
1.13	Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Refer to Section 9 of this report.
2	Promoting justifiable economic and social development	
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following:	
2.1.1	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area.	Refer to Section 8.4 of this report for a breakdown of the demographics and social environment in the study area. The Rustenburg IDP identifies a diversified economic growth, vibrant rural development and job creation as one of the key mayoral strategic priorities (IDP 2022-2027 and 2025/26 IDP Review). More detail will be provided in the EIA Phase of the application.

Ref No.	Question	Answer
2.1.2	Spatial priorities and desired spatial patterns (e.g., need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Rustenburg. The North West Province Spatial Development Framework, 2016, identifies mining and construction as economic sectors of growth and opportunity within the province that should be targeted.
2.1.3	Spatial characteristics (e.g., existing land uses, planned land uses, cultural landscapes, etc.), and	Refer to the baseline environment in Section 8 of this report. The proposed activities and infrastructure are located in a mining area and is surrounded by existing mining infrastructure.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	Considering the location and type of the activities, it is not anticipated to significantly promote or facilitate spatial transformation and sustainable urban development.
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	Refer to the impact assessment in Section 9 in this report, specifically section 9.3.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Rustenburg. In addition, the Applicant has various social and LED initiatives required under their Social & Labour Plan (SLP) commitments.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	During the public participation process feedback from the relevant communities will be obtained. Refer to Section 6.1.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	Refer to the impact assessment and mitigation measures in Section 9 of this report. The construction and operation will create employment and ensure the Applicant can continue to employ current employees at their mine operations.

Ref No.	Question	Answer
2.5	In terms of location, describe how the placement of the proposed development will:	
2.5.1	Result in the creation of residential and employment opportunities in close proximity to or integrated with each other;	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Kroondal and Rustenburg. The construction and operation will create employment and ensure the Applicant can continue to employ current employees at their mining operations.
2.5.2	Reduce the need for transport of people and goods;	The activities are not anticipated to have an impact on the transportation of goods and people.
2.5.3	Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms of public transport);	The activities are not anticipated to have any significant impact on the public transport.
2.5.4	Compliment other uses in the area;	The surrounding area is impacted by existing mining activities and associated infrastructure.
2.5.5	Be in line with the planning for the area;	Refer to item 2.1.1 of this table (above).
2.5.6	For urban related development, make use of underutilised land available with the urban edge;	Not applicable. The proposed project is not located in an urban area.
2.5.7	Optimise the use of existing resources and infrastructure;	Refer to Section 3 of this report.
2.5.8	Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g., not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement);	Not applicable, the proposed activities and infrastructure will not make use of bulk infrastructure.
2.5.9	Discourage “urban sprawl” and contribute to compaction / densification;	Not applicable. The proposed project is not located within an urban area and will not contribute to urban sprawl.

Ref No.	Question	Answer
2.5.10	Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs;	Refer to items 2.5.7 – 2.5.9 of this table (above).
2.5.11	Encourage environmentally sustainable land development practices and processes;	Refer to impact assessment in Section 9 of this report.
2.5.12	Take into account special locational factors that might favour the specific location (e.g., the location of a strategic mineral resource, access to the port, access to rail, etc.);	Refer to alternative analysis in Section 6.
2.5.13	The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential);	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Kroondal and Rustenburg. In addition, Applicant has various social and LED initiatives required under their various SLP commitments.
2.5.14	Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area; and	Refer to impact assessment in Section 9 of this report.
2.5.15	In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	Given the scale of the development it is not anticipated that the activities will contribute significantly to settlements or areas in terms of direct socio-economic returns, however, the development will allow mining operations at the mine to continue.
2.6	How was a risk-averse and cautious approach applied in terms of socio-economic impacts:	
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Refer to Section 12 of this report.
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions.

Ref No.	Question	Answer
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions.
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1	Negative impacts: e.g., health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the impact assessment in Section 9 of this report.
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	By conducting an EIA Process, the applicant ensures that equitable access has been considered. Refer to the impact assessment in Section 9 of this report.

Ref No.	Question	Answer
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Refer to the impact assessment in Section 9 of this report. The EMPr which will be included in the EIA report will specify timeframes within which mitigation measures must be implemented.
2.13	What measures were taken to:	
2.13.1	Ensure the participation of all interested and affected parties;	Refer to Section 6.1 of this report, describing the public participation process undertaken for the proposed project.
2.13.2	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation;	Refer to Section 6.1 of this report, describing the public participation process undertaken for the proposed project. advertisement, notification letter and site notice have been made available in English and Afrikaans to assist in understanding of the project. Further public consultation will be held during the review period of the Scoping / EIA reports for the project.
2.13.3	Ensure participation by vulnerable and disadvantaged persons;	
2.13.4	Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means;	
2.13.5	Ensure openness and transparency, and access to information in terms of the process;	
2.13.6	Ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge;	
2.13.7	Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted?	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income	Refer to Section 6.1 of this report, describing the public participation process undertaken for the proposed project.

Ref No.	Question	Answer
	housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	
2.15	What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Potential future workers will have to be educated on a regular basis as to the environmental and safety risks that may occur within their work environment. Furthermore, adequate measures will have to be taken to ensure that the appropriate personal protective equipment is issued to workers based on the conditions that they work in and the requirements of their job.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1	The number of temporary versus permanent jobs that will be created.	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Kroondal and Rustenburg. Further details in terms of job figures and employment opportunities will be made available for the EIA-phase report.
2.16.2	Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area).	
2.16.3	The distance from where labourers will have to travel.	
2.16.4	The location of jobs opportunities versus the location of impacts.	
2.16.5	The opportunity costs in terms of job creation.	
2.17	What measures were taken to ensure:	
2.17.1	That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	The EIA Process requires governmental departments to communicate regarding any application. In addition, all relevant departments are notified at various phases of the project by the EAP.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	

Ref No.	Question	Answer
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Refer to Section 6.1 of this report, describing the public participation process implemented for the application, as well Section 9, the impact on any national estate.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to the impact assessment and mitigation measures in Section 9 of this report. All mitigation measures are considered to the realistic and implementable.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	At this stage the proposed activities are not anticipated to produce significant pollution, environmental damage or adverse health effects in the long term as long as the proposed mitigation measures are implemented.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Refer to Section 6, description of the process followed to reach the proposed preferred site.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Refer to the impact assessment and mitigation measures in Section 9. Further detail will be provided in the EIA report.

6 PROJECT ALTERNATIVES

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the environmental assessment process. An alternative is defined as "…in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

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

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity;

(e) operational aspects of the activity; and

(f) Includes the option of not implementing the activity."

In terms of Section 24 of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the EIA process. It is important to highlight that alternatives must be practical, feasible, reasonable and viable to cater for an unbiased approach to the project and in turn to ensure environmental protection. In order to ensure full disclosure of alternative activities, it is important that various role players contribute to their identification and evaluation. Stakeholders have an important contribution to make during the EIA Process and each role is detailed as follows:

The role of the environmental assessment practitioner is to:

- encourage the proponent to consider all feasible alternatives;
- Identify reasonable alternatives;
- provide opportunities for stakeholder input to the identification and evaluation of alternatives;
- document the process of identification and selection of alternatives;
- provide a comprehensive consideration of the impacts of each of the alternatives; and
- document the process of evaluation of alternatives.
- The role of the proponent is to:
- assist in the identification of alternatives, particularly where these may be of a technical nature;
- disclose all information relevant to the identification and evaluation of alternatives;
- be open to the consideration of all reasonable alternatives; and
- be prepared for possible modifications to the project proposal before settling on a preferred option.
- The role of the public is to:
- assist in the identification of alternatives, particularly where local knowledge is required;
- be open to the consideration of all reasonable alternatives; and
- recognise that there is rarely one favoured alternative that suits all stakeholders and that alternatives will be evaluated across a broad range of criteria, including environmental, social and economic aspects.

Table 13 outlines the various alternative types that must be considered for each development. The extent of the applicability of each of these is further presented. It must be highlighted that the alternatives presented in the table are derived from both the EIA Regulations (2014) as amended as well as the Department of Environmental Affairs and Tourism's (now Department of Forestry, Fisheries and the Environment (DFFE) 2004 Integrated Environmental Information Series on the Criteria for determining alternatives in EIA. Where the alternative is applicable to the project, it will be further discussed in this Scoping Report. The alternatives discussed further in this SR are as follows:

- The No-Go Option;
- Process alternatives;
- Input alternatives;
- Site layout alternatives; and
- Design alternatives.

Table 13: Project alternatives as per NEMA EIA Regulations, 2014 as amended.

ALTERNATIVE	COMMENT
No-go Option	The 'no-go' alternative is sometimes referred to as the 'no-action' alternative (Glasson *et al.,* 1999) and at other times the 'zero-alternative'. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. This alternative must be discussed on all projects as it allows for an assessment of impacts should the activity not be undertaken. **This alternative is discussed in this report.**
Activity alternatives	These are sometimes referred to as project alternatives, although the term activity can be used in a broad sense to embrace policies, plans and programmes as well as projects. Consideration of such alternatives requires a change in the nature of the proposed activity. This would entail a process where a different project is proposed instead of the RCM project. **Based on project information, there is one proposed activity and no other activity alternative. Therefore, this alternative will not be discussed in this report.**
Location / property alternatives	The location of the activity is controlled to a large extent by the location of the ore body as well as the extent of the mining right. **No other location alternatives have been identified.**
Process alternatives	Various terms are used for this category, including technological alternative and equipment alternative. The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process. An industrial process could be changed, or an alternative technology could be used. These are also known as technological and equipment alternative and will be discussed as they are applicable to the RCM project. **These will be discussed in this report.**
Demand alternatives	Demand alternatives arise when a demand for a certain product or service can be met by some alternative means. This is applicable to the demand for a product or service. An example of this would be where there is a need to provide housing units. Examples of alternatives can be through managing demand through various methods or providing additional housing through either single dwelling residential units or

ALTERNATIVE	COMMENT
	mixed-use developments. **Specific to the proposed project, no feasible demand alternatives have been identified**.
Scheduling alternatives	These are sometimes known as sequencing or phasing alternatives. In this case an activity may comprise several components, which can be scheduled in a different order or at different times and as such produce different impacts. **No specific scheduling alternatives have been identified.**
Input alternatives	By their nature, input alternatives are most applicable to industrial applications that may use different raw materials or energy sources in their processes. Considering that the proposed development is an expansion of Mining areas and infrastructure as well as the development or expansion of a TSF(s), **feasible input alternatives may be applicable to the project and will be discussed.**
Routing alternatives	Consideration of alternative routes generally applies to linear developments such as power lines, transport, and pipeline routes. The RCM project may constitute applicable infrastructure and **therefore, routing alternatives will be discussed during the EIA phase, when more detailed information is available.**
Site layout alternatives	Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site. This may include particular components of a proposed development or may include the entire activity. One site layout has been developed for the RCM project. **Depending on the outcome of the EIA Phase specialist studies additional layout alternatives may be presented to minimise potential environmental impacts.**
Scale alternatives	In some cases, activities that can be broken down into smaller units can be undertaken on different scales. For example, a housing development within an overall mixed-used development could have the option of 1 000, 2 000 or 4 000 housing units. Each of these scale alternatives may have different impacts. **No scale alternatives have been identified.**
Design alternatives	This entails the consideration of different designs for aesthetic purposes or different construction materials to optimise local benefits and sustainability would constitute design alternatives. Appropriate applications of design alternatives are communication towers. In such cases, all designs are assumed to have different impacts. Generally, the design alternatives could be incorporated into the project proposal and so be part of the project description and need not be evaluated as separate alternatives. Based on project description and background information, engineering designs are still under assessment and will be available during the EIA Phase. **Therefore, design alternatives will not be discussed in this report, but may be discussed when more detail about different designs are available during the EIA phase.**
Operational alternatives	The Operational Alternative is where you can specify controls on the operational aspects of the project such as pressure pipes, pumps, as well as valves. In the case of the proposed expansion, **feasible operational alternatives were not identified and are not discussed in this report.**

6.1 THE NO-GO OPTION

The “No Go” or “No Action” alternative refers to the alternative of not embarking on the proposed project at all. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. It is important to note that the No Go alternative is the baseline against which all other alternatives and the development proposal are assessed. When considering the No Go alternative, the impacts (both positive and negative) associated with any other specific alternative, or the current project proposal would not occur and in effect the impacts of the No Go alternative are therefore inadvertently assessed by assessing the other alternatives. In addition to the direct implications of retaining the status quo, there are certain other indirect impacts, which may occur should the No Go alternative be followed. The ‘no-go’ alternative provides the means to compare the impacts of project alternatives with the scenario of a project not going ahead. In evaluating the ‘no-go’ alternative it is important to take into account the implications of foregoing the benefits of the proposed project.

The no-go alternative implies that once the remaining resources in the current underground and opencast mining areas at RCM are fully extracted and the sites rehabilitated, mining operations will cease entirely. This scenario assumes that the proposed project does not proceed.

The option of the project not proceeding means that both negative and positive impacts would not take place. No further environmental degradation will take place. With no continuation of mining, negative impacts on biodiversity, water resources, and surrounding ecosystems would be avoided. Conversely, the positive impacts associated with ongoing mining operations for e.g. sustained employment, economic activity and community support will also be lost. A significant number of jobs would be lost, affecting employees, contractors, and local communities dependent on the mine. The halt in operations could lead to reduced local and regional economic stability, especially in areas reliant on mining-related income.

6.2 ROUTING AND DESIGN ALTERNATIVES

The site layout in terms of the position of the haul and service roads, PCDs, TSF, and topsoil stockpile was determined by considering both spatial and practical mining operation aspects. Furthermore, environmentally sensitive areas will also be taken into consideration during the EIA and design phase to the extent that they are avoided. Therefore various options will be considered during the planning phase in order to derive an optimal layout.

6.3 PROCESS ALTERNATIVES

Process alternatives imply the investigation of alternative processes or technologies that can be used to achieve the same goal. This includes using environmentally friendly designs or materials and re-using scarce resources like water and non-renewable energy sources. Some alternatives may include deposition method of tailings and new technologies in the new plant, as well as renewable energy resources. In addition mining sequency and scheduling alternatives may also be considered.

6.4 INPUT ALTERNATIVES

By their nature, input alternatives are most relevant to industrial operations where different raw materials, energy sources, or process inputs can be substituted to improve efficiency or reduce environmental impact. Although mining operations typically rely on fixed geological resources, the proposed development—comprising the expansion of mining areas, associated infrastructure, and the development or extension of tailings storage facilities (TSFs)—may still present opportunities for feasible input alternatives.

These alternatives could include:

- **Alternative Energy Sources**: Evaluating the use of renewable energy (e.g., solar, wind) to power mining operations and TSF management systems, thereby reducing greenhouse gas emissions and reliance on fossil fuels. Examples include: Solar Power Installations: Renewable energy to reduce reliance on diesel generators and grid electricity, especially for lighting, ventilation, and pumping systems. Hybrid Energy Systems: Combining solar with battery storage or diesel backup to ensure uninterrupted power supply.

- **Water Use Efficiency**: Exploring options for water recycling, rainwater harvesting, or the use of treated wastewater to minimize freshwater consumption. Closed-Loop Water Recycling: water recycling efficiency using closed-loop systems can be improved, which may significantly reduce freshwater intake. Use of Treated Wastewater: Instead of sourcing from municipal or natural reserves, treated greywater can be used for dust suppression and mineral processing.
- **Reagent Substitution**: Assessing the potential to use less hazardous or more environmentally friendly reagents in mineral processing. Eco-Friendly Flocculants: Replacing traditional chemical flocculants with biodegradable alternatives in tailings and water treatment. Low-Toxicity Reagents: Using less hazardous chemicals in chrome beneficiation to reduce environmental and worker health risks.
- **Construction Materials**: Considering sustainable or locally sourced materials for infrastructure development to reduce carbon footprint and support local economies. Locally Sourced Aggregates: Using nearby quarries for construction materials to reduce transport emissions and support local suppliers. Recycled Steel and Concrete: For structural upgrades and other infrastructure, recycled materials can reduce carbon footprint and costs.

These input alternatives will be examined in the context of technical feasibility, cost-effectiveness, and potential environmental and social benefits during the EIA phase.

6.5 SITE LAYOUT ALTERNATIVES

RCM has an approved EA and EMPr for its current operations and the proposed additional mining activities and infrastructure mostly falls within the existing Mining Right area on properties owned by RCM. RCM is also in the process of applying to extend the mining right area and are in the process of buying and or leasing the properties on which activities are proposed that is currently not included in the mining right area. Therefore, layout alternatives are currently considered within these areas that have been included in the existing and future mining right areas. At the scoping stage, and after desktop and scoping phase studies conducted by the specialists, as well as desktop and site verification done by the EAP, the current layout does avoid most potential sensitivities on the site, including the 1:100 year flood line to the south of the study area. Also refer to Figure 64 for the combined sensitivity map with the current proposed layout. However, this needs to be confirmed by the specialist studies to be conducted and finalised during the EIA phase of the application. Should it be required that the current layout needs to be amended to exclude high sensitivity areas, this will be assessed and discussed in the EIA report.

7 STAKEHOLDER ENGAGEMENT

The Public Participation Process (PPP) is a requirement of several pieces of South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their comments are considered, and a record included in the reports submitted to the Authorities. The process ensures that all stakeholders are provided this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Involvement and participation in the environmental study and authorisation/approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Introduce the proposed project;
- Explain the authorisations required;
- Explain the environmental studies already completed and yet to be undertaken (where applicable);

- Solicit and record any issues, concerns, suggestions, and objections to the project;
- Provide opportunity for input and gathering of local knowledge;
- Establish and formalise lines of communication between the I&APs and the project team;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximize and/or promote positive environmental impacts associated with the project.

7.1 PRE-CONSULTATION WITH THE COMPETENT AUTHORITY

A pre-application meeting with the competent authority (DMPR) was held on the 27 May 2025. The purpose of the pre-consultation was to provide the authorities with background information of the proposed project, confirm NEMA EIA triggered listed activities, the process to be followed and plan of study for the EIA such as specialist studies and public participation.

7.2 GENERAL APPROACH TO SCOPING AND PUBLIC PARTICIPATION

The PPP for the proposed project has been undertaken in accordance with the requirements of the MPRDA and NEMA EIA Regulations (2014), and in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project and have their views considered and included as part of project planning.

An initial I&AP database has been compiled based on known key I&AP's, Windeed searches, and stakeholder databases provided by the mine. The I&AP database includes amongst others, landowners, communities, regulatory authorities and other special interest groups.

7.2.1 LIST OF PRE-IDENTIFIED ORGANS OF STATE/ KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

Pre-identified stakeholders included:

- Government entities:
    - Rustenburg Local Municipality (Municipality as well as relevant Ward Councillor/s);
    - Bojanala Platinum District Municipality;
    - National Department of Agriculture, Land Reform and Rural Development;
    - National Department of Co-operative Governance and Traditional Affairs;
    - National Department of Human Settlements;
    - National Department of Mineral and Petroleum Resources (DMPR) (Competent Authority);
    - National Department of Rural Development and Land Affairs;
    - National Department of Tourism;
    - National Department of Transport;
    - National Department of Water and Sanitation;
    - North West Department of Community Safety and Management;
    - North West Department of Cooperative Governance and Traditional Affairs;
    - North West Department of Human Settlements;
    - North West Department of Minerals and Energy;

- North West Department of Water and Sanitation;
- North West Department Public Works and Roads;
- North West Development Corporation Soc Ltd;
- North West Economic Development, Environment, Conservation and Tourism;
- North West Parks Board;
- North West Provincial Government: Department of Economic Development, Environment, Conservation and Tourism;
- North West Provincial Government: Department of Community Safety and Transport Management;
- North West Provincial Government: Department of Social Development;
- North West Provincial Heritage Resources Authority;
- North West Wetland Forum.

- Organs of State:
  - Council of Geoscience;
  - Magaliesberg Biosphere Management Authority;
  - National Nuclear Regulator;
  - National Roads Agency;
  - Agricultural Research Council;
  - National House of Traditional Leaders;
  - National Transmission Company of South Africa;
  - National Energy Regulator of South Africa (NERSA);
  - South African Heritage Resources Agency (SAHRA);
  - South African National Biodiversity Institute (SANBI);
  - South African Civil Aviation Authority (CAA);
  - South African National Parks (SANPARKS);
  - South African National Roads Agency Limited (SANRAL);
  - South African National Roads Agency Ltd: Northen Region;
  - Transnet Soc Ltd;
  - National Transmission Company South Africa (NTCSA); and
  - Eskom Soc Ltd.
- Others:
  - BirdLife South Africa;
  - Botanical Society;
  - Centre for Environmental Rights;
  - Conservation South Africa (CSA);
  - Earth Life Africa;
  - Endangered Wildlife Trust;

- Federation for a Sustainable Environment;
- GroundWork SA;
- Mining Affected Communities United in Action (MACUA);
- Mining and Environmental Justice Community Network of South Africa;
- Natural Justice;
- WESSA;
- World Wildlife Fund; and
- Agri SA.

7.2.2 INITIAL NOTIFICATION

The PPP commenced on the 25th April 2025 with an initial call to register notification. Notification during this initial consultation was given in the manner described below.

7.2.2.1 EMAILS, REGISTERED MAIL AND FAXES

Notification letters (in English and Afrikaans) were distributed to pre-identified I&APS through either SMSs, and/or emails on the 25th, 26th, 29th , and 30th of April 2025.

The notification documents included inter alia the following information:

- Authorisations required;
- Sufficient detail of the proposed development to enable I&APs to assess/surmise what impact the development will have on them or the use of their land;
- The purpose of the proposed project;
- Details of the application processes associated with proposed activities;
- Details of the affected properties;
- Details of the South African environmental legislation that must be adhered to; and
- Contact details of the EAP.

Please refer to Appendix 2 for initial notification and proofs.

7.2.2.2 NEWSPAPER AND GAZETTE ADVERTISEMENTS

Advertisements (in English and Afrikaans) describing the proposed project and Environmental Impact Assessment process were placed in the Rustenburg Herald Newspaper and the Platinum Weekly Newspaper with circulation in the vicinity of the study area on the 25th of April 2025. The Gazette Notice was placed in the North West Provincial Gazette on the 29th of April 2025. The newspaper and Gazette Notice adverts included the following information:

- Project name;
- Applicant name;
- Project location;
- Nature of the activity;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Please refer to Appendix 2 for proof of the advert and gazette notice placed.

7.2.2.3 SITE NOTICE PLACEMENT

Ten (10) A1 correx board site notices (in English and Afrikaans) were placed at ten (10) locations around the proposed project study area on the 24th of April 2025. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Map of proposed project area;
- Project description;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Please refer to Appendix 2 for proof of site notice and site notice distribution.

7.3 NOTIFICATION OF INTERESTED AND AFFECTED PARTIES OF ENVIRONMENTAL SCOPING REPORT AVAILIBILITY AND PUBLIC MEETING

Notification (in English, Afrikaans, and Setswana) regarding the availability of the Scoping Report for public review and comment, and details of the Public Meeting will be provided to pre-identified and registered I&APs. The notifications will be distributed through either email, registered mail, fax, and/or SMS, where contact details are available.

Newspaper Advertisements (in English, Afrikaans and Setswana) regarding the availability of the SR and details of the Public Meeting have been placed in the Rustenburg Herald Newspaper with circulation in the vicinity of the study area on the 12th of March 2026. The Gazette notice will be published in the North West Provincial Gazette on the 24th of March 2026.

On site notices on A1 Correx board (in English, Afrikaans, and Setswana) will be placed in the vicinity of the study area on 12 March 2026.

Contact details will be provided to I&APs should they require assistance accessing the information or require copies of the reports.

Hard copies of the Scoping Report (SR) will be placed at the Rustenburg Public Library (Cnr Heystek/Thabo Mbeki Drive: 25.6332° S, 27.2754° E) for a period of 30 days from 12 March 2026.

The SR will also be made available on the EIMS website (https://www.eims.co.za/public-participation/).

The public meeting will be held at the Sibanye Stillwater Recreation Club, (3rd Avenue, Waterkloof, Kroondal, Rustenburg) ($25^0$41’50.5”S; 27^0 19’37.8 E on the 26th of March between 12h00 and 14h00.

Proofs of this will be included in the Final Scoping Report to be submitted to the Competent Authority.

7.4 PUBLIC PARTICIPATION PROGRESS

Comments raised to date have been addressed in a transparent manner and included in the Public Participation Report. To date, summary of comments received are as follows:

- Requests to register as I&AP;
- Request for project reports; and
- Confirmation from stakeholders that they are not affected by the proposed project.

All comments that will be received during the review of the Scoping Report will be captured and responded to through a Comments and Response Report that will be included in the report. Comments received to date have

been included in this report. All I&APs registered on the Project database will be informed of the availability of the Scoping Report for public review. I&APs will be provided with another opportunity to submit their comments during the Environmental Impact Assessment (EIA) Phase of the project. Refer to Appendix 2 for the Public Participation Report and all Public Participation related documents.

7.5 REVIEW OF THE SCOPING REPORT BY COMPETENT AUTHORITIES

DMPR as the competent Authority for the listed activity must, within 43 days of receipt of the Final Scoping Report that has been subjected to 30 days of public review as a Draft Report, accept the Final Scoping Report and Plan of Study for EIA in writing should no amendments be required, or shortcomings be identified therein. Upon acceptance of the Scoping Report, the Environmental Assessment Practitioner (EAP) may then proceed with the tasks contemplated in the Plan of Study for EIA.

The authority can also reject the Scoping Report for not following legislative procedure if any of the required steps were not undertaken. In terms of Regulation 22 (b) of Government Notice R. 982, the Scoping Report may be amended and resubmitted by the EAP should it be rejected. On receipt of the amended Scoping Report and Plan of Study for EIA, the competent authority will then reconsider the application. Should the Scoping Report be approved, the amended Scoping Report will then be made available for public review and comment prior to submission to the Competent Authority.

The authority may also advise the EAP of matters that may hinder the success of the EIA application or matters that may prejudice the success of the application.

7.6 PUBLIC PARTICIPATION PROCESS FOR EIA PHASE

The Public Participation Process (PPP) will be documented and included in the Environmental Impact Report (EIR). The PPP will be undertaken in accordance with the Plan of Study for EIA. The project I&APs will be updated on all project developments throughout the EIA Phase. A summary of comments received from the registered I&APs, the date of their receipt and responses of the EAP to those comments will be provided in the Comments and Response Report that will be updated during all project phases. All copies of any representations, objections and comments received will also be submitted to the competent authority together with the EIR.

7.7 APPEAL PERIOD

After a decision has been reached by DMRE, Chapter 2 of the National Appeal Regulations 2014 makes provision for any affected person to appeal against the decision. Within 20 days of being notified of the decision by the competent authority, the appellant must submit the appeal to the appeal administrator. An appeal panel may be appointed at the discretion of the delegated or organ of state to handle the case and it would then submit its recommendations to that organ of state for a final decision on the appeal to be reached. EIMS will communicate the decision of the Provincial Authority and the way appeals should be submitted to the Minister and to all I&APs as soon as reasonably possible after the final decision has been received.

8 ENVIRONMENTAL ATTRIBUTES AND BASELINE ENVIRONMENT

This section of the Scoping Report provides a description of the environment that may be affected by the proposed project. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from existing information available for the area as well as baseline information received from certain specialists assessments. Please note that detailed specialist assessments are being completed to inform the EIA-phase report. The DFFE screening tool was also used to inform this section and a copy of the screening report is included in Appendix 3.

8.1 TOPOGRAPHY

The natural landscape of the study area is characterised by a rolling topography, with an increase in height toward the Magalies Mountains approximately 8 km to the south (Airshed, 2025). The elevation of the study area ranges from 1130 metres above mean sea level (mamsl) to 1150 mamsl (Hydrogeek, 2025). Refer to Figure 7 below.

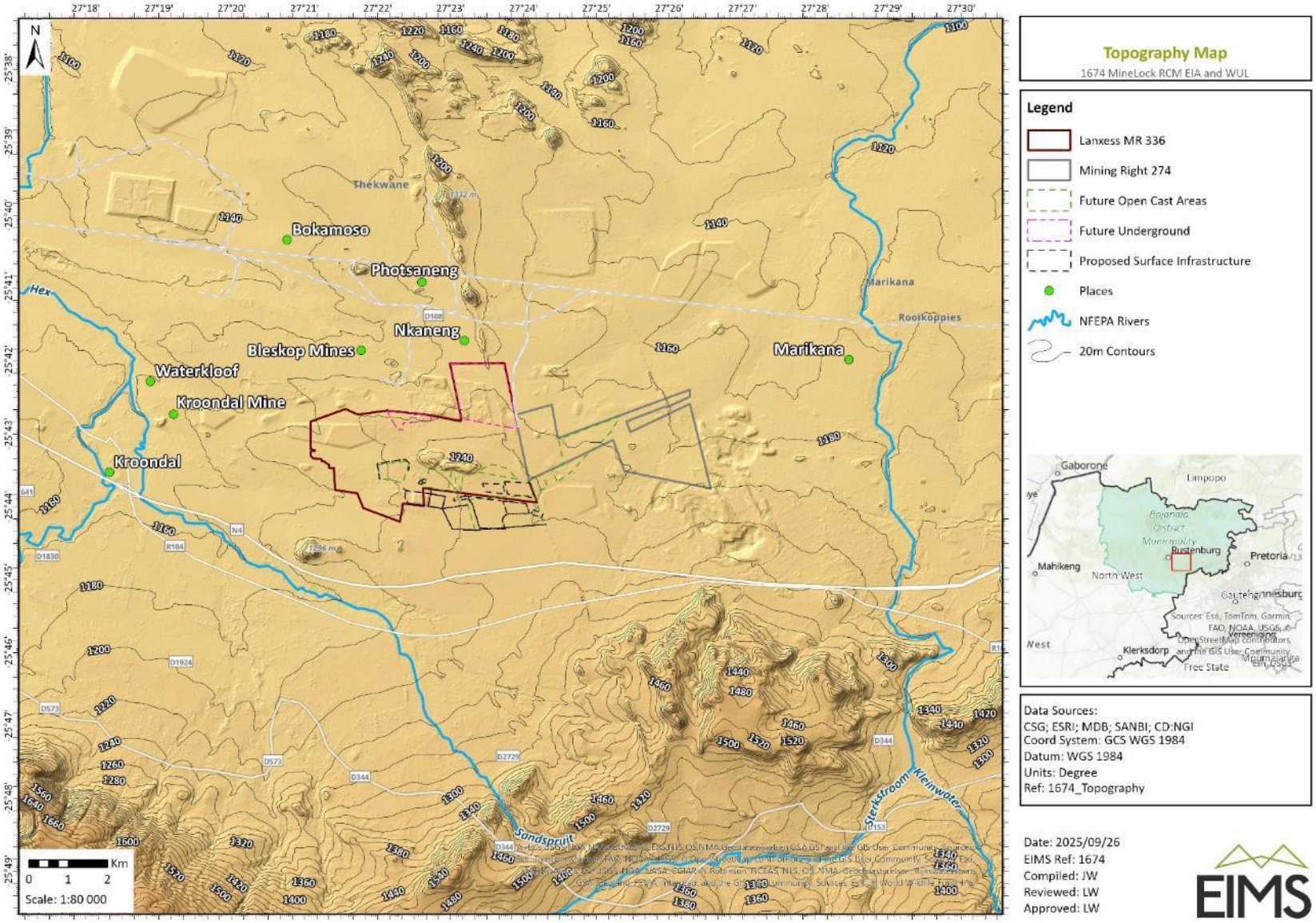


Figure 7: Topography of the mining area.

8.2 GEOLOGY AND SOILS

8.2.1 REGIONAL GEOLOGY

The regional geology of the area is given in Figure 8 and Figure 9. The regional area is underlain by the Ruighoek pyroxenite, Mathlagame norite, Mathlagame norite anorthosite and Kroondal Norite of the Rusten-burg Layered Suite, Bushveld Complex, Vaalian Era. The soil cover on the site consists of a dark brown to black, firm loamy clay with abundant vegetation roots. This soil is dispersive and expansive and forms large cracks when moisture is driven off. Locally the soil is referred to as black "turf".

Generally, it should be noted that the geology of site has been artificially modified in areas due to mining activities surrounding the site. This artificially modification of the geology could possibly have an impact on the hydraulic properties of groundwater flow in the subsurface. A simplified description of the units underlying the study area is represented. The ore body is in the Critical zone of the Rustenburg Layered suite in the Bushveld Ingenious Complex (BIC). The area strikes east-west and dip10 degrees to the north. The chrome layers are interlayered by pyroxenites, norites and anorthosites.

The faults are predominantly dextral, many of which have later been intruded by dykes. The majority of the dykes have a north-north-west strike and form part of the Pilanesberg dyke swarm. A major dyke flanks the western portion of the study area and is associated with a major fault in the area and constitutes the most noticeable topographic feature.

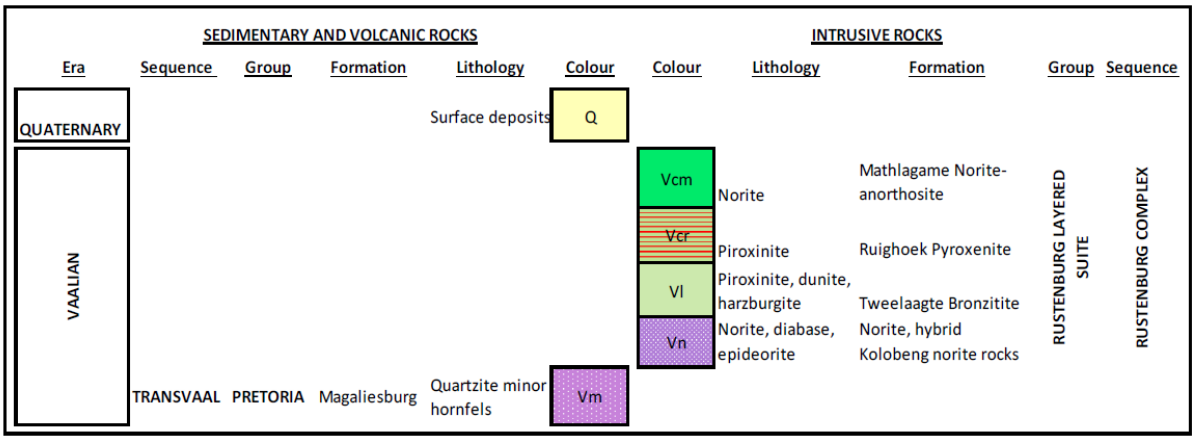


Figure 8: Geology groups present (Hydrogeek, 2025).

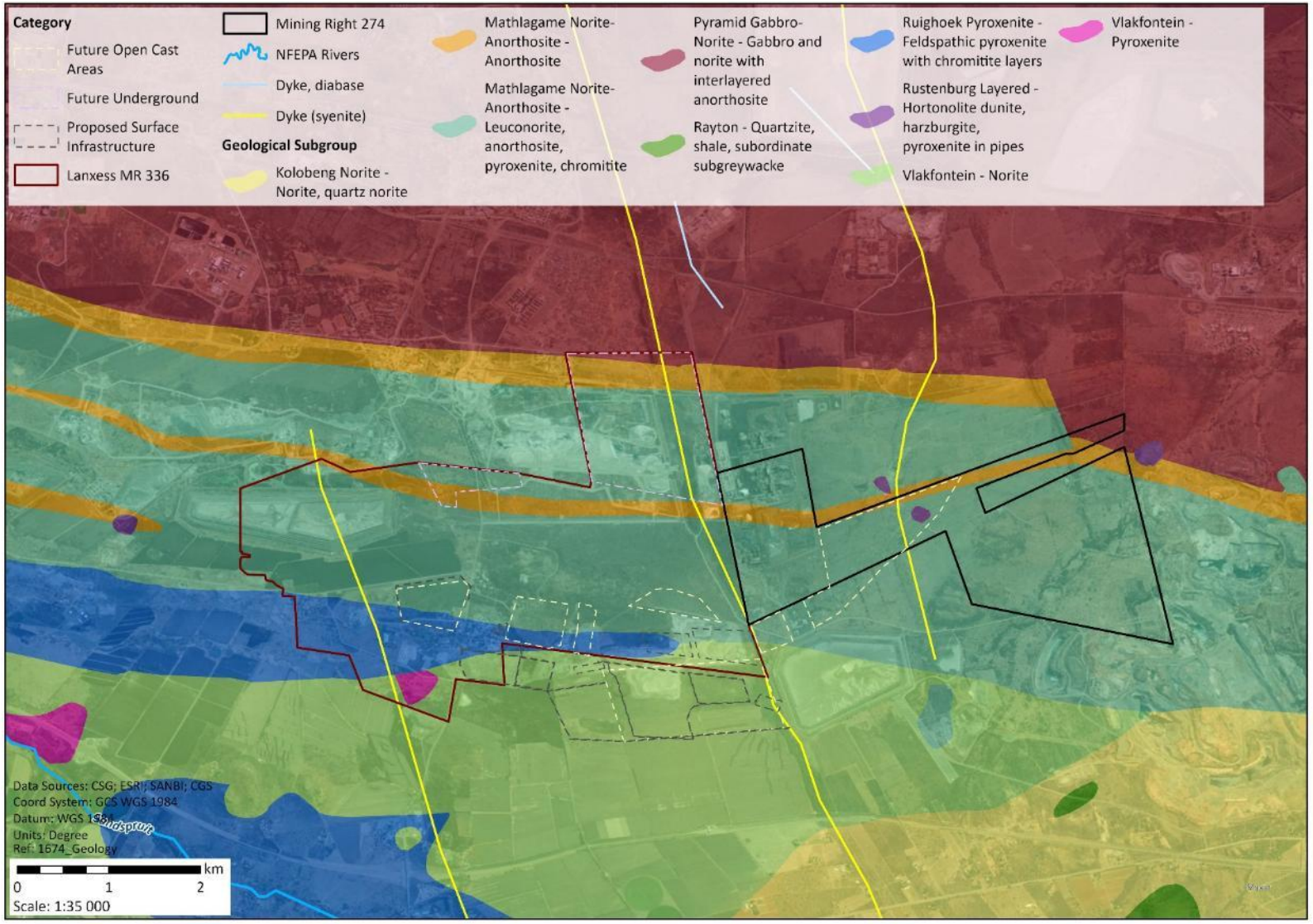


Figure 9: Simplified Geology of the mining area.

8.2.2 SOILS

Soil information was obtained using published South African Land Type Data. Land type data for the site was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 - 2006). The land type data is presented at a scale of 1:250 000 and comprises of the division of land into land types (Figure 10). According to the land type database (Land Type Survey Staff, 1972 – 2006) the development primarily falls within the Ea3, Bc8 and Ib116 land type.

The Ea land type is characterised by vertic, melanic, red-structured diagnostic horizons and undifferentiated soils. The Ib land types have miscellaneous land classes and soils with rocky areas being dominant in the terrain. The Bc land type is characterised by plinthic catena.

The Ea3 land type mainly consists of Arcadia, Oakleaf soil forms and rocky areas, according to the Soil classification working group (1991), with the occurrence of other soils within the landscape. The Ib 116 land type mainly consists of Arcadia and Rensburg soil forms, with rocky areas, associated with the occurrence of other soils in the landscape. The Bc land type is distinguished by a plinthic catena, where the soil profile exhibits a sequence of horizons with varying degrees of iron and manganese concretions. Upland duplex and margalitic soils are infrequent within this classification, while eutrophic red soils are extensively distributed, contributing to the nutrient-rich nature of the area.

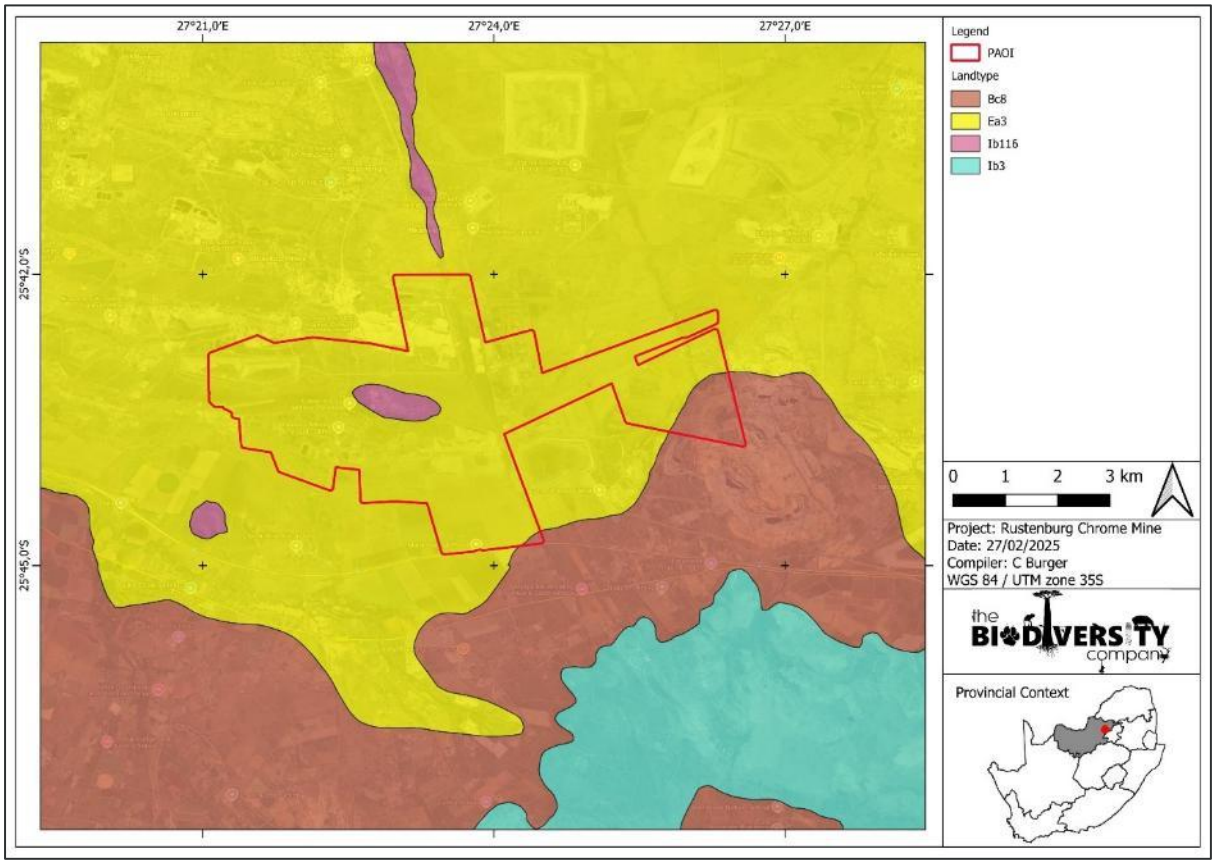


Figure 10: Land Types

The terrain units for the land type and expected soils for the land type are illustrated in Figure 11 to Figure 13 and Table 14 to Table 16, respectively.

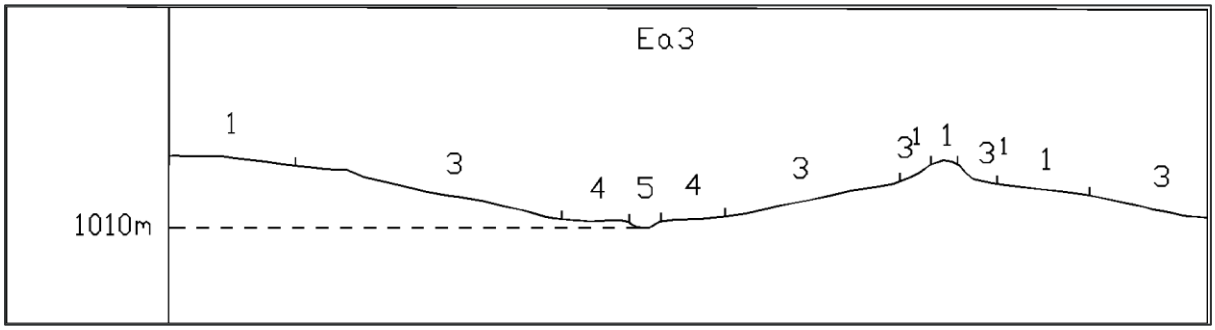


Figure 11: Illustrations of land type Ea 3 terrain units (Land Type Survey Staff, 1972 – 2006).

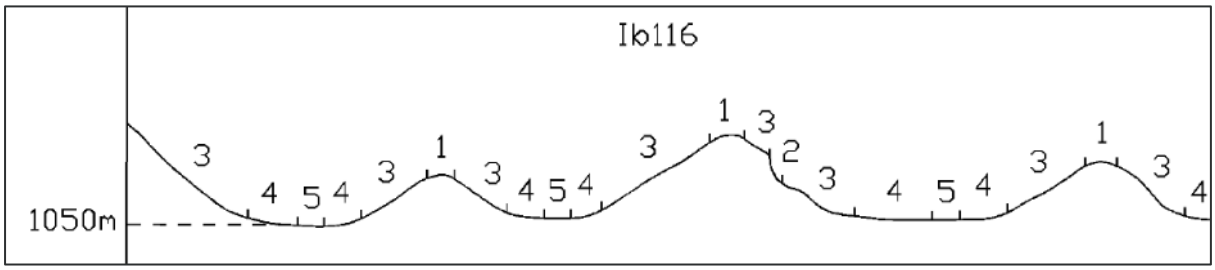


Figure 12: Illustration of land type Ib 116 terrain units (Land Type Survey Staff, 1972 - 2006).

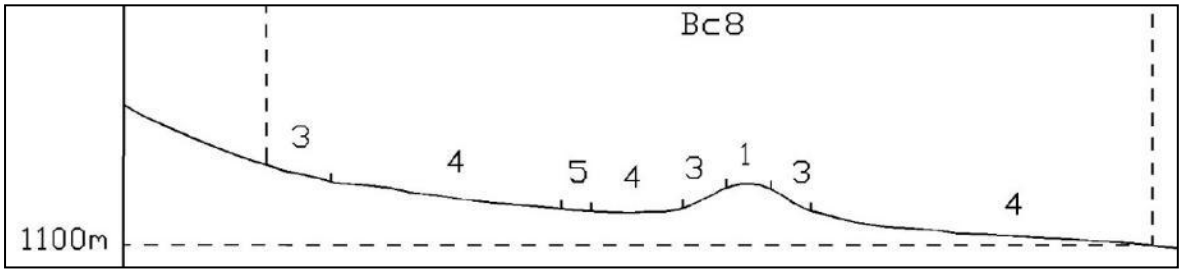


Figure 13: Illustration of land type Bc 8 terrain units (Land Type Survey Staff, 1972 – 2006.

Table 14: Soils expected at the respective terrain units within the Ea 3 land type (Land Type Survey Staff, 1972 - 2006).

Terrain Units											
1 (30%)		1[1] (0.5%)		3 (44.5%)		3[1] (1%)		4 (15%)		5 (9%)	
Arcadia	70%	Bare Rock	80%	Arcadia	76%	Bare Rock	70%	Arcadia	89%	Oakleaf	67%
Bare Rock	14%	Mispah	20%	Bare Rock	10%	Mispah	30%	Hutton	3%	Arcadia	22%

Terrain Units										
Mispah	9%			Mispah	6%		Shortlands	3 %	Shortlands	6%
Hutton	4%			Hutton	4%		Swartland	3 %	Hutton	5%
Shortlands	3%			Shortlands	3%		Bare Rock	2 %		
				Swartland	1%					

Table 15: Soils expected at the respective terrain units within the Ib 116 land type (Land Type Survey Staff, 1972 - 2006).

Terrain Units									
1 (5%)		2 (1%)		3 (50%)		4 (39%)		5 (5%)	
Bare Rock	60%	Bare Rocks	100%	Bare Rocks	86%	Bare Rocks	45%	Rensburg	40%
Mispah	40%			Mispah	14%	Arcadia	39%	Arcadia	40%
						Mispah	16%	Mispah	12%
								Bare Rocks	8%

Table 16: Soils expected at the respective terrain units within the Bc 8 land type (Land Type Survey Staff, 1972 - 2006).

Terrain units							
1 (20%)		3 (60%)		4 (15%)		5 (5%)	
Bare Rock	50%	Mispah	50%	Hutton	40%	Dundee	60%
Mispah	50%	Bare Rock	44%	Avalon	18%	Arcadia	10%
		Hutton	6%	Mispah	17%	Kroonstad	10%
				Kroonstad	7%	Shortlands	6%
				Shortlands	6%		
				Bare Rock	6%		
				Kroonstad	5%		
				Arcadia	1%		

8.2.3 LAND CAPABILITY

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which ten potential land capability classes are located within the proposed PAOI, including;

- Land Capability 1 to 5 (Very Low/Low to Low Sensitivity);
- Land Capability 6 to 8 (Low/Moderate to Moderate Sensitivity); and
- Land Capability 9 to 10 (Moderate to High);

The sensitivities as per the Department of Agriculture, Forestry and Fisheries (DAFF, 2017) national raster file indicated that the land capabilities range from very low to moderate-high across the development area (Figure 14: Land Capability Sensitivity (DAFF, 2017).

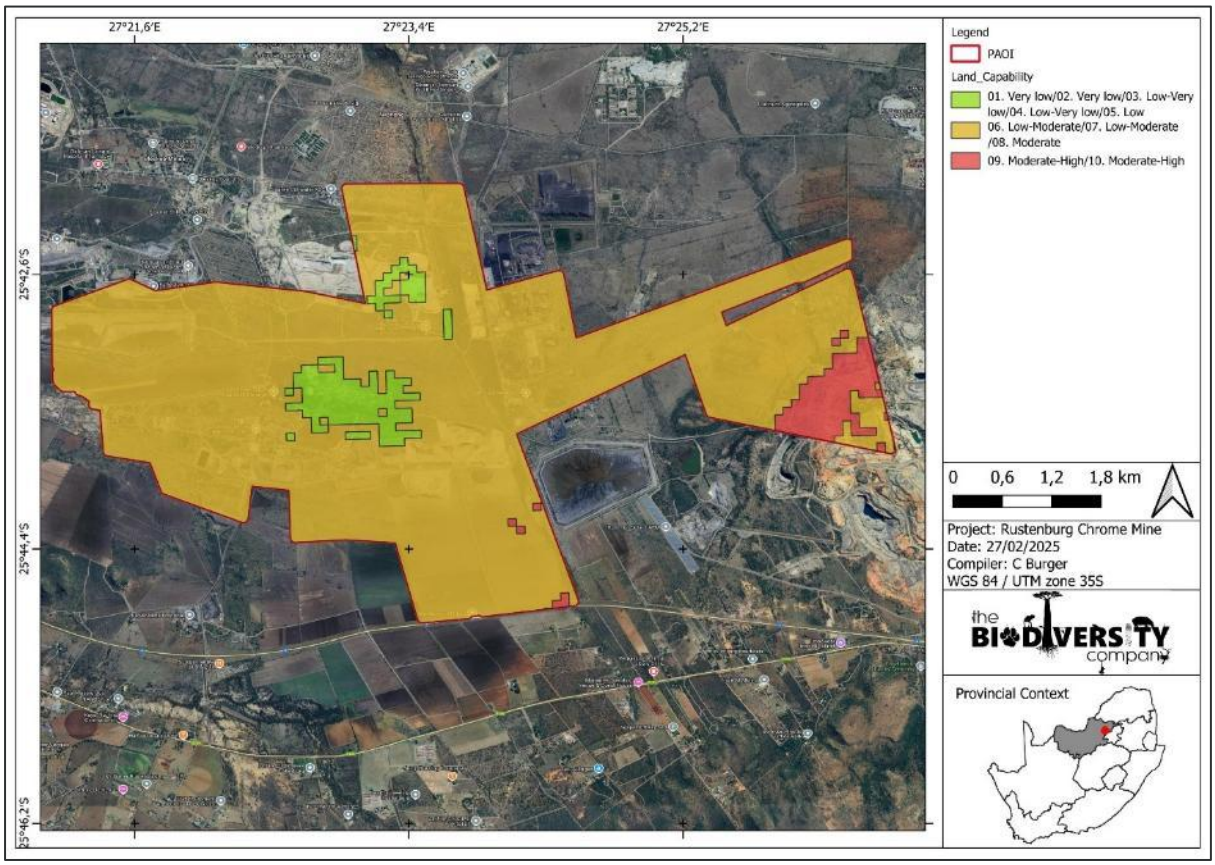


Figure 14: Land Capability Sensitivity (DAFF, 2017).

8.3 CLIMATE

8.3.1 SURFACE WIND FIELD

The wind field determines both the distance of downward transport and the rate of dilution of pollutants. The generation of mechanical turbulence is a function of the wind speed, in combination with the surface roughness. The wind field for the study area is described with the use of wind roses. Wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing winds in between 4 and 5 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. Calm conditions are periods when the wind speed was below 1 m/s. These low values can be due to "meteorological" calm conditions when there is no air movement; or, when there may be wind, but it is below the anemometer starting threshold.

The period wind field and diurnal variability in the wind field are shown in Figure 15. The average wind field is mainly from the north-to-east-to south half of the wind grid with calm conditions 2.52% of the time. The daytime wind field is mainly from the north, ranging between north-west to north-east with 1.75% calm conditions.

During the night, the wind field shifts to the south and south-southeast with less frequent winds from the south-westerly to north-westerly sector. The frequency of night-time calm conditions increases to 3.30%.

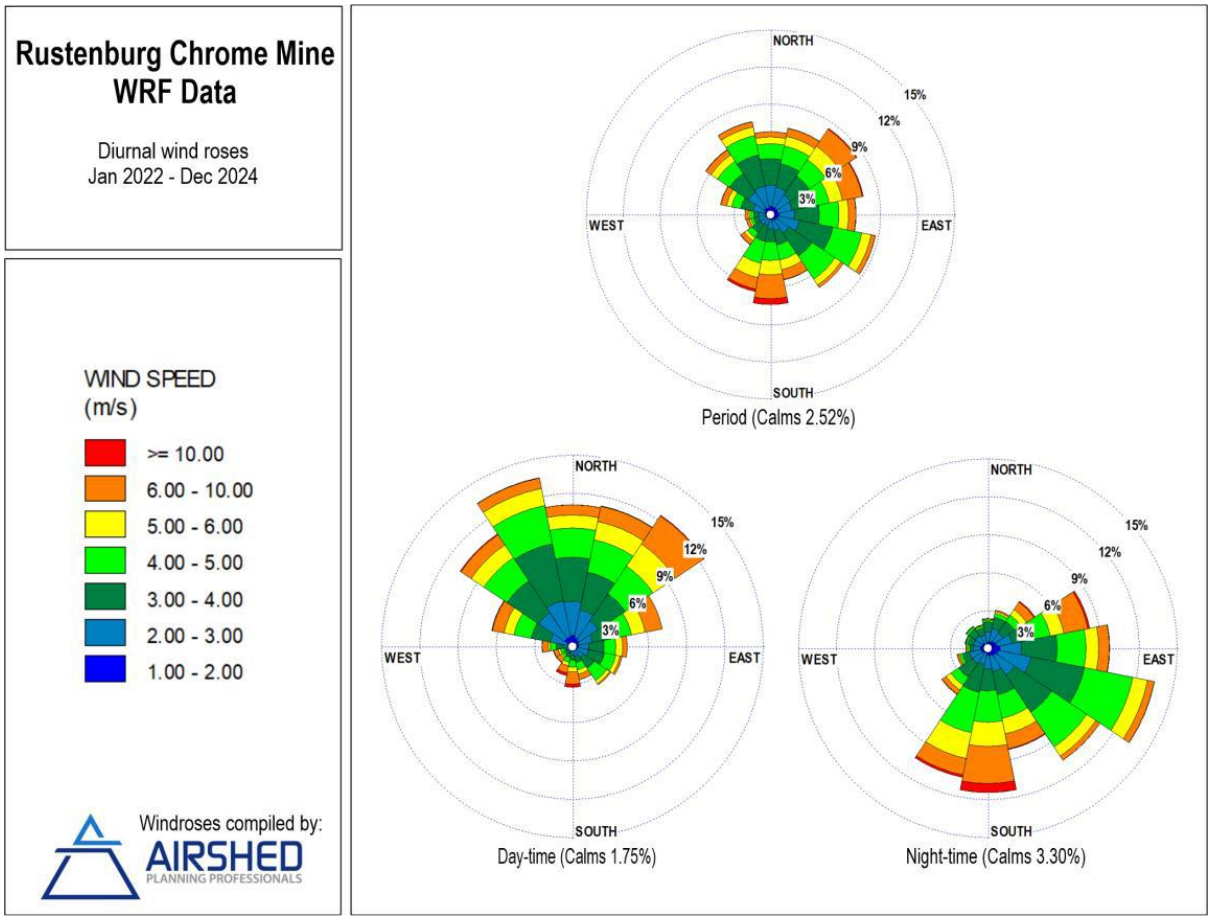


Figure 15: Period, day- and night-time wind roses (WRF data; 2022 to 2024).

A distinct seasonal variation in the wind field in visible from Figure 16. During summer, the wind field is varied between most directions with more frequent winds from the north-eastern sector. The wind field shifts to south during autumn, with more frequent southerly winds during winter. During spring, the northerly winds increase with frequent north to north-east winds.

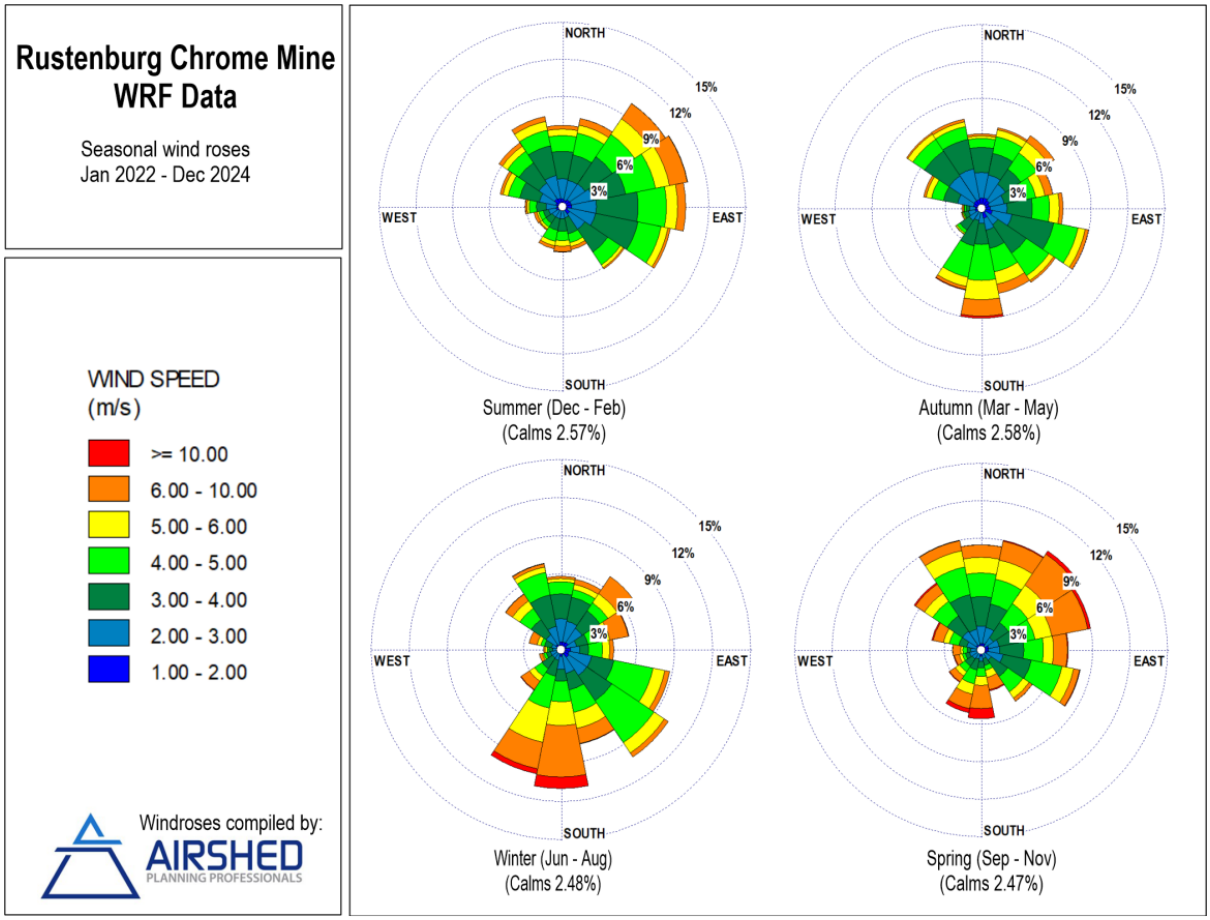


Figure 16: Seasonal wind roses (WRF data; 2022 to 2024).

According to the Beaufort wind force scale, wind speeds between 6-8 m/s equates to a moderate breeze, with wind speeds between 14-17 m/s near gale force winds. Based on the three years of WRF data, range between 0.3 m/s to 15.2 m/s, with an average wind speed of 4 m/s. The likelihood for wind erosion to occur from open and exposed surfaces, with loose fine material, was estimated when the wind speed exceeds 8 m/s. The US EPA indicates wind erosion from stockpiles to occur when winds exceed 5.4 m/s. Wind speeds exceeding 8 m/s and 5.4 m/s occurred for 4% and 18%, respectively over the period.

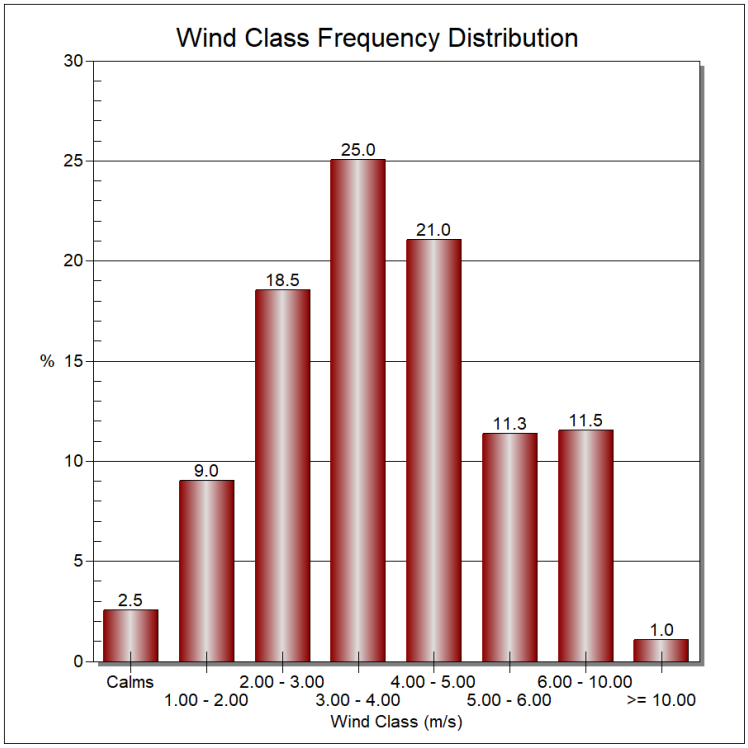


Figure 17: Wind speed categories (WRF data; 2022 to 2024)

8.3.2 AMBIENT TEMPERATURE

Air temperature is important, both for determining the effect of plume buoyancy (the larger the temperature difference between the plume and the ambient air, the higher a pollution plume is able to rise and determining the development of the mixing and inversion layers). The monthly temperature pattern is provided in Figure 18 with the diurnal temperature profile in Figure 19. The area experiences hot temperatures during summer, with maximums of above 36°C for the months between November and March. Winter temperatures are relatively low especially in the months of May to July, with a minimum of -2.6°C in July.

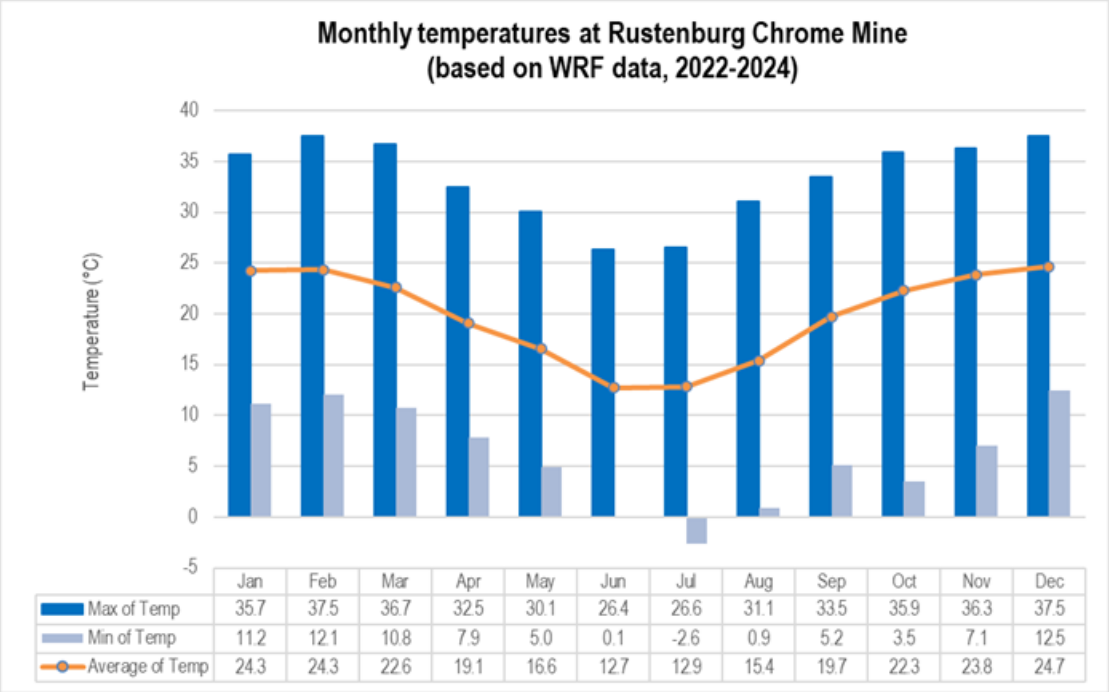


Figure 18: Minimum, average and maximum temperatures (WRF data; 2022 to 2024).

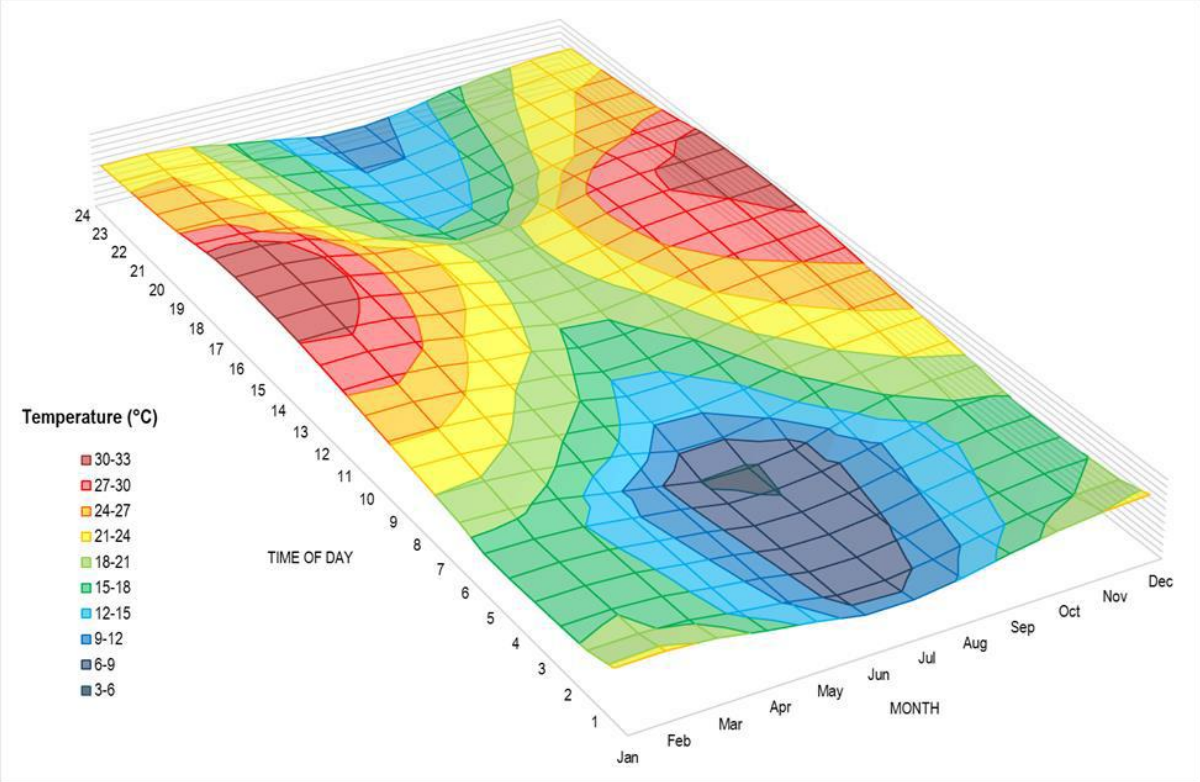


Figure 19: Diurnal temperature profile (WRF data; 2022 to 2024)

8.3.3 PRECIPITATION

Precipitation is important to air pollution studies since it represents an effective removal mechanism for atmospheric pollutants and inhibits dust generation potentials. Monthly rainfall for the study area (based on WRF data for 2022 – 2024) is given in Figure 20. Months wherein the most rain occurred stretched from October

to April. The total annual rainfall for the Project site is given to as 1 178 mm (2022), 692 mm (2023) and 620 mm (2024).

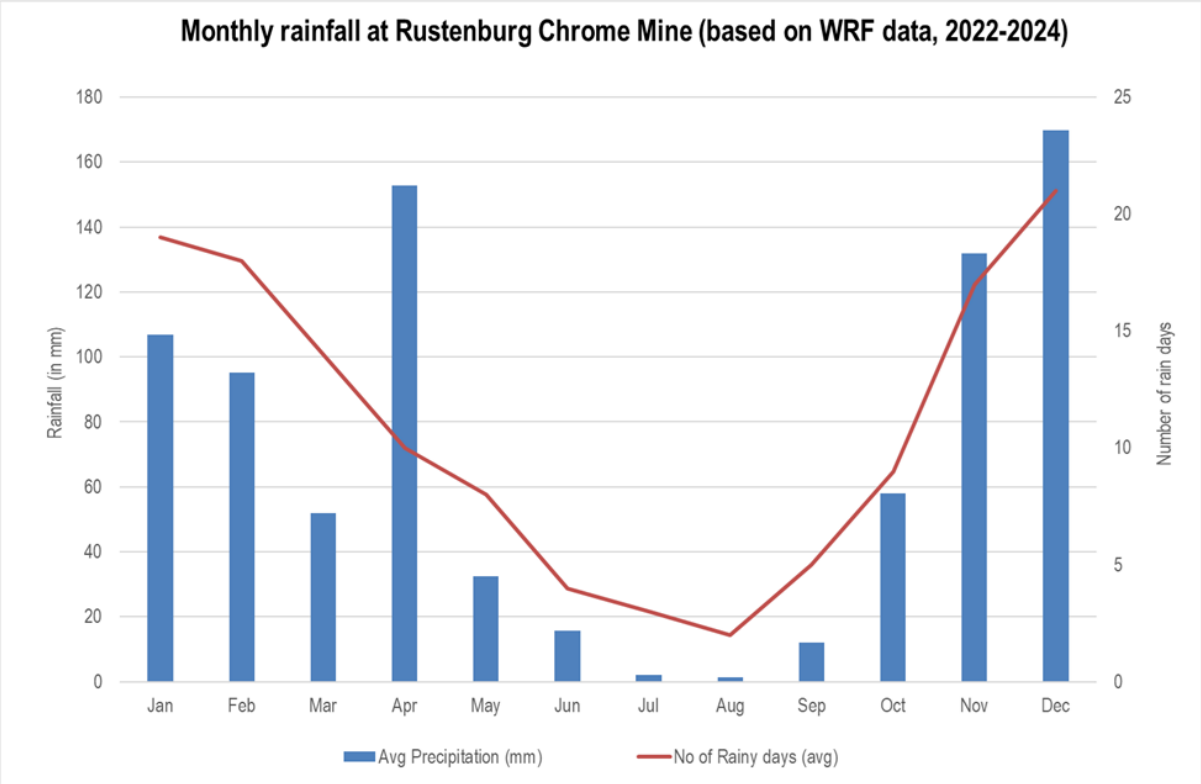


Figure 20: Monthly precipitation (WRF data; 2022 to 2024).

8.3.4 CLIMATE CHANGE PREDICTIONS

The GreenBook (CSIR, GreenBook 2025) provides downscaled (±8×8 km) climate projections for South Africa to the 2050s and models hydro-meteorological hazards (drought, heat, wildfire, flooding) together with socio-economic exposure and vulnerability at municipal and settlement scales. Table 17 provides a summary of the climate change metrics applicable to the municipality. The Rossby Centre regional model (RCA4) is used in the predictions for climate change. Two trajectories are included based on the four Representative Concentration Pathways (RCPs) discussed in the IPCC's assessment report. RCPs are defined by their influence on atmospheric radiative forcing in the year 2100. RCP4.5 represents an addition to the radiation budget of 4.5 W/m2 as a result of an increase in GHGs. The two RCPs selected were RCP4.5 representing the medium-to-low pathway and RCP8.5 representing the high pathway. RCP4.5 is based on a CO_2 concentration of 560 ppm and RCP8.5 on 950 ppm by 2100. RCP4.5 is based on if current interventions to reduce GHG emissions being sustained (after 2100 the concentration is expected to stabilise or even decrease). RCP8.5 is based on if no interventions to reduce GHG emissions being implemented (after 2100 the concentration is expected to continue to increase).

Table 17: Climate change predictions.

Aspect	Baseline (1961-1990)	Predicted Change (2021-2050)	
		RCP4.5	RCP8.5
Average temperature	Min: 12.20°C Avg: 18.62°C Max: 24.99°C	+ 2.24°C — 2.85°C	+ 2.83°C — 3.18°C

Aspect	Baseline (1961-1990)	Predicted Change (2021-2050)	
		RCP4.5	RCP8.5
# very Hot Days[2]		+ 5.36 days — 38.82 days	+ 9.24 days — 49.94 days
Average annual rainfall	953.31mm	-61.54mm — 84.82mm	14.08mm — 109.90mm
# extreme annual rainfall days[3]		-1.42 days — 0.86 days	-0.54 days — 1.54 days

Climate change hazards identified for the municipality include:

- Predicted fire danger days increase to 46[4].
- The likelihood of wildfires occurring in the wildland-urban interface is regarded as likely in the residential settlement areas.
- Residential settlements have a moderate potential for increased flooding due to the predicted increase in extreme rainfall days.
- There is a predicted increase in drought tendencies per 10 years (more frequent than baseline), with the communities in the area having a moderate increase in drought exposure.
- The surrounding settlements are predicted to have a medium to high risk of encountering increasing heat stresses (heat waves and extreme heat days).

Predicted climate changes should be integrated into design and risk assessment considerations. For this project, the following aspects are addressed:

- Pollution control structures must account for medium to long-term climate changes, including increased instances of extreme rainfall and potential increases in overall precipitation.
- More intense rainfall events and settlement expansion into flood-prone areas increase flood risk for roads, bridges, stormwater systems, and low-lying zones, which is relevant to mine stormwater management, tailings, and pollution control facilities.
- Conservative assumptions and inputs should be applied when determining floodlines to reduce long-term infrastructure flood risk.
- Climate change scenarios need to be incorporated into mine water balance planning.
- Design criteria and stormwater management should allow for higher magnitude design storms and brief peak intensities, with attention to robust attenuation, diversions, erosion protection, and verification of tailings and waste facility freeboard and spillway capacity under heavier rainfall.
- Water security strategies should include drought-resilient approaches, such as increased reuse, modular treatment, contingency sourcing, and integration of groundwater monitoring for planned abstraction or storage activities.
- Heat and workforce safety measures should involve heat-stress management plans, including work-rest cycles, provision of shade, hydration, and early-warning triggers based on local thresholds during periods of high temperatures.

[2] where temperatures exceed 35°C.
[3] more than 20 mm in 24 hours.
[4] A fire danger day is described as a day when the McArthur fire-danger index exceeds a value of 24.

- Fire management protocols for servitudes and perimeter areas should be enhanced through fuel breaks, regular inspections, accessible roads, and coordination with relevant fire agencies.
- In project areas adjacent to high-vulnerability settlements, collaborative design of stormwater, flood mitigation, and heat relief interventions with municipal authorities is recommended to minimize external risks.

8.4 SOCIO-ECONOMIC

RCM operations are located within Rustenburg Local Municipality which is in the Bojanala District. The area also represents the largest economy in the North West Province.

8.4.1 DEMOGRAPHICS AND SOCIAL PROFILE

North West Province ranks seventh amongst the nine provinces in terms of population estimated at just over 3.5 million according to the Community Survey 2016. This represented a 1.5% growth since 2011. In 2022, the Provincial population growth was estimated at just over 4.1 million people. In terms of population distribution by sex, the province's population continues to be male-dominated. The estimated population of the province in 2022 was just over 3.8 million (StatsSA).

Bojanala Platinum District Municipality is one of the four District Municipalities in the North West Province situated to the east of the province. The District Municipality, whose seat is in Rustenburg City, comprises 17% of the total area of the province with a population of just over 1.67 million in 2022 representing 44% of the population of the Province. The four Local municipalities in the District are Rustenburg, Madibeng, Moses Kotane, Moretele, and Kgetleng River with Rustenburg having the largest population representing 34.6% of the District's total population (Figure 21). In terms of number of households in the District, Rustenburg Local Municipality has the highest number of households (Figure 22).

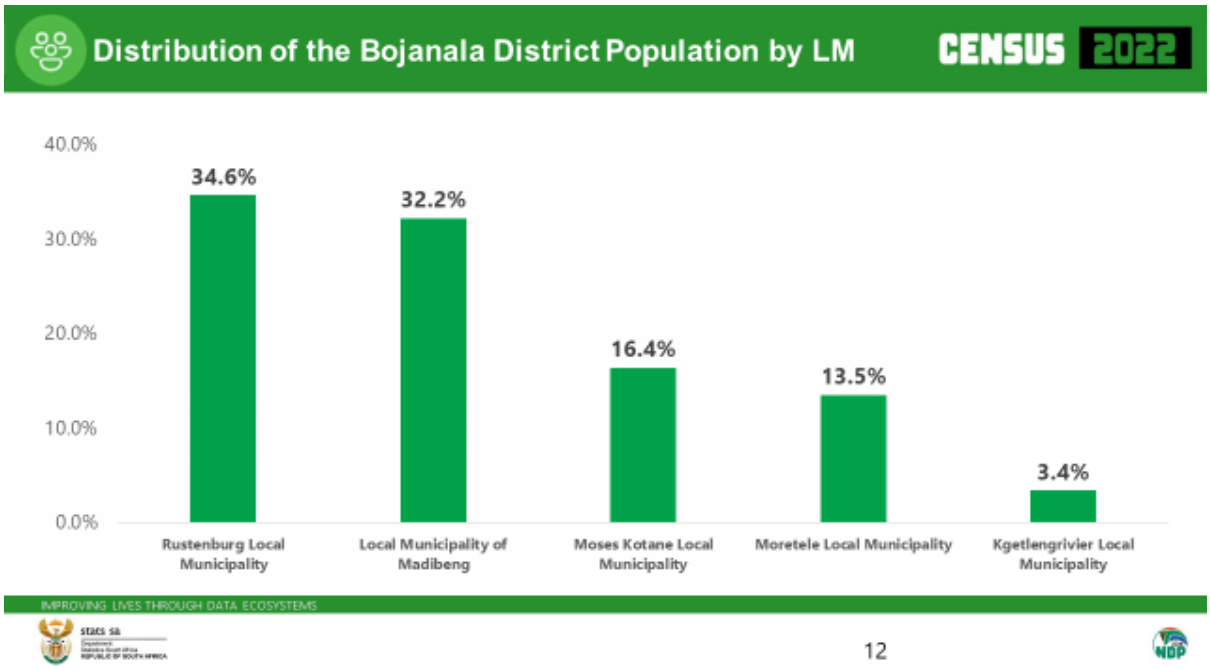


Figure 21: Distribution of Bojanala District Population by Local Municipality.

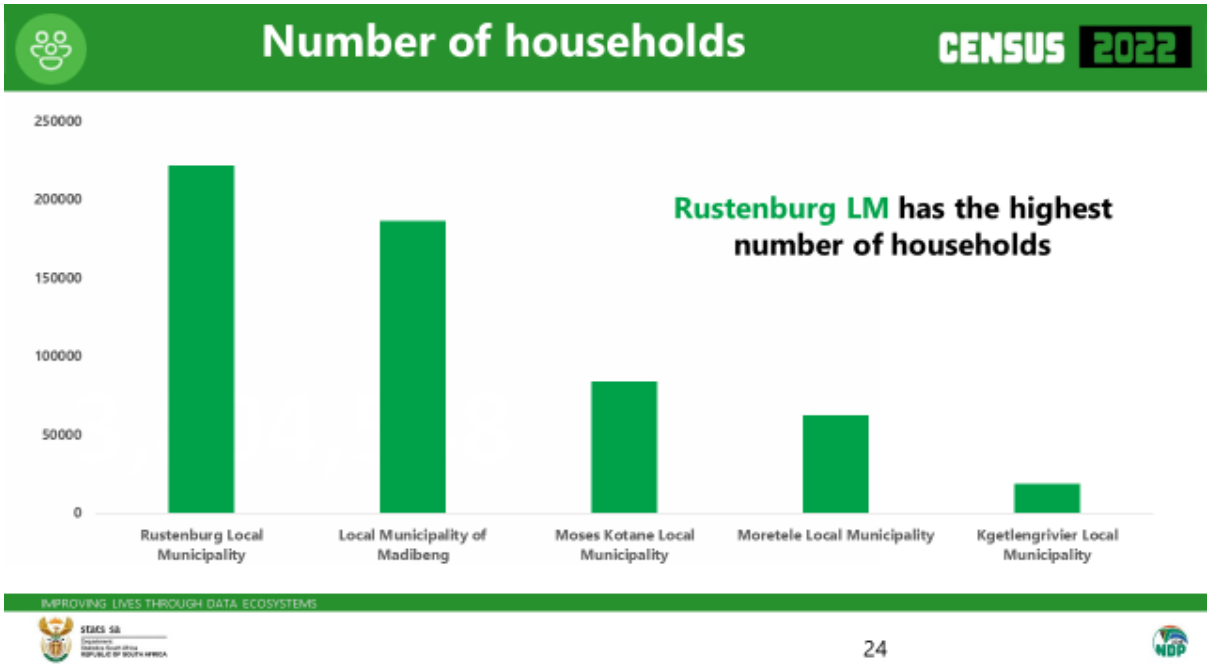


Figure 22: Number of households in Bojanala District Municipality by Local Municipality.

In terms of other key indicators, Bojanala has close to 480,000 people living below the food poverty line which represents more than a quarter of the population at 26.1% in 2021. During the same period, the number of people aged 20 and above with matric was over 435 000 representing 23.9% of the population.

The table below highlights some of the socio-economic development indicators for Bojanala District in relation to the North West Province and the country in general.

Table 18: Some socio-economic indicators for Bojanala District in relation to the NW Province and SA.

Abstract of KEY INDICATORS: South Africa, North West Province and NW District Municipalities (2021) (Source: IHS Markit; Regional Explorer 2294 (2.6q): Nov 2022)				
Category	Metric	SA	North West	Bojanala DM
Size of Area	(km²)	1 221 246	104 882	18 333
	% Share of Region		8,6%	17,5%
Demographic	Total population	59 646 053	4 095 248	1 820 994
	% Share of Region		6,9%	44,5%
	Population Growth Rate (%) 2020	1,5%	1,5%	1,6%
	Number of Households	16 820 584	1 226 035	587 937
Development	Human Development Index (HDI)	0,66	0,63	0,65
	Gini coefficient	0,64	0,63	0,62
	Poverty indicators			

Abstract of KEY INDICATORS: South Africa, North West Province and NW District Municipalities (2021) (Source: IHS Markit; Regional Explorer 2294 (2.6q): Nov 2022)				
	People below the food poverty line (StatsSA defined)	19 584 179	1 311 981	479 744
	2021%	32,46%	31,66%	26,01%
	Highest level of education: age 20+; Matric only	12 982 536	830 243	435 142
	Population density (number of people per km²)	49,40	39,51	100,61
	Urban Population Rate (%)	64,76%	46,55%	38,90%

Compared to the District's population increase of 16.2%, Rustenburg Local Municipality's population increased by 26.5% between 2016 and 2023 with the male population being higher than the female similar to the overall Province's population trend.

In terms of the age structure, the population aged between 15 and 64 represents over 71% of the total population in Rustenburg. 3.9% Of the population age 20 and above have no formal schooling with 8.2% of the same population group having attained higher education.

According to StatsSA, Rustenburg Local Municipality's total population increased by 26.5% between 2016 and 2023 as compared to 16.2% for Bojanala District during the same period. As is the case with the Province and the District, the male population is higher than the female population in Rustenburg. The Local Municipality's population was projected to increase to 870 996 in 2023 with about 70% of the population being the Economically Active Population (15-64).

In terms of education, 17,300 people aged 20 and above had no schooling in 2020. During the same period, 178,000 people had matric only.

According to the StatsSA Quarter Labour Force Surveys (QLFS) 2022 and 2023, the North West provincial unemployment recorded 36.8% in terms of the official definition of unemployment in the third quarter of 2022, representing an improvement compared to the 39% recorded during the third quarter in 2023. However, in terms of the expanded definition, the province continued to record the highest unemployment rate compared to all Provinces at 53.5% during the second quarter of 2023 compared to 53.3% in the second quarter of 2022.

The unemployment rate in the Bojanala District continued to increase with 24.5% recorded in 2012 and 48.1% in 2021 as reflected in the graph below. According to HIS Martik S&P Global (2022) (Bojanala District Municipality's 2024/25 IDP Review), the unemployment rate for Rustenburg Local Municipality has also been increasing recording 19.6% in 2012 and 41.7% in 2021.

In terms of access to basic services by the local municipality's residents, there has generally been improvement with access to electricity, water, sanitation and waste removal between the periods 2011 to 2016; and 2016 to 2022 (Table 19Table 19).

Table 19: Household services

	2022	2016	2011
Flush toilet connected to sewerage	72.8%	52.9%	56.2%
Weekly refuse removal	75.6%	67.1%	69.2%

	2022	2016	2011
Piped water inside dwelling	53.0%	28.5%	35.8%
Electricity for lighting	94.5%	83.7%	83.0%

Source: Extract from Municipalities of South Africa https://municipalities.co.za/overview/1191/rustenburg-local-municipality

8.4.2 RUSTENBURG LOCAL MUNICIPALITY'S INTEGRATED DEVELOPMENT PLAN (IDP) CONSIDERATION

In terms of the local municipality's IDP (5-Year IDP 2022-2027), the municipality identified its community needs and grouped them under the following areas: Safety; Education; Health; Public Works and Roads; Electricity; Social Services; and General. Furthermore, the municipality's IDP provided a list of projects per ward that the municipality has, or is going to, budget for. Several wards were not provided for in terms of the listed and funded projects and these included wards hosting communities within which RCM operates.

8.4.3 LAND COVER AND USE

With reference to Figure 23, the land cover surrounding RCM is characterized by a mix of mining-disturbed areas, natural vegetation, and agricultural land. Historically, the region has undergone significant land-use changes due to mining expansion:

- Mining Footprint: Large portions of the area are occupied by open-cast and underground chrome mining operations, tailings storage facilities, and associated infrastructure such as haul roads and processing plants.
- Natural Vegetation: The mine lies within the Savanna Biome, specifically the Marikana Thornveld vegetation type. This consists mainly of Acacia (Vachellia) species, mixed bushveld, and grassland patches.
- Agricultural Use: Surrounding farms are used for subsistence and commercial agriculture, including grazing and some crop cultivation.

Over the recent past woodland and grassland have decreased, with much of it converted to cultivated land or cleared for mining activities. Open mining areas have expanded significantly in the Rustenburg region due to chrome and platinum mining.

RCM is bounded to the north, east and west by mining operations, and to the south by cultivated land and the N4 freeway. The closes residential uses are located in the villages of Nkageng and Photsaneng (~3,5km to the north of the existing mine).

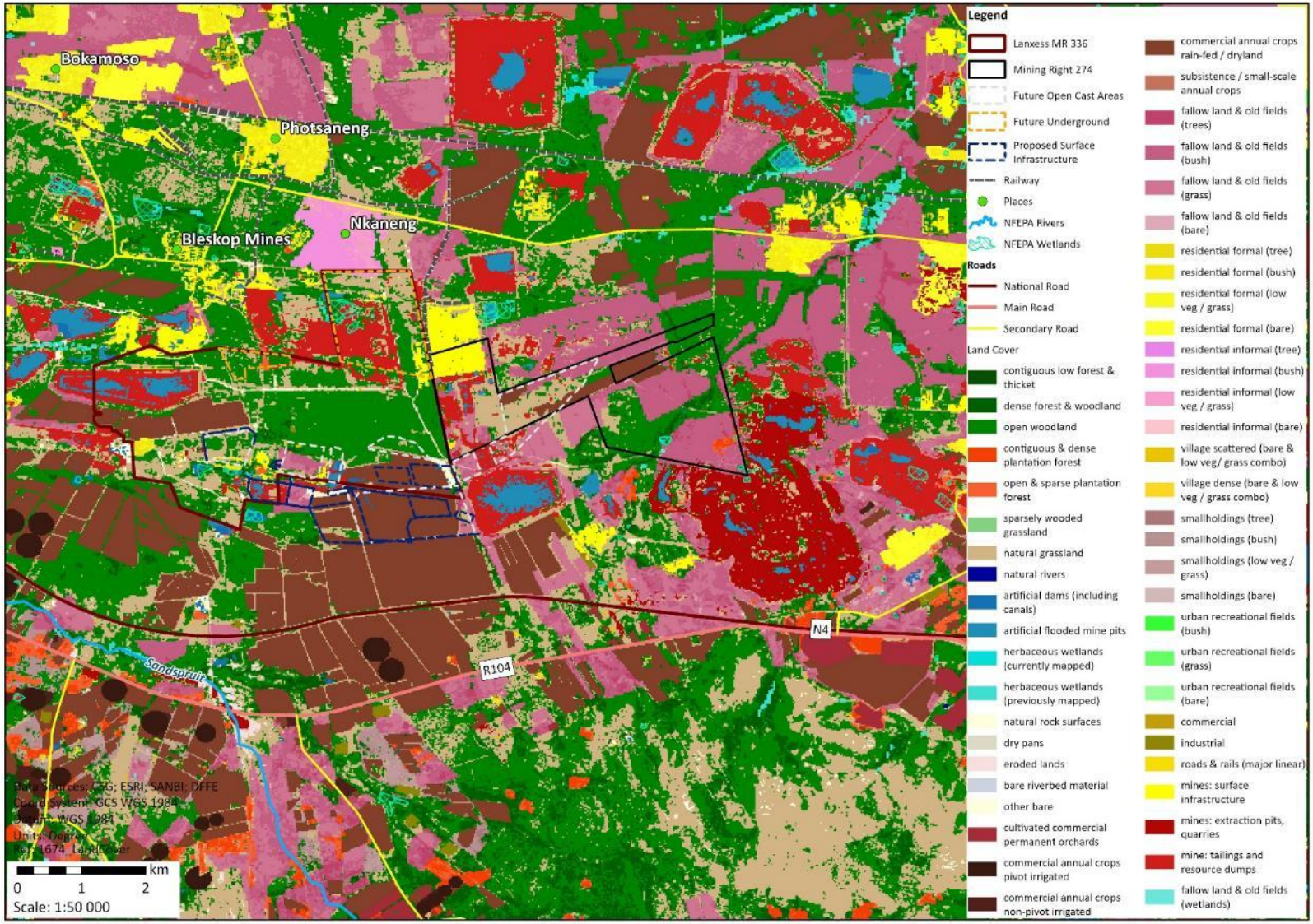


Figure 23: Land Cover of the Study and Surrounding Area.

8.5 CULTURAL HERITAGE RESOURCES

8.5.1 OVERVIEW OF THE STUDY AREA AND SURROUNDING LANDSCAPE

8.5.1.1 2.5 MILLION TO 250 000 YEARS AGO

The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial handaxe (e.g. Figure 24). The Acheulian dates to approximately 1.5 million years ago.

While no immediate ESA occurrences are located close to the study area, the ESA site of Barberspan, in the North West Province, is located over 200 km south-east. Here ESA hominids are documented living next to permanent water sources in a water scarce environment (Caruana et al. 2020).

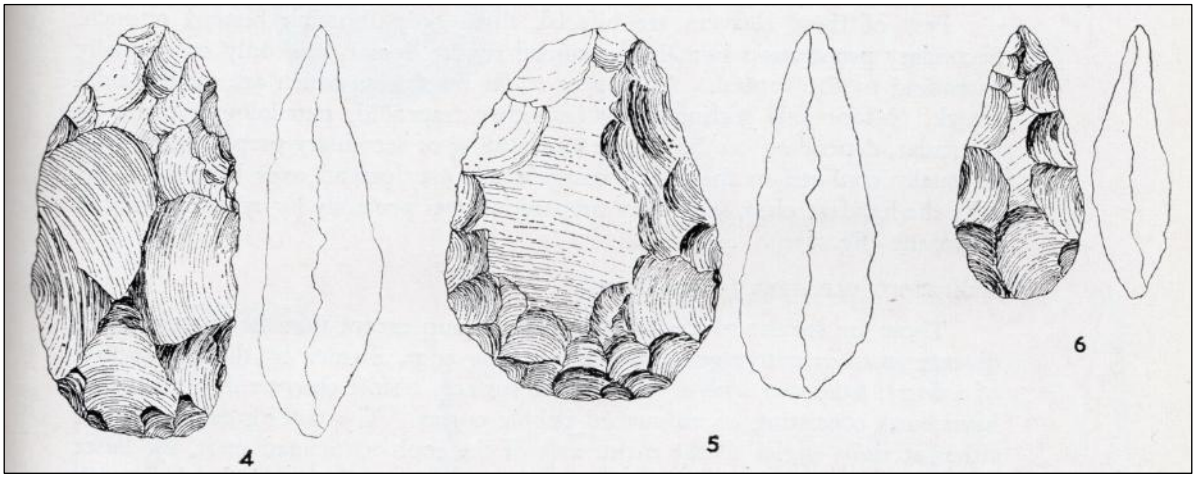


Figure 24: Example of Early Stone Age Later Acheulian handaxes. These handaxes were identified at Blaaubank near Rooiberg. Cropped section of an illustration published in Mason (1962:199).

8.5.1.2 250 000 TO 40 000 YEARS AGO

The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique. The MSA site of Olieboomspoort Shelter is over 200 km north of the study area which contains a large timespan of artefacts including Late Stone Age (LSA) and ESA occupations (Mason 1962).

8.5.1.3 40 000 YEARS AGO TO THE HISTORIC PAST

The LSA is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. Well documented sites such as Jubilee Shelter (38 km north) and Kruger Cave (13 km south) are known from the vicinity. In Kruger Cave many bone points and link shafts were excavated while ostrich egg shell bead production was also noted (Mason 1988). At Jubilee Shelter bone points begin to occur during the Oakhurst industry, 12 000 years ago (Wadley 1996).

8.5.1.4 AD 350 – AD 650

The Bambata facies (Figure 25) of the Benfica Sub-Branch of the Kalundu Ceramic Tradition represents the earliest known Iron Age period within the surroundings of the study area. The decoration on the ceramics from this facies is characterised by "...fine decoration, multiple bands and cross-hatching on long rim, alternating blocks of stamped and incised lines in neck." (Huffman, 2007:215).

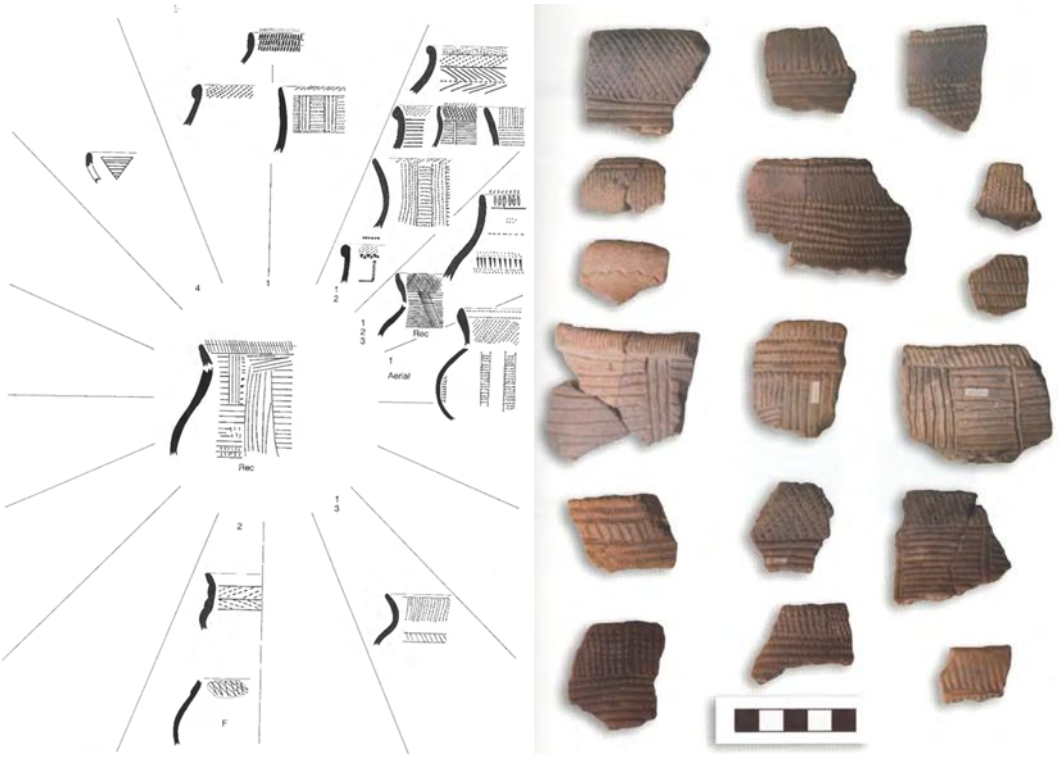


Figure 25: Bambata Types (Huffman, 2007:214). Bambata pottery (Huffman, 2007:215).

8.5.1.5 AD 1000 – AD 1300

The Eiland facies (Figure 26) of the Kalundu Ceramic Tradition represents the fourth known Iron Age period within the surroundings of the study area. The decoration on the ceramics from this facies is characterised by "...fine herringbone with stamping." (Huffman, 2007:221).

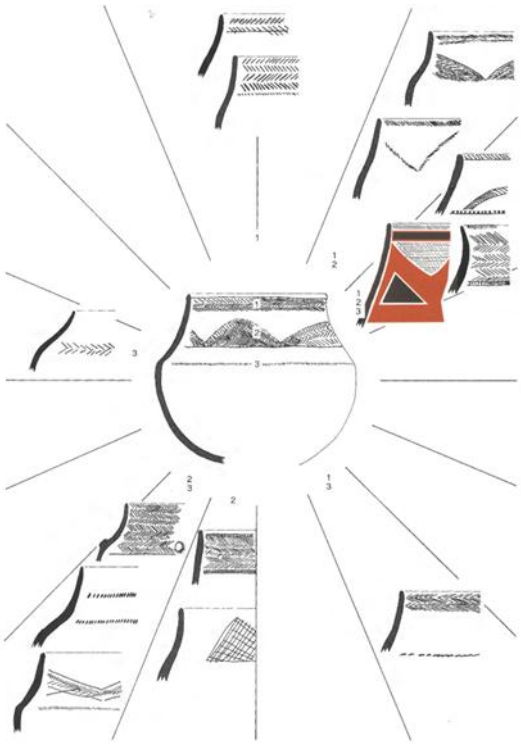


Figure 26: Eiland types (Huffman, 2007:228). Eiland pottery (Huffman, 2007:229).

8.5.1.6 1500 AD – 1700 AD

The Olifantspoort facies (Figure 27) of the Moloko Branch of the Urewe Ceramic Tradition is the second Iron Age facies to be identified within the surroundings of the study area. The Olifantspoort facies can likely be dated to between AD 1500 and AD 1700. The key features of the decoration used on the ceramics from this facies include multiple bands of fine stamping or narrow incision separated by colour (Huffman, 2007).

The type site for this facies is located on the farm Olifantspoort 328 JQ, which is situated approximately 12 km north-east of the present study area. The Olifantspoort facies holds an important position in the sequence of the Moloko or Sotho-Tswana group. The earliest facies to be associated with the Moloko is the Icon facies (AD 1300 – 1500), with sites found across large sections of what is today the Limpopo Province. The Icon facies resulted in three different and parallel Iron Age facies, namely the Madikwe facies (AD 1500 – 1700) (which in turn led to the Buispoort facies between AD 1700 and 1850), the Letsibogo facies (AD 1500 – 1700) and thirdly the Olifantspoort facies. The Olifantspoort facies developed into the Thabeng facies (AD 1700 – 1850) (Huffman, 2007). It is therefore evident that the Olifantspoort facies represents a key pillar in our understanding of the origins and sequence of the Sotho-Tswana people of today (Huffman, 2007).

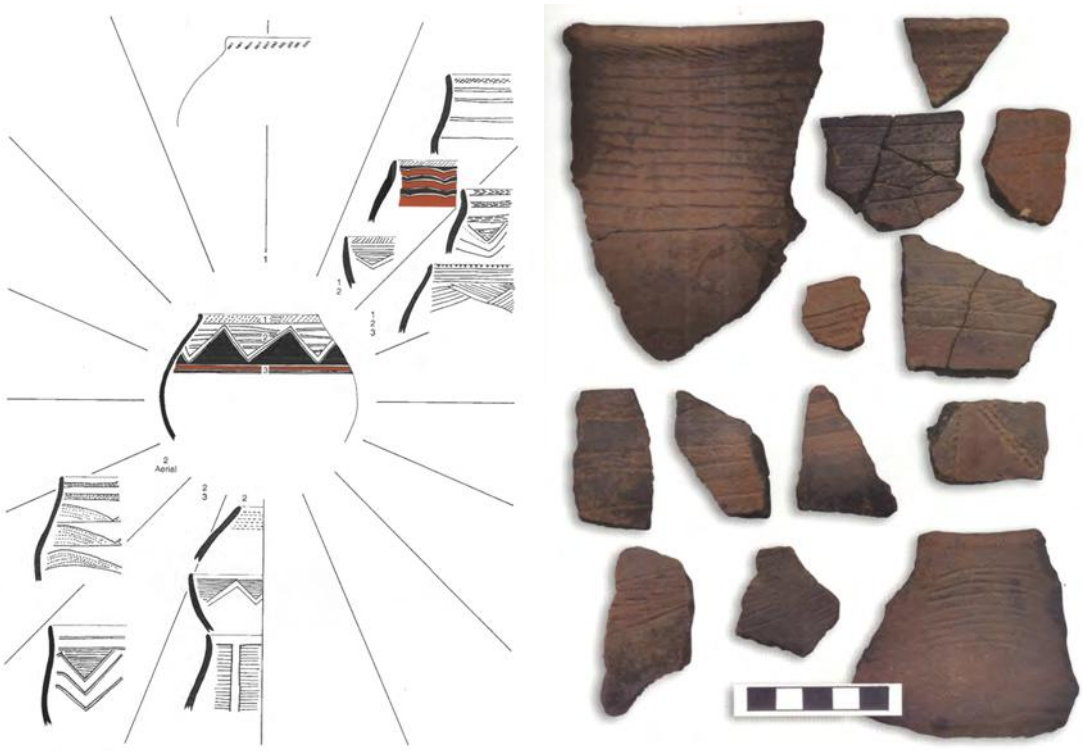


Figure 27: Olifantspoort types (Huffman, 2007:192). Olifantspoort pottery (Huffman, 2007:193).

8.5.1.7 1500 AD – 1700 AD

The Madikwe facies (Figure 28) of the Blackburn Branch of the Urewe Ceramic Tradition represents the next phase in the Iron Age of the study area and surroundings. This facies can likely be dated to between AD 1500 and AD 1700. The decoration on the ceramics associated with this facies is characterised by multiple bands of cord impressions, incisions, stabs and punctates separated by colour (Huffman, 2007).

As indicated above, the Madikwe facies represents one of three parallel Iron Age facies which had developed from the original Moloko facies known as Icon. As such, the Madikwe facies was the contemporary of the Olifantspoort and Letsibogo facies, and developed into the Buispoort facies (AD 1700 – AD 1850) (Huffman, 2007).

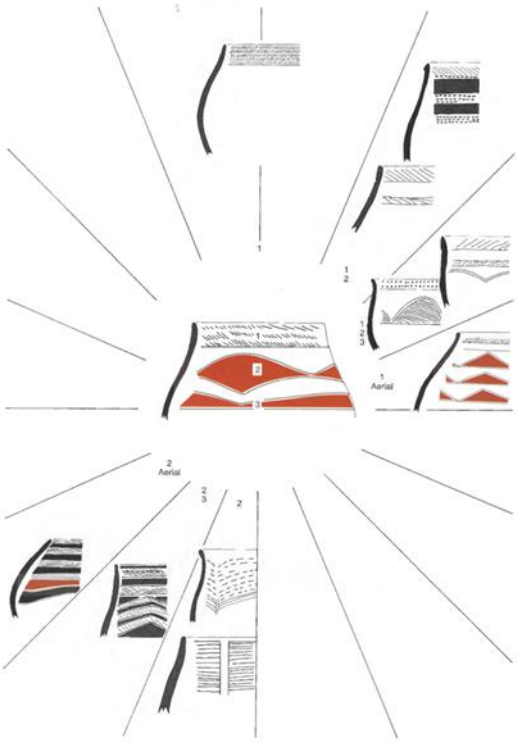


Figure 28: Madikwe types (Huffman, 2007:200). Madikwe pottery (Huffman, 2007:201).

8.5.1.8 1650 AD – 1820 AD

The Uitkomst facies (Figure 29) of the Blackburn Branch of the Urewe Ceramic Tradition represents another Iron Age period identified for the surroundings of the study area. This facies can likely be dated to between AD 1650 and AD 1820. The decoration on the ceramics associated with this facies is characterised by stamped arcades, appliqué of parallel incisions, stamping and cord impressions and is described as a mixture of the characteristics of both Ntsuanatsatsi (Nguni) and Olifantspoort (Sotho) (Huffman, 2007).

The Uitkomst pottery is viewed as a combination of Ntsuanatsatsi and Olifantspoort, and with the Makgwareng facies is seen as the successors to the Ntsuanatsatsi facies. The Ntsuanatsatsi facies (represented as "fried egg" patterned stone walling) is closely related to the oral histories of the Early Fokeng people and represents the earliest known movement of Nguni people out of KZN into the inland areas of South Africa. Regarding this theory, the Bafokeng settled at Ntsuanatsatsi Hill in the present-day Free State Province. Subsequently, the BaKwena lineage had broken away from the Bahurutshe cluster and crossed southward over the Vaal River to encounter the Bafokeng. As a result of this contact a Bafokeng-Bakwena cluster was formed, which moved northward and became further 'Sotho-ised' by coming into increasing contact with other Sotho-Tswana groups. According to this theory, this eventually resulted in the appearance of Uitkomst facies type pottery which contained elements of both Nguni and Sotho-Tswana speakers (Huffman, 2007). Huffman states that that the Uitkomst facies is directly associated with the Bafokeng (Huffman, 2007). However, it worth noting that not all researchers agree with this preposition of the Bafokeng origins. In their book on the history of the Bafokeng, Bernard Mbenga and Andrew Mason indicate that the research of Prof. R.J. Mason and Dr. J.C.C. Pistorius "...would indicate that the Bafokeng originated from the Bahurutshe-Bakwena-Bakgatla lineage cluster. Tom Huffman holds a different view..." (Mbenga & Mason, 2010).

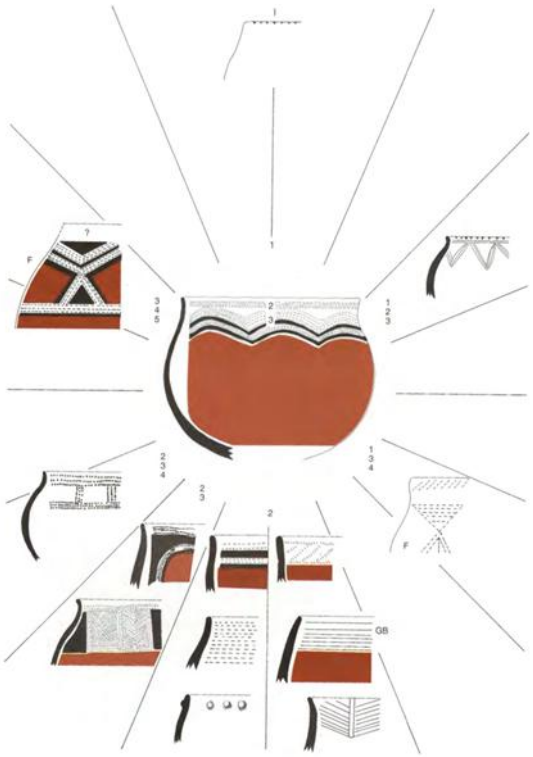


Figure 29: Uitkomst types (Huffman, 2007:172). Uitkomst pottery (Huffman, 2007:173).

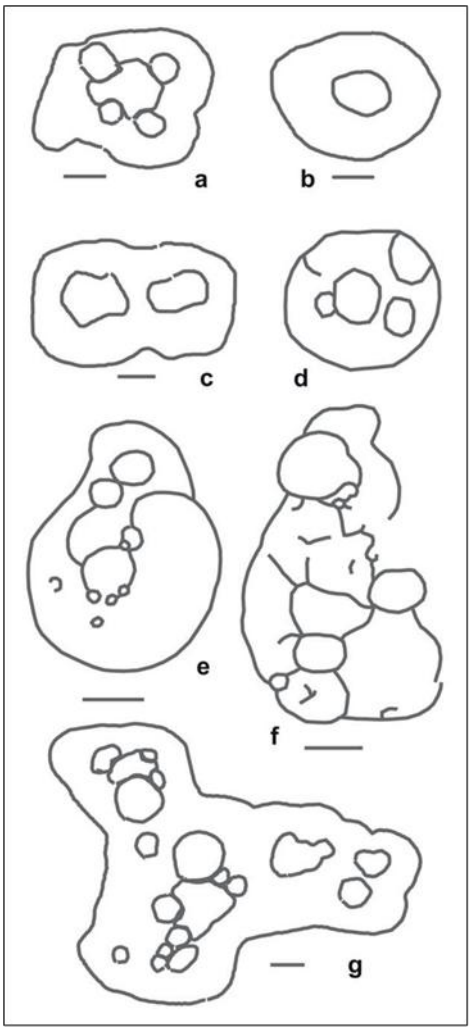


Figure 30: Examples of so-called Group I settlements as published by Sadr & Rodier (2012:3).

The settlement layout as depicted in illustration 'b' provides an example of a simple Type N settlement which has the appearance of a 'fried egg'. Illustration 'a' provides one example of a more elaborate Type N settlement. The settlement layouts as depicted in this figure can be associated with the Ntsuanatsatsi facies and the Bafokeng as well.

8.5.1.9 1700 AD – 1840 AD

The Buispoort facies (Figure 31) of the Moloko branch of the Urewe Ceramic Tradition is the next phase to be identified within the study area's surroundings. It is most likely dated to between AD 1700 and AD 1840. The key features on the decorated ceramics include rim notching, broadly incised chevrons and white bands, all with red ochre (Huffman, 2007).

It is believed that the Madikwe facies developed into the Buispoort facies. The Buispoort facies is associated with sites such as Buffelshoek, Kaditshwene, Molokwane and Olifantspoort (Huffman, 2007). Molokwane is the nearest of these sites to the study area and is located on the farm Selonskraal 317 JQ some 19.5km to the North-West (Pistorius, 1992).

During the early 1980s, Dr. J.C.C. Pistorius conducted archaeological excavations at Molokwane. His research was aimed at "…proving that the site's settlement style is representative of the settlement system of historical and contemporary Sotho-Tswana villages (metse) in its ground plan, composition and

settlement layout." (Pistorius, 1992:1). The available oral history was also assessed in this research, which revealed that Molokwane was the home of the Bakwena Bamodimosa Bammatau from c. 1600 AD to the early 1800s (Pistorius, 1992).

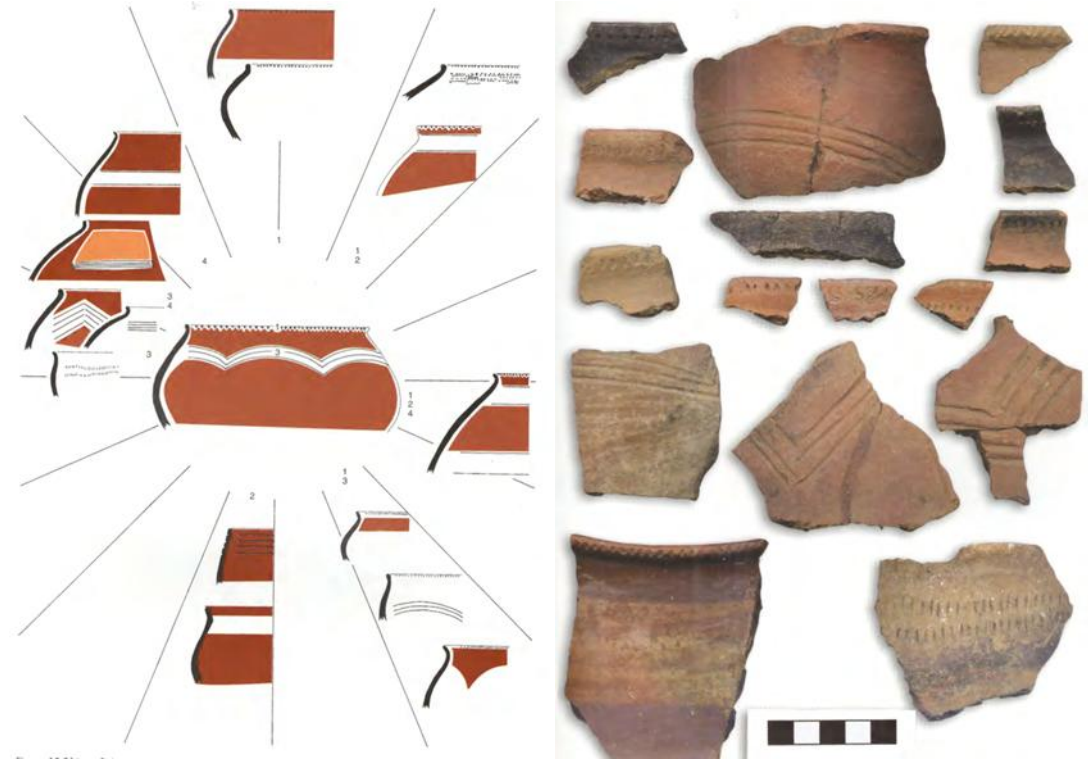


Figure 31: Buispoort types (Huffman, 2007:204). Buispoort pottery (Huffman, 2007:205).

8.5.1.10 C. 1650 – C. 1700

During this time the Bathlako were living in proximity to the area today known as Cullinan, east of Pretoria. During the second half of the seventeenth century Kgosi Thatwe, the Bathlako chief, dispatched a reconnaissance party to the west of his chiefdom to assess the grazing conditions there. His sons Leema, Matutu and Modisane subsequently established themselves at Pharami (Boschoek) before settling along the Toelanie River near Pella.

At Pella the chiefdom was split with Leema and his followers establishing the Batlhako ba Leema chiefdom and Matutu and his followers establishing the Batlhako ba Leemana chiefdom. In turn, the ancestors of the Batloung moved to Mabjanatsiri near the present-day farm Grootwagendrift 233 JP, situated roughly 62 km north-west of the present study area (Breutz, 1957).

Later, the son of Matutu, namely Seutlwane moved with his followers to Maseletsane on the northern end of the Pilwe Hills (Breutz, 1957). The northern end of the Pilwe Hills is situated roughly 68km North-West of the present study area.

8.5.1.11 EARLY 1700S

At the time, and possibly for some time before this date, the area surrounding present-day Rustenburg would have been occupied by the Bafokeng and the Tlokwa people (Hall et al., 2008). Mbenga and Mason (2010) indicate that Prof. R.D. Coertze estimation was that the Bafokeng had settled in the vicinity of Rustenburg at the end of the 17th century. Their land at the time stretched from the "...Ngwaritsi (Selons) River to the west, the Bakwena-ba-Mogopa to the east, the Magaliesberg to the south and the Kgetleng (Elands) River to the north (Mbenga & Mason, 2010: 7).

8.5.1.12 1750S

During the mid eighteenth century the Batlokwa ba ga Sedumedi under Kgosi Mosima Tsele moved from Tlokwe (in proximity to present-day Potchefstroom) to the Pilanesberg. They settled at Bote, which is presently located on the farm of Houwater 54 JQ in the Pilanesberg National Park (Hall et.al., 2008) (Anderson, 2009). While at Bote, Mosima passed away and was succeeded by Monaheng (Hall et.al., 2008) (Anderson, 2009). The farm Houwater is located 64 km north-west of the present study area.

At roughly the same time, the son of Seutlwane, namely Mabe, moved with his followers from Maseletsane on the northern end of Pilwe Hill to Mothoutlung situated on the present-day farm Palmietfontein 208 JP (Breutz, 1953).

8.5.1.13 LATE 1700S

During the reign of kgosi Sekete IV the Bafokeng had "...relations of conflict..." with their Batswana neighbours (Mbenga & Mason, 2010).

8.5.1.14 1760 – 1770

As a result of the conflict between the Bafokeng and its neighbours (including the Batlokwa ba ga Sedumedi), Kgosi Monaheng moved with his people from Bote to Itlholanoga (Hall et.al., 2008) (Anderson, 2009). They remained here from 1760 to 1770 (Anderson, 2009).

Itlholanoga is believed to be located on the present-day farm Doornhoek 91 JQ. Sections of both the Pilanesberg National Park and Sun City are located on this farm. The farm is located 65 km north-west of the present study area.

8.5.1.15 1780 – 1785

The Batlokwa ba ga Sedumedi chiefdom moved from Itlholanoga to Mankwe in c. 1780. The settlement of Mankwe coincided with the rule of Kgosi Taukobong. Mankwe is located on the farm Zwaarverdiend 234 JP. This farm is situated 57 km north-west of the present study area.

8.5.1.16 1785 – 1815 IN C. 1785

Kgosi Taukobong led the Batlokwa ba ga Sedumedi chiefdom from Mankwe to Maruping, which is located in the Pilwe Hills (Anderson, 2009).

A succession battle during the early nineteenth century split the Tlokwa chiefdom in two, with Kgosi Molefe and his followers fleeing approximately 50 km to the west to establish themselves at Kolontwaneng (present day farm Grootfontein 225 JP). Molefe and his followers established the Batlokwa ba ga Bogatsu at Kolontwaneng.

Meanwhile, the balance of the Batlokwa ba ga Sedumedi remained at the Pilwe Hills until 1815 (Anderson, 2009).

8.5.1.17 1815

Under its new leader Bogatsu, the Batlokwa chiefdom moved to Marothodi in 1815. Marothodi is located on the present-day farms of Bultfontein 204 JP, Diamant 206 JP and Vlakfontein 207 JP. Of these, the latter farm is situated nearest to the present study area at a distance of 119 km to the north-west.

While the chief moved to Marothodi, a section of the Batlokwa ba ga Sedumedi remained behind in the Pilwe Hills (Anderson, 2009).

8.5.1.18 C. 1820

During the reign of Bogatsu the Batlokwa became embroiled in another conflict with the Bafokeng. As a result, the Bafokeng, under its chief Moseletsane, marched on the Batlokwa at Pilwe and Marothodi. The

Tlokwe met the Bafokeng on the plain to the west of the Pilwe Hills where the Bafokeng chief was eventually captured and executed by the Batlokwa (Anderson, 2009).

8.5.1.19 C. 1823

The Batlokwa ba ga Sedumedi remained at Marothodi until c. 1823 when they moved to present-day Botswana (Anderson, 2009).

8.5.1.20 1827 – 1832

The Khumalo Ndebele (Matabele) of Mzilikazi established themselves along the Magaliesberg Mountains, having moved here from the central Vaal River. In c. 1832 the Khumalo Ndebele moved to the Marico River (Bergh, 1999).

Dr. J.CC Pistorius interpreted a number of settlement features that he identified some 30 km north-west of the present study area, as a Matabele settlement (Pistorius, 1996).

8.5.1.21 1829 – 1837

During this period, a number of expeditions led by explorers, missionaries, hunters and adventurers travelled through the general surroundings of the study area. These included the expeditions of Robert Schoon & William McLuckie (1829), Robert Moffat (1829), Andrew Smith (1835) and Cornwallis Harris (1836-1837) (Pistorius, 1996).

8.5.1.22 1836

The first Voortrekker parties started crossing the Vaal River (Bergh, 1999).

8.5.1.23 LATE 1830S – EARLY 1840S

These years saw the early establishment of farms by the Voortrekkers in the general vicinity of the study area (Bergh, 1999). One of these Voortrekkers was Stephanus Johannes Paulus (Paul) Kruger, who was President of the Zuid-Afrikaansche Republiek between 1883 and the end of the South African War in 1902. His family formed part of the Voortrekkers who settled in these parts during this time and, in 1841 at the age of 16, Kruger himself became an owner of a farm (Waterkloof) near Rustenburg. He would eventually own a large number of farms in the Rustenburg area, including Boekenhoutfontein 260 JQ (located roughly 48 km north-east of the present study area).

During this period the first contacts between the black people residing in the Rustenburg area at the time (including the Bafokeng) and white people took place. According to Bergh (2005) these early contacts resulted in the setting aside of land by the Voortrekker leadership for the Bafokeng people. This land appears to have included the farms Boekenhoutfontein 260 IQ, Turffontein 262 IQ (located 44 km north-west of the present study area) and possibly Kookfontein 265 IQ (39 km north-west of the study area) as well (Bergh, 2005).

Mbenga (1997) indicates that the relationship between the Voortrekkers and the Bakgatla were initially also amicable. However, within a short period the relationship between the Voortrekkers and the black groups living in the area around Rustenburg became increasingly strained. For example, Bergh (2005) states that the Bafokeng were eventually dispossessed of their farms. The system of unpaid labour enforced by the Voortrekkers on the local black groups would certainly have deteriorated the relationship further. See for example Morton (1992).

8.5.1.24 1851

Both the district and town of Rustenburg were established in this year (Bergh, 1999).

Early 1860s After 1861, Tshomankane Pilane moved with a significant section of the Bakgatla ba ga Kgafela from Saulspoort (on the north-eastern end of what is today known as the Pilanesberg National Park) to

establish himself at a place known as Bopitiko (Breutz, 1953). While some authors indicate that Bopitiko is located on the present-day farm Doornhoek 91 JQ, others (Breutz, 1953) (Schapera, 1965) indicates that Bopitiko was located on the farm presently known as Ledig 90 JQ. These farms are both situated approximately 65 km north-west of the study area.

8.5.1.25 1862

In 1862 Henry Gonin arrived in the Rustenburg District to establish a missionary station for the Dutch Reformed Church. His first mission station was established on the farm Welgeval 171 JQ (Morton, 1992), which is presently located within the Pilanesburg National Park and is located roughly 62 km north-west of the present study area.

8.5.1.26 1867

Hermannsburg missionary Hermann Wenhold established the Kana mission station amongst the Bafokeng. At the time the mission station was established on the farm Tweedepoort 283 JQ (Bergh, 2005). This farm is situated roughly 30 km west of the study area.

8.5.1.27 DECEMBER 1869

The Kana mission station was moved from the farm Tweedepoort 283 JQ to the farm Reinkoyalskraal 278 JQ (Bergh, 2005). This new location for the Kana Mission Station is located 33 km north-west of the study area.

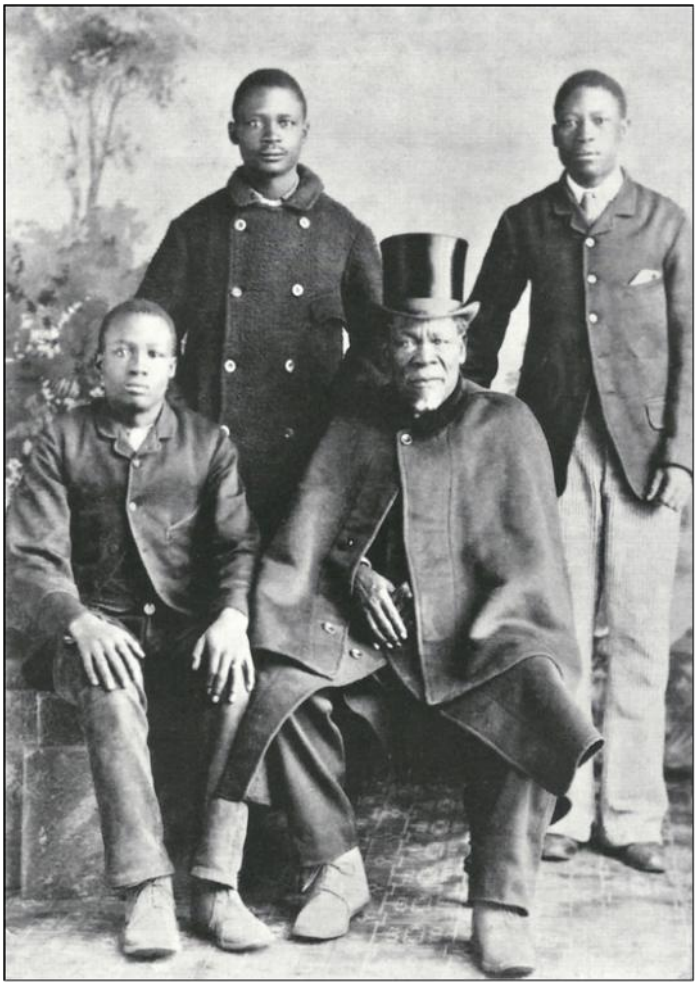


Figure 32: Photograph taken in 1887 of Kgosi Mokgatle and his sons (Mbenga & Manson, 2010).

8.5.1.28 1860S – 1870S

With the assistance provided by German missionary Christoph Penzhorn of the Hermannsburg Missionary Society, Kgosi Mokgatle (Figure 32) and the Bafokeng bought a number of farms in proximity to Rustenburg (Bergh, 2005). These acquisitions were an attempt by the Kgosi and the Bafokeng to procure land that had been theirs before the arrival of the first white people.

Mbenga & Manson (2010) states that the Bafokeng acquired a total of 24 farms during the second half of the 19th century. Of these, the closest farms to the present study area are Turffontein 262 JQ (located 48 km north-west of the present study area), Doornspruit 106 JQ (located 45 km west of the present study area) and Klein Doornspruit 108 JQ (roughly 61 km north-west of the present study area) (Bergh, 2005). The residence of Chief August Mokgatle is also situated about 10 km north of the survey area (Coetzee 2008).

8.5.1.29 1880-1881

The First Boer War (also known as the First War of Independence) took place during this time. The most significant aspect of the war for the town of Rustenburg would have been the besiegement of a company of 2nd Batallion Royal Scots Fusiliers by Boer forces. The siege lasted for 93 days (Wulfsohn, 1992). While the earthwork fort in which the British forces were besieged does not exist anymore, its present location would have been the corner of Kerk and Von Wielligh Streets. This position is some 26 km north-west of the present study area (Wulfsohn, 1992).

8.5.1.30 1899 – 1902

The South African War took place during these years. While no skirmishes or battles are known from within the study area, a number of events and activities associated with the war from the surroundings of the study area are known.

In early 1900 for example, a group of men from Rustenburg were called upon to establish a laager on the drift over the Elands River "…on the present-day main road to Sun City…" (Wulfsohn, 1992:68). This was to prevent an invasion into Rustenburg by the Bakgatla from Saulspoort and Bechuanaland. The men holding the drift included W.T. Dawes, August Schoch, J.S. (Sammy) Mundel and Philip Brink (Wulfsohn, 1992). The location of this drift is roughly 62 km north-west of the present study area.

During the war years the Bakgatla from Saulspoort and Bechuanaland under Kgosi Linchwe I (the son of Kgamanyane Pilane) actively resisted and fought the Boer Commandos and also raided Boer farms across the present-day North West and Gauteng Provinces as far as south of Rustenburg (some sources even indicate that the Kgatla regiments raided farms in the Pretoria District as well). While no clear victors in the fight for the land north of the Elands River emerged, the Bakgatla succeeded in harassing and attacking the Boer forces to the extent that the far north-western areas of the Transvaal Republic were largely left unmanned and unoccupied by Boer forces during much of the war, and especially so as the war progressed. While numerous skirmishes would have taken place around the Pilanesberg as a result of the tug of war between the Boers and Baklgatla, two pitched battles did occur in this area namely at Janskop and Draaiberg (Morton, 1992). These battlefields are located on the northern and north-western ends of the Pilanesberg, and as a result some distance from the present study area.

Apart from the drift over the Elands River, another highly strategic point from the surroundings of the study area during the war years was Boschoek Nek. Situated 52 km north-west of the present study area, this topographic feature represented one of only a few passes through the Magaliesberg Mountains. The strategic importance of the nek was not realised at first by the British authorities, with the Boer forces utilising it with impunity on numerous occasions to move men across the mountain range. Even as late as 21 May 1902, reports were received by the British Command in Rustenburg that a group of 30 Boers had crossed over the nek from the west to carry out raids on the Kana Mission Station and Magatostad (Wulfsohn, 1992).

This said, Boschoek Nek was at least temporarily occupied by several British units during the guerrilla phase of the war. For example, on 9 June 1901, General Dixon occupied the nek with a force comprising three infrantry batallions, several batteries of artillery and numerous mounted horsemen. Boschoek Nek was again held by Colonel Allenby and his men during September 1901 (Wulfsohn, 1992).

Other recorded events include the returning to Rustenburg of a column under the command of Colonel Colenbrander on 10 March 1902 from a patrol of the Elands River beyond Boschhoek. While the details of this patrol are not known, it would have been carried out in the immediate surroundings of the study area.

8.5.1.31 1902

At the end of the South African War the Rustenburg District was divided into three wards, namely Swartruggens, Hex River and Elands River. The current study area fell within the Elands River Ward of the Rustenburg District (Bergh, 1999). During this time, Ramono, the brother of Linchwe I, was installed as kgosi of the Bakgatla ba ga Kgafela living in the then Transvaal (Tlou & Campbell, 1997).

8.5.1.32 1914 -1915

In 1914 the South African government under General Louis Botha decided to assist Great Britain in its war with Germany. A number of Boer leaders were not happy about this turn of events, and when General Koos de la Rey was killed at a roadblock in Johannesburg emotions reached a boiling point and a Boer rebellion broke across the then Transvaal and Free State. This was also true for the wider surroundings of the study area. On 6 and 7 November 1914, for example, a force of 18 rebels attacked the Pilanesberg Police Station, which at the time was held by a single policeman, Constable Petrus Paulus Jacobus (Piet) Botha. The attack did not succeed (Wulfsohn, 1989). While the exact location of this police station is not presently known, Mr Wulfsohn indicates that it was near Sun City.

8.5.1.33 1924

In this year the famous geologist Hans Merensky was shown a sample of platinum ore that a Mr. Andries Lombard had found near Lydenburg. Merensky managed to trace a platinum reef all along the outer edge of the Bushveld Complex from Lydenburg to Rustenburg. This reef was to be known as Merensky Reef (Carruthers, 2007).

The discovery of the Bushveld Complex was of extensive economic significance for South Africa. As indicated by Wikipedia, the Bushveld Igneous Complex "…contains the world's largest reserves of platinum-group-metals (PGMs) – platinum, palladium, osmium, iridium, rhodium, and ruthenium – along with vast quantities of iron, tin, chromium, titanium and vanadium."

The complex was traced along two zones or belts, known as the Western and Eastern Belt. The Western Belt is of significance for the present study. The relevant government survey reports and later studies all indicate that the Western Belt "…extends for about 100 miles as follows: from Brits towards Rustenburg and then northwards, skirting the Pilanesberg on its western side and continuing almost as far as the Crocodile River." See for example The Official Year Book of the Union (1938:862).

The identification of the Bushveld Igneous Complex inter alia between Rustenburg and the west of the Pilanesberg, meant that the surroundings of the study area were increasingly prospected and mined in the years after 1924.

8.5.1.34 DECEMBER 1924

A branch line was opened between Rustenburg and Boschhoek (Higginson, 2014). This development would have stimulated mining exploration and development in areas around Boschhoek.

At the time, the Boschhoek railhead would have been located roughly 50 km north-west of the study area.

8.5.1.35 APRIL 1929

In April 1929, E.R. Schoch published his "Notes on the Nickel and Copper Deposits in the Norite Complex of the Pilansberg, District Rustenburg, Transvaal" in the Journal of the South African Institute of Mining and Metallurgy. This, and other attempts at prospecting and exploring the mineral wealth of the areas to the west of the Pilanesberg, would have stimulated the mineral development of the wider surroundings of the study area.

8.5.1.36 AUGUST 1936

Palmiet Chrome (Pty) Ltd was established in August 1936. It owned 3,807 morgen of chrome rights on the farm Palmietfontein 208 JP (South African Mining Yearbook, 1941/2), situated some 58 km north-west of the present study area.

8.5.1.37 15 JANUARY 1938

Rustenburg Chrome Mines (Pty) Ltd was established on this day and at the time held options on the farm Vogelstruisnek 173 JP (South African Mining Yearbook, 1941/2), situated roughly 77 km north-west of the present study area.

8.5.1.38 1966

In 1966 the Apartheid government forcibly relocated the Bakubung ba Ratheo from Molotestad near Boons (roughly 32 km south of the present study area) to the farms Wydhoek, Ledig and Koedoesfontein. When Bophutatswana was established a decade later, these farms were handed over to the Bantustan (www.wikipedia.org). See also Historia (2000).

8.5.1.39 6 DECEMBER 1977

The South African government granted independence to Bophutatswana on 6 December 1977 (www.wikipedia.org).

8.5.1.40 1977

The Pilanesberg National Park was established in 1977 and during its early years was managed by the then Agricultural Development Corporation of Bophutatswana (Carruthers, 2011).

High level summary of regional sensitivities and features:

The receiving environment holds a rich and layered cultural and historical legacy, spanning from the Early Stone Age through the Iron Age and into the recent past. Archaeological evidence indicates intermittent human occupation dating back over two million years, with artefacts from the Early, Middle, and Late Stone Age phases found in the broader region. The area is particularly significant for its Iron Age ceramic traditions and settlements, attributed to Sotho-Tswana, Nguni, and other groups, with numerous facies representing distinctive periods and cultural affiliations.

Throughout the last several centuries, the landscape witnessed the establishment and migration of various chiefdoms and communities, including the Bafokeng, Batlokwa, Bakgatla, and Batloung, whose histories are closely linked to the evolution of local settlement patterns, land use, and socio-political dynamics. The colonial era introduced significant changes, including the arrival of Voortrekkers, subsequent land dispossession, and the establishment of farms, towns, and mission stations during the 19th century. The region was further shaped by the impacts of the Anglo-Boer wars, forced removals during apartheid, and the development of mining and conservation areas.

These layers of occupation and transformation have left tangible and intangible heritage resources, including archaeological sites, historical settlements, graves, and cultural landscapes. Many of these features are potentially older than 60 years and are thus protected under the National Heritage Resources Act (Act 25 of 1999). The area's complex history and ongoing land use changes underscore the need for

careful consideration of cultural heritage sensitivities in any proposed development, to ensure compliance with heritage legislation and the respectful management of historically significant sites and traditions.

8.5.2 ARCHIVAL AND HISTORICAL MAPS

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were studied to identify structures, possible Burial Ground and Graves (BGG) or archaeological sites present in the footprint area.

Historical topographic maps (1:50 000) and orthophotos for various years (1960 and 1968) were available for utilisation in the background study. These maps were assessed to observe the development of the area, as well as the location of possible historical structures and BGG. The study area was overlain on the map sheets to identify structures or graves situated within or immediately adjacent to the study area that could possibly be older than 60 years and thus protected under section 34 and 36 of the NHRA.

Figure 33 indicates several potential heritage features including mining infrastructure, shafts, huts and homesteads, trig beacons and farming infrastructure. No Late Iron Age (LIA) walling is indicated however, the orthophoto (Figure 34) indicates a large kraal on the eastern side of the koppie in the present study area. Google satellite imagery for various years (2004-2025) indicates a vast network of LIA walling particularly on the southern and eastern side of the koppie during seasons with low vegetation cover (Figure 35). LIA walling of smaller extent is present on and north of the koppie. Overall, the progression of occupancy of the area during the Iron Age was succeeded by large-scale farming and eventually by mining, with each phase leaving its traces upon the landscape.

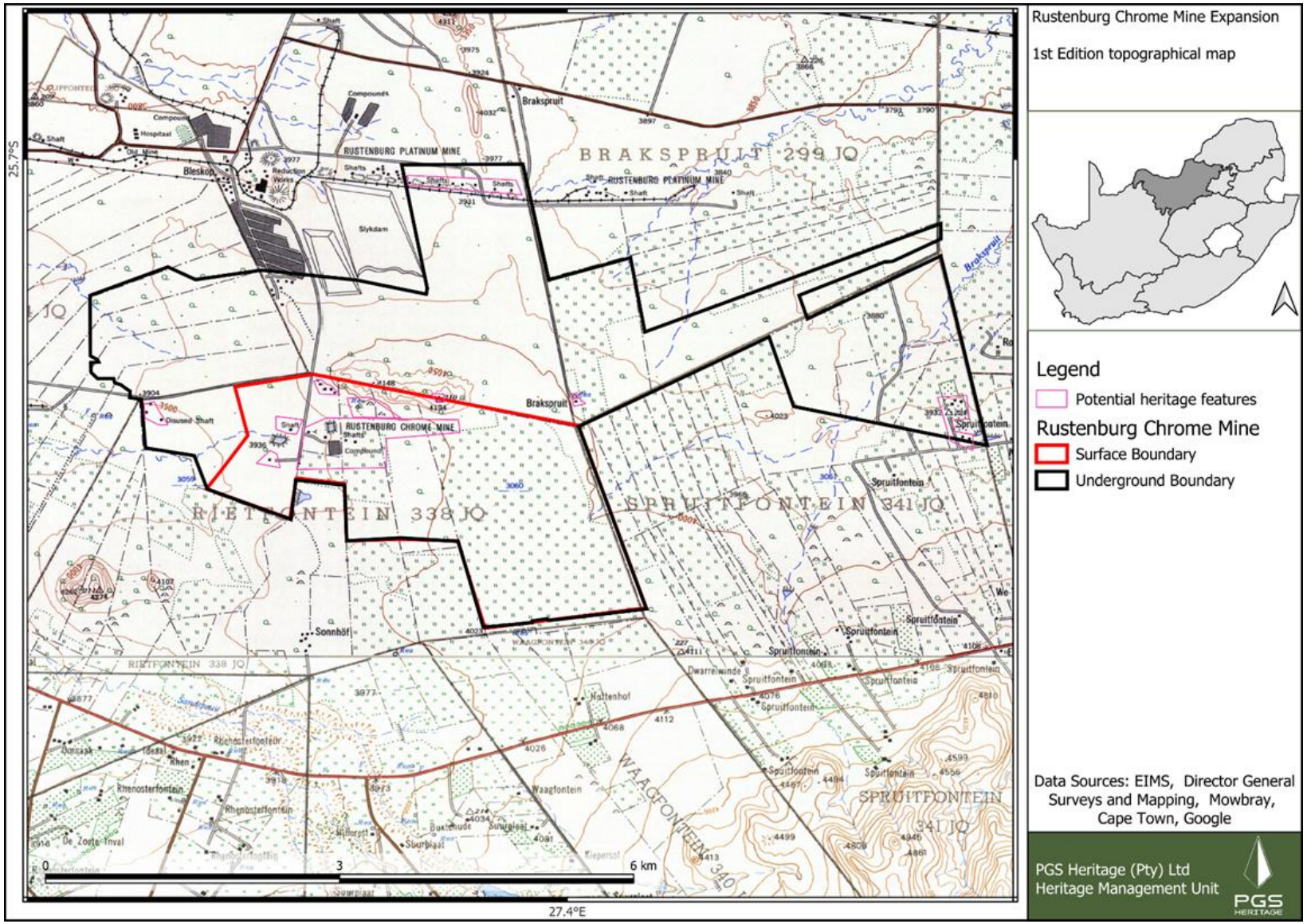


Figure 33: First Edition topographical map 2527CB (1968) with potential hearitage features highlighted in pink.

Figure 34: Historical orthophoto (1960) of the area, with a zoomed in section of LIA walling visible on the eastern side of the koppie.

Figure 35: Iron Age walling identified through satellite imagery.

8.6 PALAEONTOLOGY

Cultural Heritage in South Africa, including all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include "all objects recovered from the soil or waters of South Africa, including archaeological and **palaeontological objects** and material, meteorites and rare geological specimens". Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

8.6.1 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The geology of the study area is depicted on the 1:250 000 Rustenburg 2526 (1981) Geological Map (Council for Geosciences, Pretoria) (Figure 36, Table 20Table 20). The entire study area is underlain by Mathlagame Norite-Anorthosite (Vcm, green) and Bronzitite, Harzburgite and Norite (Vl, green) of the Rustenburg Layered Suite (Bushveld Complex). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Rustenburg Layered Suite (Bushveld Complex) is Zero (grey) (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014). The suggested location is classified as having a Medium (orange) Palaeontology Theme Sensitivity in the DFFE (Department of Forestry Fisheries and the Environment) Screening Report (Figure 37).

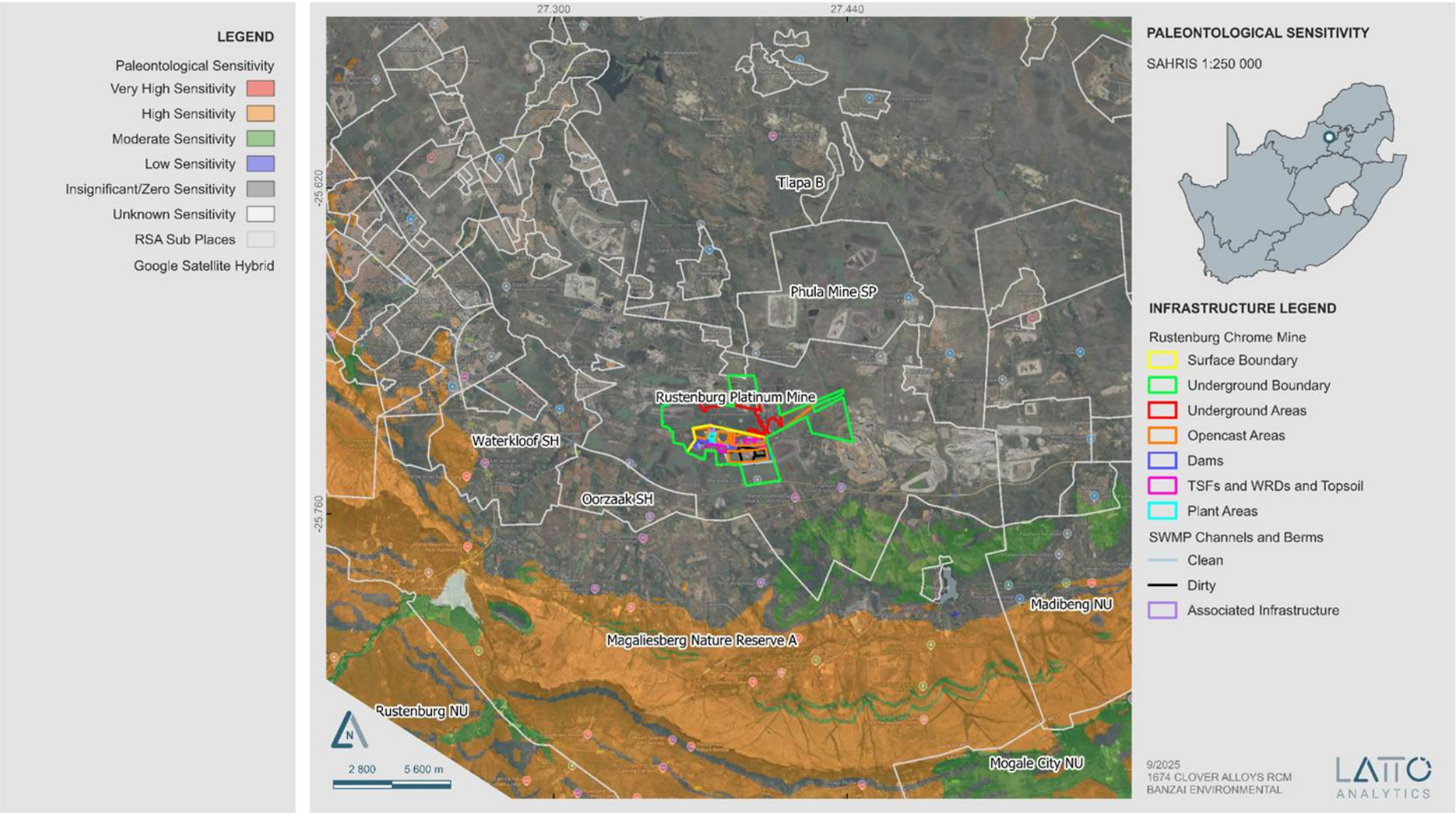


Figure 36: Extract of the SAHRIS PalaeoMap (Council of Geosciences, Pretoria indicting the Zero (grey) Palaeontological Sensitivity of the proposed Rustenburg Mine Expansion in the North West Province.

Table 20: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	**INSIGNIFICANT/ZERO**	**No palaeontological studies are required**
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The SAHRIS Palaeosensitivity map indicates that the proposed development is underlain by sediments with a Zero (grey) Palaeontological Sensitivity, while the DFFE Screening tool indicates a Medium (orange) Palaeontological Sensitivity. The above-mentioned Palaeontological Sensitivities required a desktop assessment being conducted and thus the Palaeontological Sensitivity was not verified by a site investigation. However, desktop research has indicated that the proposed Mine Expansion has a Low to Zero Palaeontological Sensitivity.

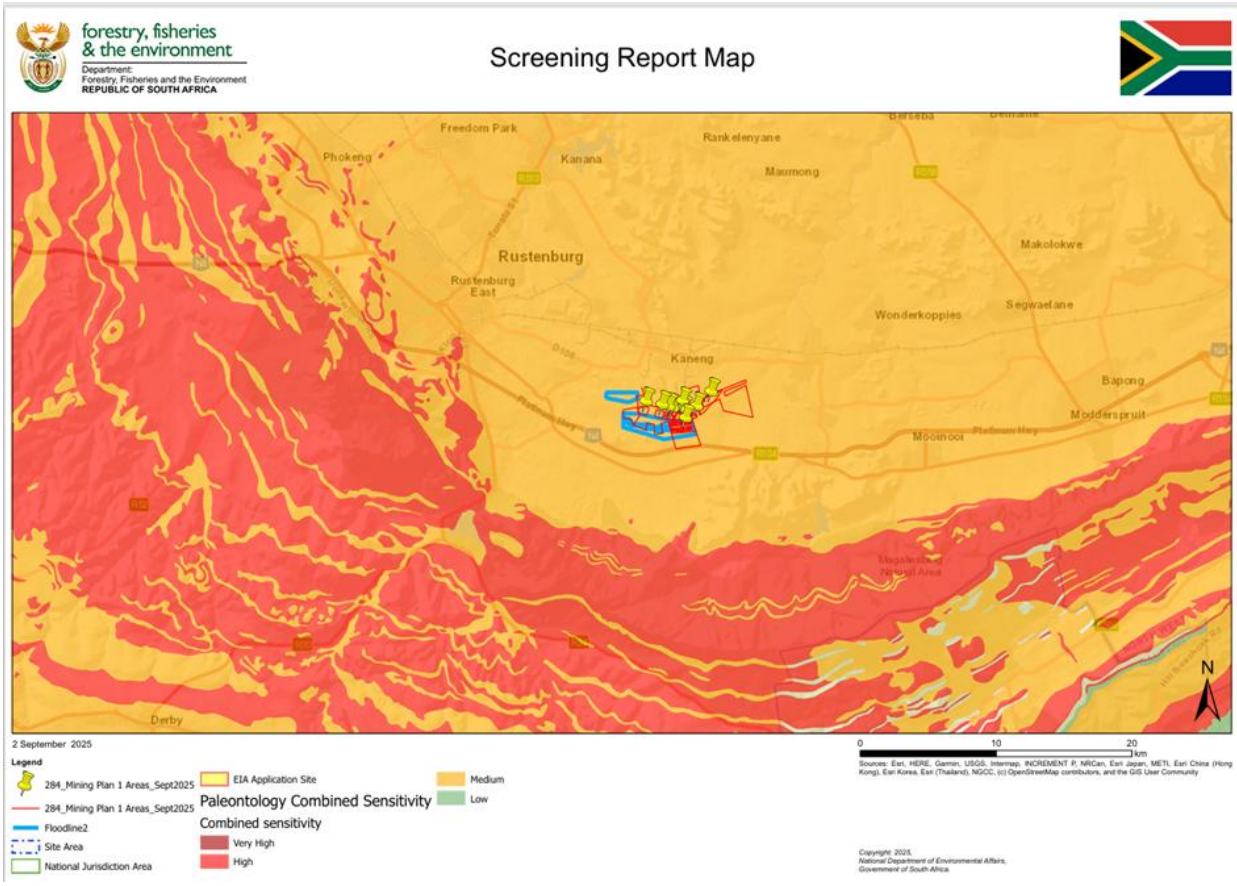


Figure 37: Palaeontological Sensitivity of the study area by the National Environmental Web-based Screening Tool indicates a medium (orange) Palaeontological Sensitivity.

The Bushveld Complex comprise of the largest mafic intrusion in the world and underlie an area of almost 65 000 km^2. The maximum thickness of these rocks is almost 8 km while individual layers can be followed for about 150 km. This intrusion is world renowned for the ore reserves of platinum-group elements namely chromium and vanadium. The Bushveld Complex is divided in 4 groups namely the Lebowa Granite Suite, Rashoop Granophyre Suite, Rustenburg Layered Suite and Rooiberg Group (Table 21Table 21). The latter Group of felsic and minor volcanic rocks may be genetically closer related to the Bushveld event as to the Transvaal Supergroup (Hutton and Schweitzer, 1995). The Rustenburg Layered Suite reveals a complete differentiation sequence of magma and is made up of various rock layers ranging from dunite, gabbro, norite, and pyroxenite, and anorthosite to magnetite and apatite- rich diorite.

Table 21: Currently accepted nomenclature and subdivisions of the Bushveld Complex (Cawthorn et al, 2006).

	Standard zonal subdivision (informal)		Nomenclature recommended by SACS (1980), including subsequent additions					
	All areas		Eastern limb		Western limb		Northern limb	
RUSTENBURG LAYERED SUITE	Upper Zone	Subzone C	Roossenekal Subsuite[1]	Luipershoek Olivine Diorite		Bierkraal Magnetite Gabbro		Molendraai Magnetite Gabbro[1]
		Subzone B		Ironstone Magnetite Gabbro				
		Subzone A		Magnet Heights Gabbronorite				
	Main Zone	Upper Subzone[4]	Dsjate Subsuite[1]	Mapoch Gabbronorite		Pyramid Gabbronorite		Mapela Gabbronorite[1]
		Lower Subzone		Leolo Mountain Gabbronorite				
				Winnaarshoek Norite-Anorthosite				
	Critical Zone	Upper Subzone	Dwars River Subsuite[1]	Winterveld Norite-Anorthosite	Schilpadnest Subsuite[1]	Mathlagame Norite-Anorthosite		Grasvally Norite-Anorthosite[1]
		Lower Subzone		Mooihoek Pyroxenite		Ruighoek Bronzitite		
	Lower Zone[3]	Upper Pyroxenite Subzone	Croydon Subsuite[1]	Serokolo Bronzitite	Vlakfontein Subsuite[1]	Tweelaagte Bronzitite	Zoetveld Subsuite[1]	Moorddrift Harz-burgite-Pyroxenite[2]
		Harzburgite Subzone		Jagdlust Harzburgite		Groenfontein Harzburgite		Drummondlea Harzburgite[2]
		Lower Pyroxenite Subzone		Rostock Bronzitite		Makgope Bronzitite		Volspruit Pyroxenite[2]
				Clapham Bronzitite		Eerlyk Bronzitite		
	Marginal Zone			Shelter Norite		Kroondal Norite / Kolobeng Norite		

[1]Walraven (1986)
[2]Hulbert and Von Gruenewaldt (1982)
[3]Teigler and Eales (1996) suggested that the top of the Lower Zone be taken at the top of the Harzburgite Subzone
[4]Kruger (1994) proposed, on the basis of initial Sr isotopic ratios, that the Upper Subzone of the Main Zone should be included in the Upper Zone

The Bushveld Complex is thus igneous in origin and thus unfossiliferous.

8.6.2 FINDINGS OF THE BASELINE PALAEONTOLOGICAL STUDY

The proposed Rustenburg Chrome Mine Project in North-West Province is underlain by Mathlagame Norite-Anorthosite and Bronzitite, Harzburgite and Norite of the Rustenburg Layered Suite (Bushveld Complex). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Rustenburg Layered Suite (Bushveld Complex) is Zero (Almond and Pether, 2009; Almond et al., 2013, Groenewald et al 2014). The suggested location is classified as having a Medium Palaeontology Theme Sensitivity in the DFFE (Department of Forestry Fisheries and the Environment) Screening Report. Updated Geology (Council of Geosciences) refined the geological map and indicate that the proposed

development is underlain by the Schilpadnest and Vlakfontein Subsuite (Rustenburg Layered Subsuite of the Bushveld Complex).

Desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest in the development area is rare.

8.7 TERRESTRIAL BIODIVERSITY

8.7.1 ECOLOGICALLY IMPORTANT LANDSCAPE FEATURES

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 22.

Table 22: Summary of relevance of the proposed project to ecologically important landscape features.

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with an EN and LC Ecosystem.	8.7.1.1
Ecosystem Protection Level	Relevant – Overlaps with a PP Ecosystem.	8.7.1.2
Provincial Conservation Plan	Relevant – The PAOI overlaps with CBA 2, ESA 1 and ESA 2.	8.7.1.3
Protected Areas	Relevant – Located within the Magaliesberg Biosphere Reserve 'Transition' zones, and approximately 8 km north of the Magaliesburg Protected Natural Environment.	8.7.1.4
National Protected Areas Expansion Strategy (NPAES)	Relevant – The PAOI overlaps with NPAES Priority Focus Areas.	8.7.1.5
Key Biodiversity Areas (KBA)	Relevant – The PAOI is situated 2 km from the Magaliesberg KBA.	8.7.1.6
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Relevant – The PAOI does not overlap with any SAIIAE wetlands or Rivers.	8.8.1.1
National Freshwater Priority Area (NFEPA)	Relevant – The PAOI overlaps with non-priority FEPA wetlands.	8.8.1.2
Aquatic Critical Biodiversity Area	Relevant – The PAOI overlaps with ESA 1 and ESA 2.	8.8.1.3
Strategic Water Source Areas (SWSA)	Relevant – The PAOI overlaps with the Kroondal/Marikana Groundwater SWSAs.	8.8.1.4
Mining and Biodiversity Guidelines	Relevant – According to the Mining and Biodiversity Guidelines spatial dataset (2013), the PAOI is of medium and high BI and there is therefore a correlating medium and high risk for mining.	8.7.1.7

8.7.1.1 ECOSYSTEM THREAT STATUS

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), based on the proportion of the original extent of each ecosystem

type that remains in good ecological condition. According to the spatial dataset the proposed project overlaps with an EN and LC Ecosystem (Figure 38).

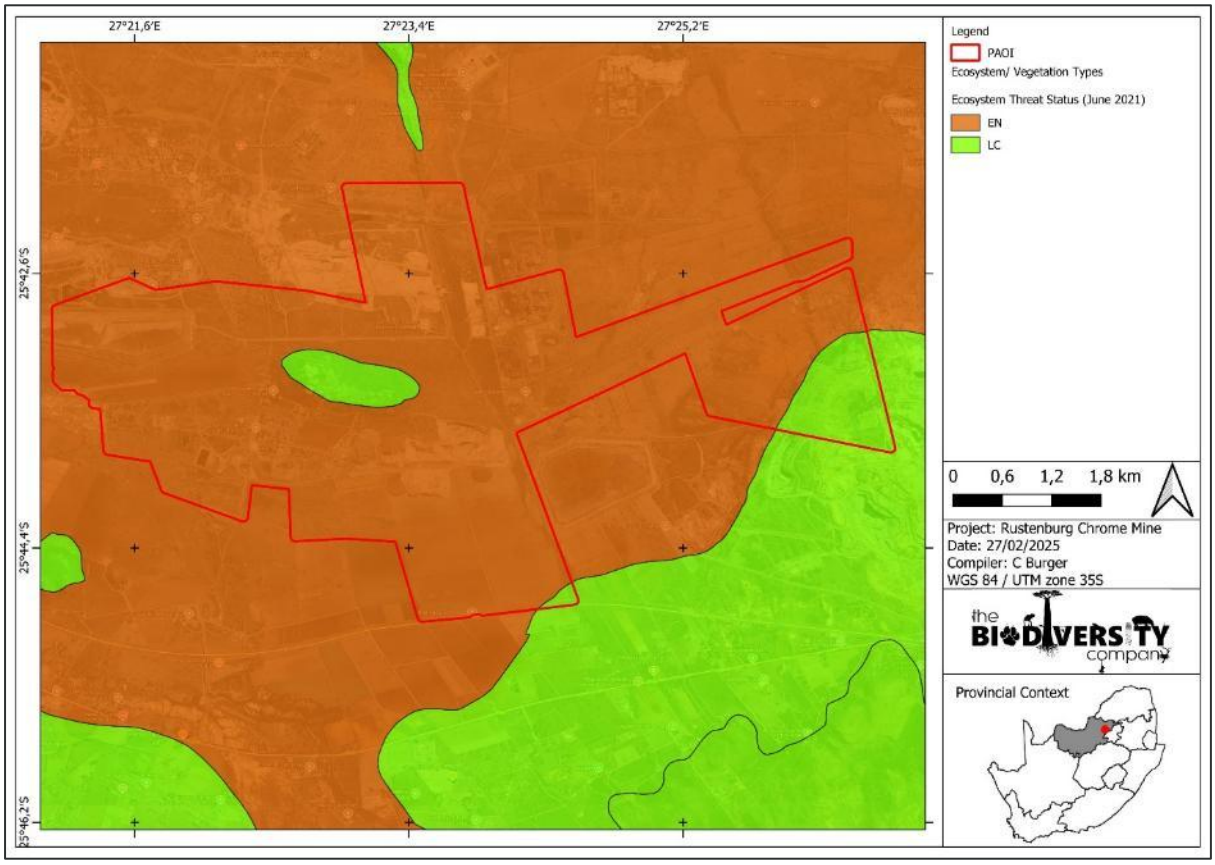


Figure 38: Map illustrating the ecosystem threat status associated with the PAOI.

8.7.1.2 ECOSYSTEM PROTECTION LEVEL

The Ecosystem Protection Level Status is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a PP ecosystem (Figure 39).

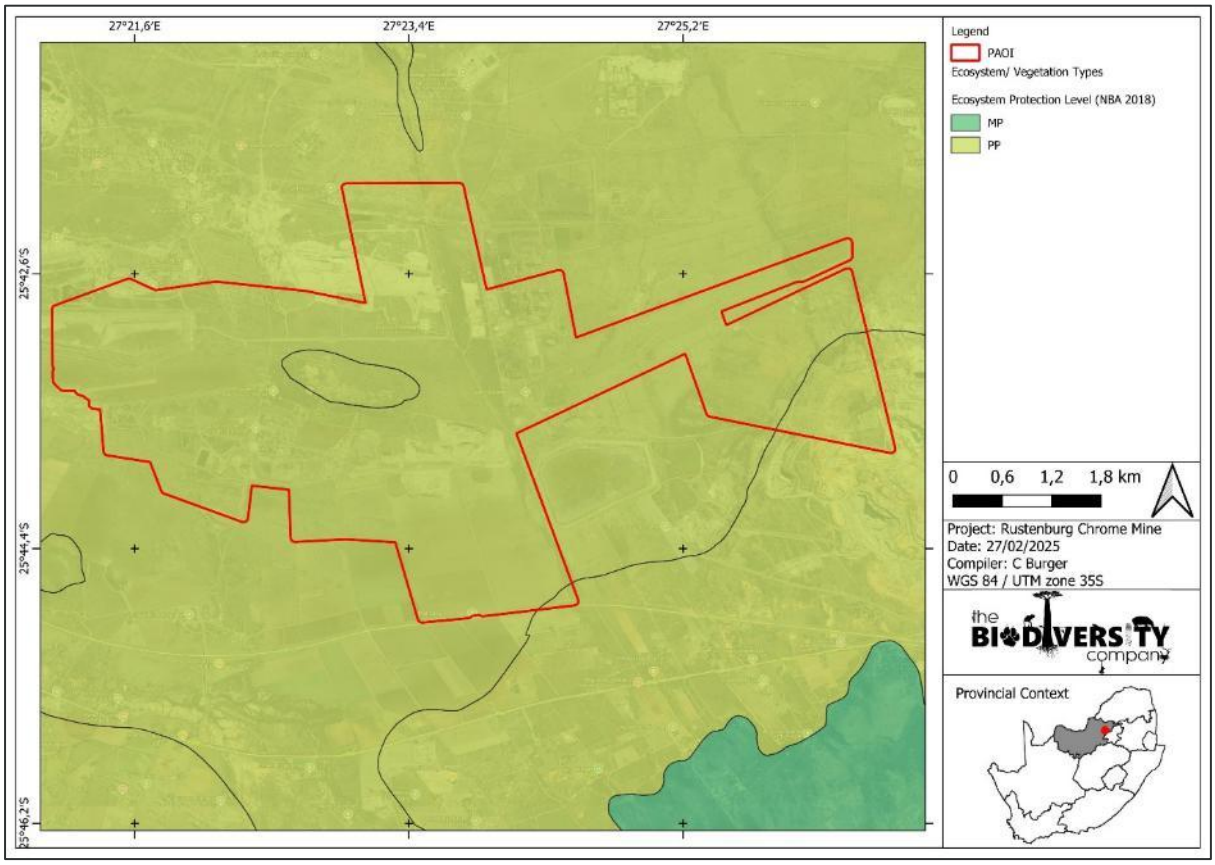


Figure 39: Map illustrating the ecosystem protection level associated with the PAOI.

8.7.1.3 CRITICAL BIODIVERSITY AREAS AND ECOLOGICAL SUPPORT AREAS

The conservation of CBAs is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017).

The purpose of the North-West Biodiversity Sector Plan (NWBSP) (2015) is to inform land-use planning and development on a provincial scale and to aid in natural resource management. One of the outputs is a map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These are classified into different categories, namely CBA1 areas, CBA2 areas, ESA1 areas and ESA2 areas based on biodiversity characteristics, spatial configuration, and requirements for meeting targets for both biodiversity patterns and ecological processes. Figure 40 shows the PAOI superimposed on the Terrestrial CBA maps. The PAOI overlaps with CBA 2, ESA 1 and ESA 2.

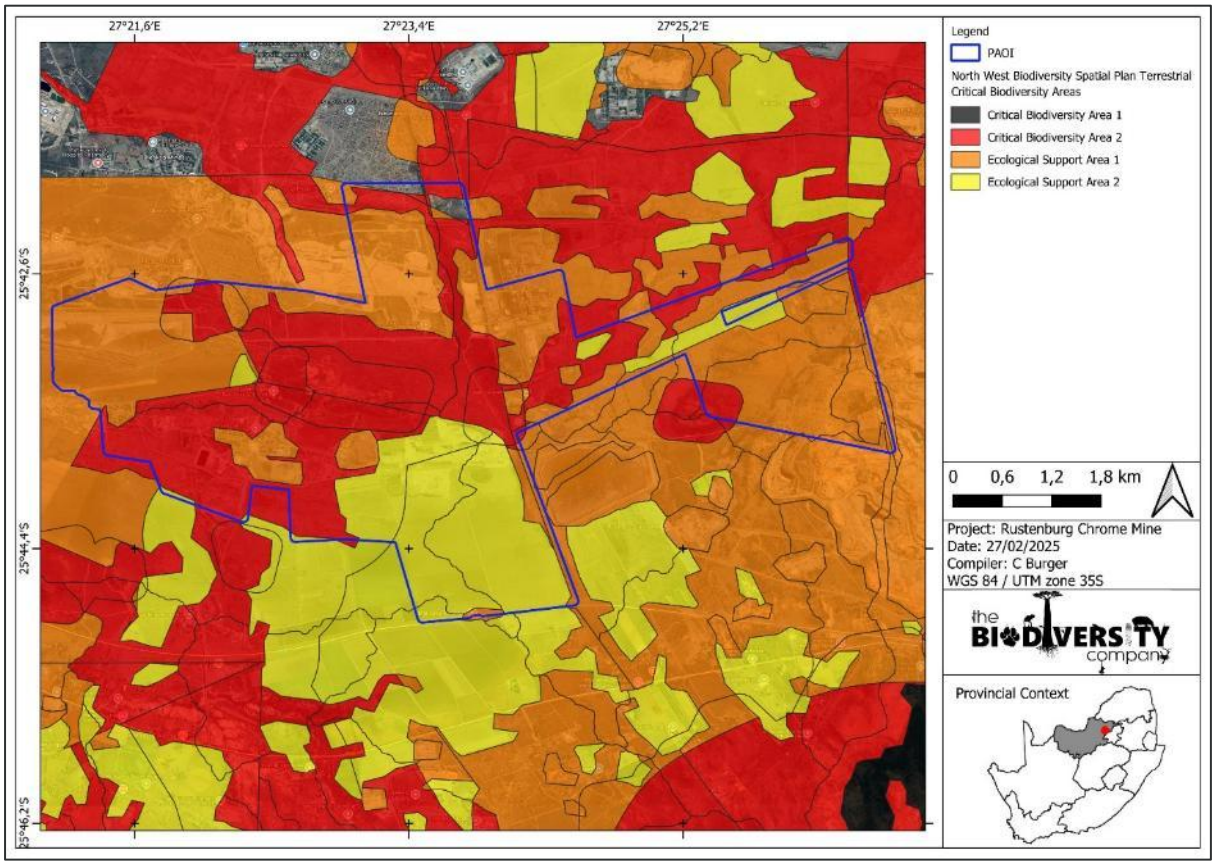


Figure 40: Map illustrating the locations of CBAs in the PAOI

8.7.1.4 PROTECTED AREAS

According to the protected area spatial datasets from SAPAD (2024) and SACAD (2024), the PAOI is located within the Magaliesberg Biosphere Reserve 'Transition' zones, and approximately 8 km north of the Magaliesburg Protected Natural Environment (Figure 41).

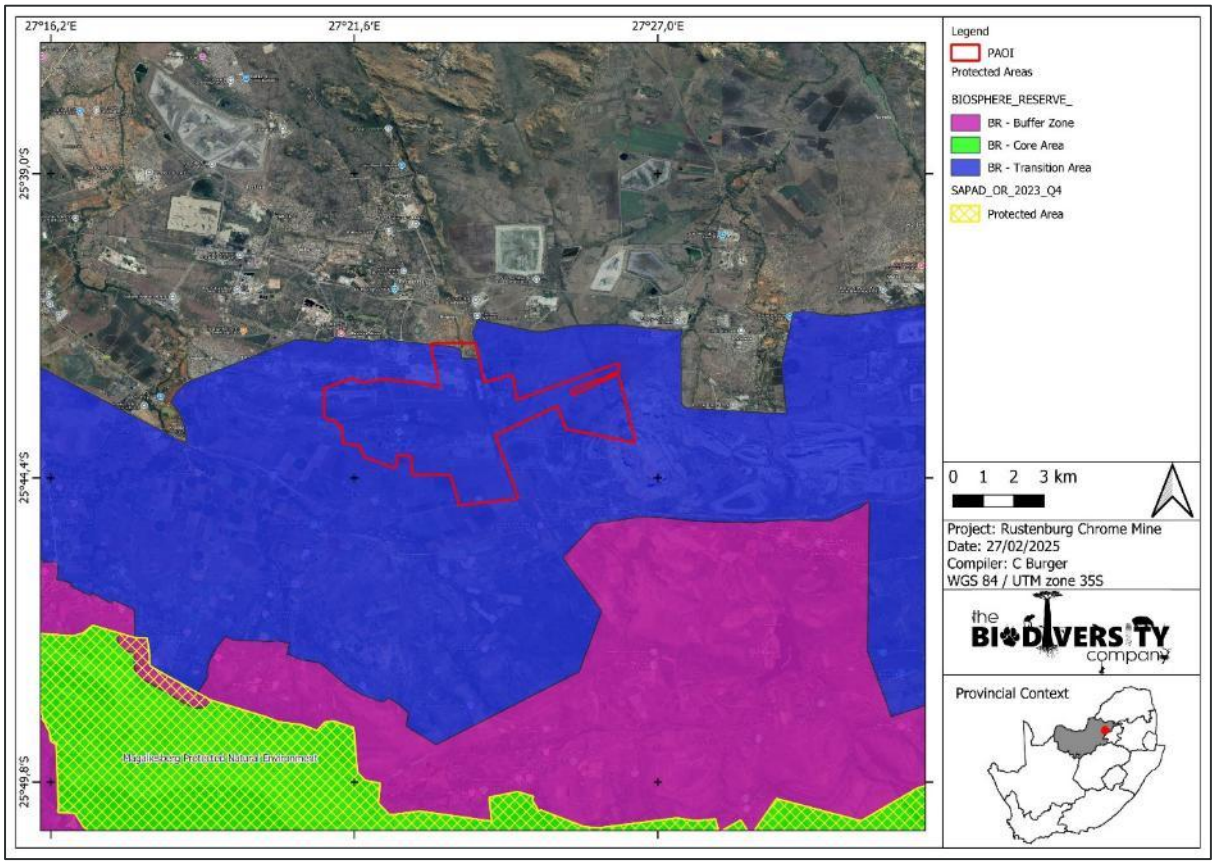


Figure 41: The PAOI in relation to the protected areas

8.7.1.5 NATIONAL PROTECTED AREA EXPANSION STRATEGY

National Protected Area Expansion Strategy 2016 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The PAOI overlaps with NPAES Priority Focus Areas (Figure 42).

Figure 42: The PAOI in relation to the National Protected Area Expansion Strategy

8.7.1.6 KEY BIODIVERSITY AREAS

A new set of Key Biodiversity Areas (KBA) specific to South Africa has been identified using the Global Standard for the Identification of Key Biodiversity Areas version 1.2 (IUCN 2016), applied to South African species and ecosystems. KBAs are critical sites that play a vital role in maintaining global biodiversity by serving as essential habitats for species. The identification of KBAs enables governments and civil society to pinpoint key locations crucial for species and their habitats worldwide. This understanding facilitates collaborative efforts to manage and conserve these areas, thereby safeguarding global biological diversity and supporting international biodiversity objectives.

Unlike the Important Bird Areas (IBAs), which primarily focus on birds, the KBA framework encompasses a broader spectrum of biodiversity, including mammals, amphibians, plants, and other taxa. BirdLife South Africa (BLSA), in consultation with the KBA National Coordination Group, has opted to retire IBAs and integrate KBAs into its conservation strategy. This strategic shift acknowledges the necessity of investing resources effectively to protect avian and other macroecological elements at the site level within a comprehensive framework of biodiversity conservation (KBA NCG, 2024).

The PAOI is situated 2 km from the Magaliesberg KBA (Figure 43).

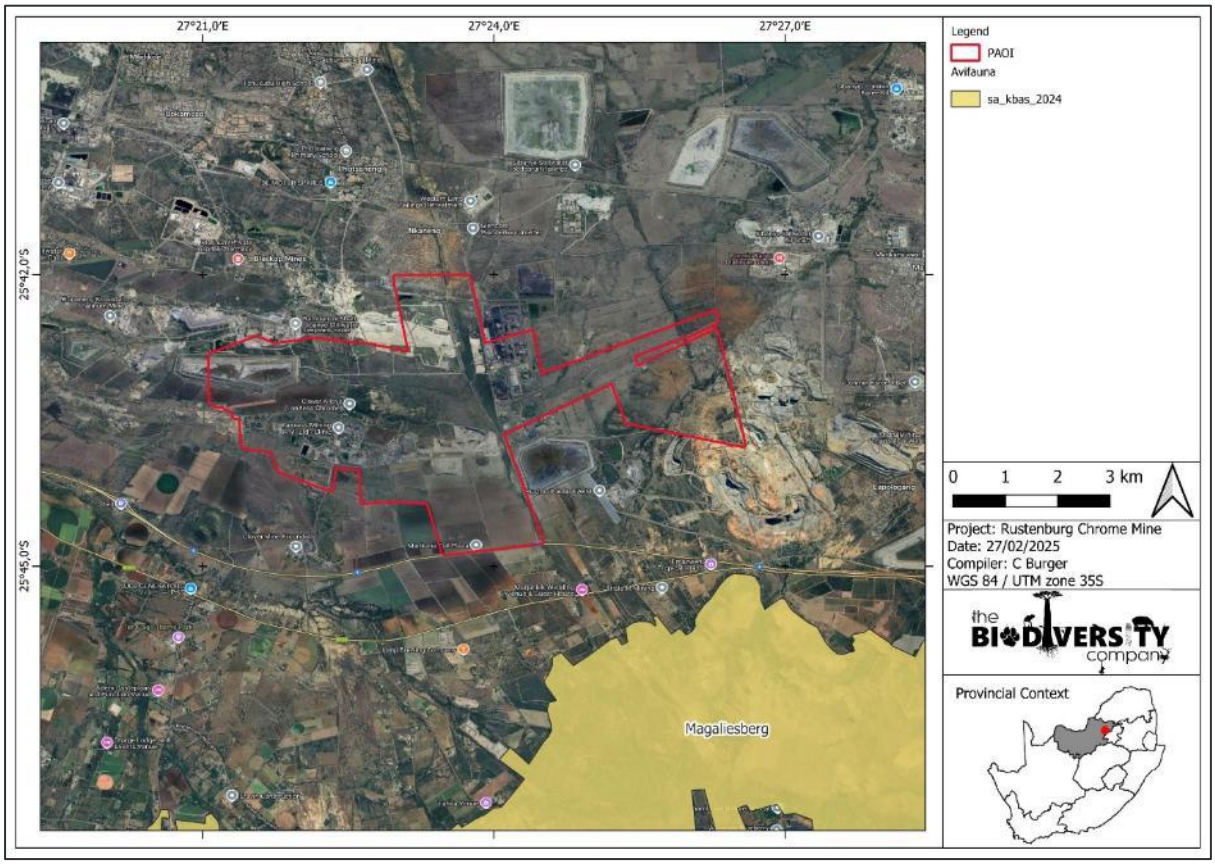


Figure 43: The PAOI in relation to the nearest KBAs.

8.7.1.7 MINING AND BIODIVERSITY GUIDELINES

According to the Mining and Biodiversity Guidelines spatial dataset (2013), the PAOI is of medium and high BI and there is therefore a correlating moderate and high risk for mining (Figure 44).

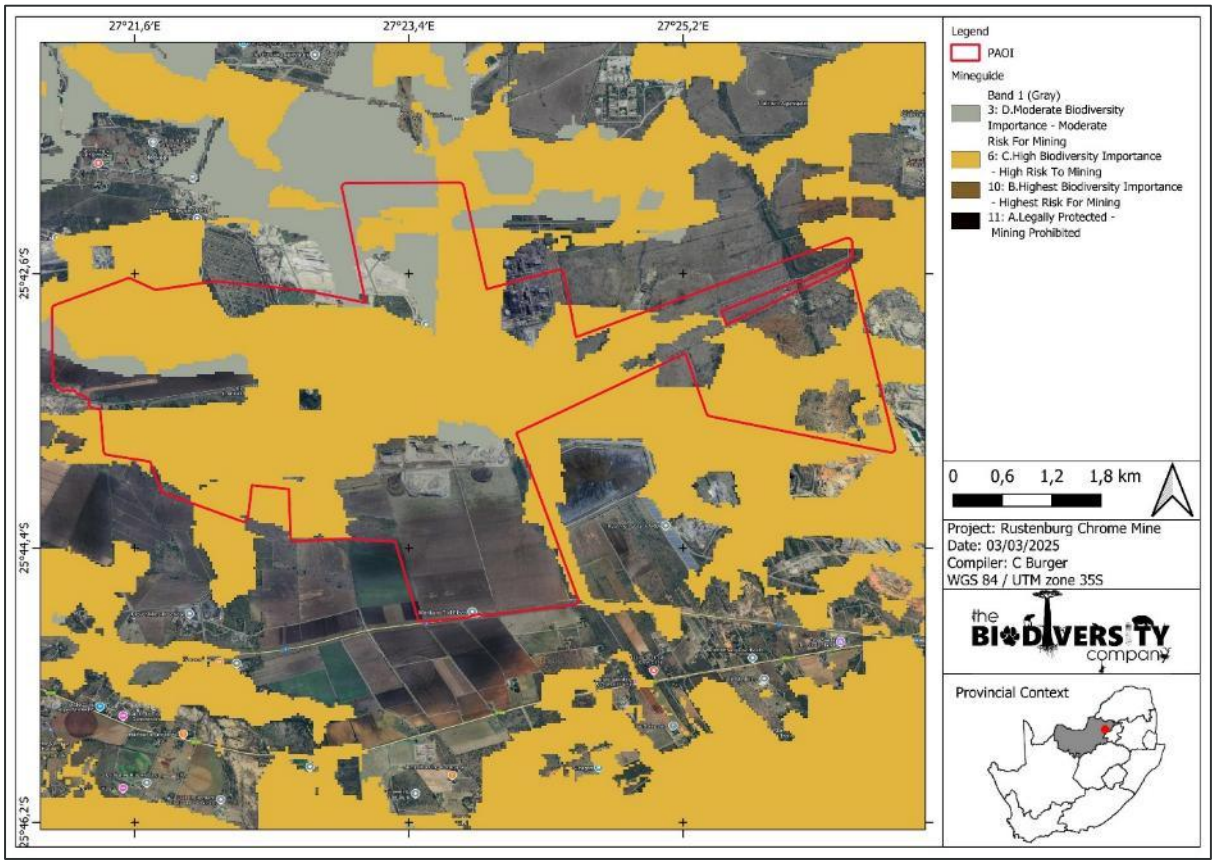


Figure 44: The PAOI in relation to the Mining and Biodiversity Guidelines.

8.7.2 FLORA ASSESSMENT

This section is divided into a description of the vegetation type expected to occur under natural conditions and the expected flora species.

8.7.2.1 VEGETATION TYPE

The PAOI is situated in the Savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include a seasonal precipitation and a sub-tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer (Mucina & Rutherford, 2006). At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include *Vachellia* and *Albizia*) and a generally dense herbaceous layer (Scholes & Walker, 1993).

On a fine-scale vegetation type, the PAOI overlaps with the Marikana Thornveld, Moot Plains Bushveld and Norite Koppies Bushveld vegetation types (Figure 45).

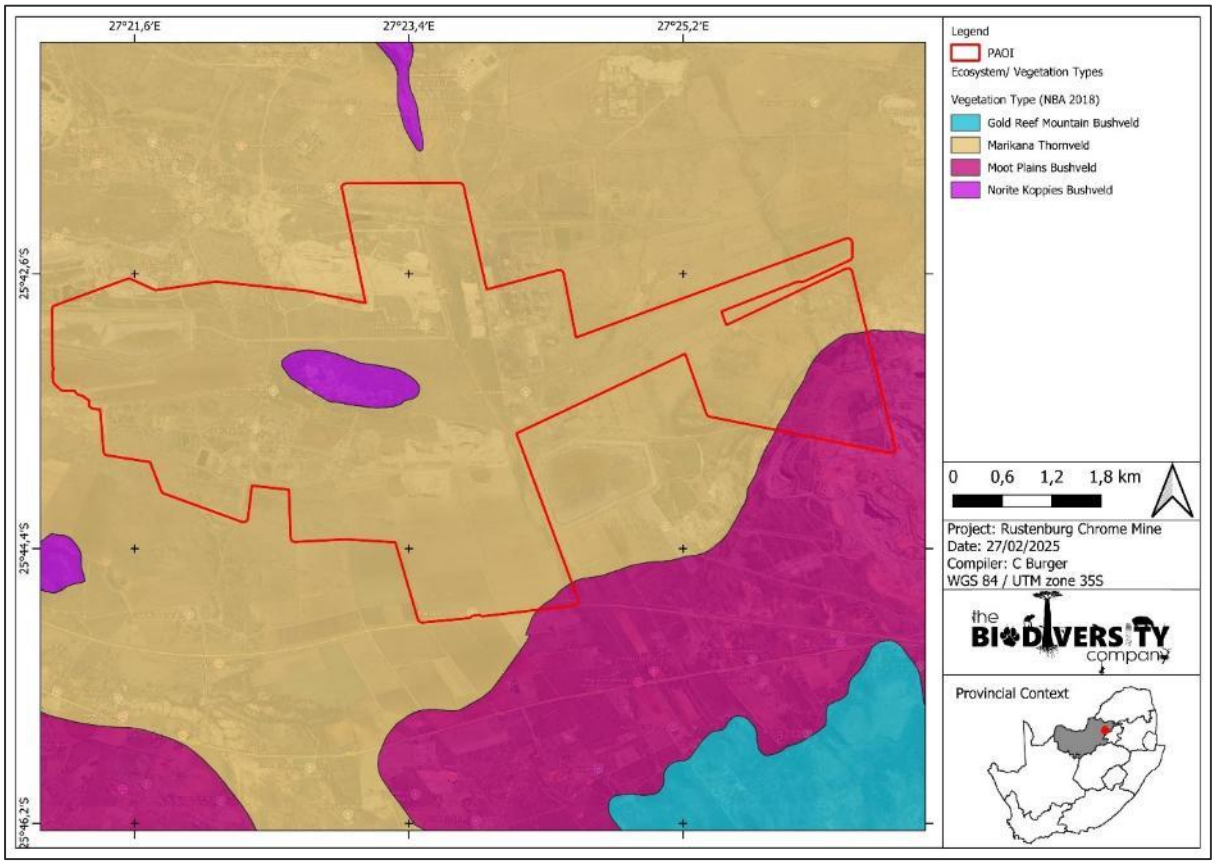


Figure 45: Map illustrating the vegetation types associated with the PAOI.

8.7.2.1.1 MARIKANA THORNVELD

Marikana Thornveld extends on the broad plains from Rustenburg in the West, through Marikana and Brits, and towards Pretoria in the East (Mucina & Rutherford, 2006). It is characterised by open *Vachellia karroo* woodland, which occurs in valleys and on undulating plains and hills (Mucina & Rutherford, 2006). Fire-protected habitats, such as drainage lines, rocky outcrops and termitaria are typically dominated by denser, shrub-dominated vegetation (Mucina & Rutherford, 2006).

Important Plant Taxa in the Marikana Thornveld

Based on Mucina and Rutherford's (2006) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant) or are prominent in the landscape within a particular vegetation type. They note the following species are important taxa in the Marikana Thornveld vegetation type:

- **Tall Tree**: *Senegalia burkei.*
- **Small Trees**: *Senegalia caffra, Vachellia gerrardii, Vachellia karroo, Combretum molle, Searsia lancea, Ziziphus mucronata, Vachellia nilotica, Vachellia tortilis subsp. heteracantha, Celtis africana, Dombeya rotundifolia, Pappea capensis, Peltophorum africanum, Terminalia sericea.*
- **Tall Shrubs**: *Euclea crispa subsp. crispa, Olea europaea subsp. africana, Searsia pyroides var. pyroides, Diospyros lycioides subsp. guerkei, Ehretia rigida subsp. rigida, Euclea undulata, Grewia flava, Pavetta gardeniifolia.*
- **Low Shrubs**: *Asparagus cooperi, Rhynchosia nitens, Indigofera zeyheri, Justicia flava.*
- **Woody Climbers**: *Clematis brachiata, Helinus integrifolius.*
- **Herbaceous Climbers:** *Pentarrhinum insipidum, Cyphostemma cirrhosum*.

- **Graminoids**: *Elionurus muticus, Eragrostis lehmanniana, Setaria sphacelata, Themeda triandra, Aristida scabrivalvis subsp. scabrivalvis, Fingerhuthia africana, Heteropogon contortus, Hyperthelia dissoluta, Melinis nerviglumis, Pogonarthria squarrosa.*
- **Herbs**: *Hermannia depressa, Ipomoea obscura, Barleria macrostegia, Dianthus mooiensis subsp. mooiensis, Ipomoea oblongata, Vernonia oligocephala.*
- **Geophytic Herbs**: *Ledebouria revoluta, Ornithogalum tenuifolium, Sansevieria aethiopica.*

Conservation Status

According to Mucina and Rutherford (2006), this vegetation type is classified as Endangered, with its national conservation target being 19%. Over 48% has already been transformed by urban expansion and cultivation, and alien invasive plants occur in high densities, especially along drainage lines (Mucina & Rutherford, 2006). Erosion is very low to moderate (Mucina & Rutherford, 2006). Less than 1% is conserved in the Magaliesberg Nature Area, De Onderstepoort Nature Reserve and other reserves. Erosion is very low to moderate (Mucina & Rutherford, 2006).

8.7.2.1.2 MOOT PLAINS BUSHVELD

The main belt of the Moot Plains Bushveld extends from the Selons River Valley south of the Magaliesberg, through Maanhaarrand and the valley bottom of the Magalies River, east of the Hartebeestpoort Dam between the Magaliesberg and Daspoort mountain ranges and to Pretoria (Mucina & Rutherford, 2006). It is characterised by low-lying savanna dominated by *Vachellia* sp. occurring on the bottomlands and plains, or woodlands on the lower hillsides vary in height and density (Mucina & Rutherford, 2006). Grasses dominate the herbaceous layer (Mucina & Rutherford, 2006).

Important Plant Taxa

Mucina and Rutherford (2006) noted the following species as important taxa in the Moot Plains Bushveld:

- **Small trees:** *Vachellia nilotica, Vachellia tortillis subsp. heteracantha, Searsia lancea*.
- **Tall shrubs:** *Buddleja saligna, Euclea undulata, Olea europaea subsp. africana, Grewia occidentalis, Gymnosporia polyacantha, Mystroxylon aethiopicum subsp. burkeanum.*
- **Low shrubs:** *Aptosimum elongatum, Felicia fascicularis, Lantana rugosa, Teucrium trifidum*.
- **Succulent shrub:** *Kalanchoe paniculata*.
- **Woody climber***: Jasminum breviflorum*.
- **Herbaceous climber:** *Lotononis bainesii.*
- **Graminoids:** *Heteropogon contortus, Setaria sphacelata, Themeda triandra, Aristida congesta, Chloris virgata, Cynodon dactylon, Sporobolus nitens, Tragus racemosus.*
- **Herbs:** *Achyropsis avicularis, Corchorus asplenifolius, Evolvulus alsinoides, Helichrysum nudifolium, Helichrysum undulatum, Hermannia depressa, Osteospermum muricatum, Phyllanthus maderaspatensis.*

Conservation status of the Moot Plains Bushveld

According to Mucina and Rutherford (2006), this vegetation type is classified as Vulnerable, with its national conservation target being 19%. About 28% has been transformed by cultivation as well as urban and built-up areas (Mucina & Rutherford, 2006).

8.7.2.1.3 NORITE KOPPIES BUSHVELD

The Norite Koppies Bushveld, also known as SVcb 7, is a vegetation type situated in the North-West and Gauteng Provinces of South Africa. It is embedded in the Marikana Thornveld, north of the Magaliesberg, on rocky hills between Rustenburg and Pretoria, with the highest hills near Brits. The altitude ranges from about 1,100 to 1,350 meters (Mucina & Rutherford, 2006).

Important Plant Taxa

Mucina and Rutherford (2006) noted the following species as important taxa in the Moot Plains Bushveld:

- **Tall Tree:** *Sclerocarya birrea subsp. caffra*.
- **Small Trees:** *Combretum molle, Croton gratissimus, Ficus abutilifolia, Pappea capensis, Senegalia afra, Bridelia mollis, Combretum apiculatum, Cussonia paniculata*.
- **Tall Shrubs:** *Euclea crispa subsp. crispa, Olea europaea subsp. africana, Rhus pyroides var. pyroides, Diospyros lycioides subsp. guerkei, Ehretia rigida subsp. rigida, Euclea undulata, Grewia flava, Pavetta gardeniifolia.*
- **Low Shrubs**: *Asparagus cooperi, Rhynchosia nitens, Indigofera zeyheri, Justicia flava*.
- **Woody Climbers:** *Clematis brachiata, Helinus integrifolius*.
- **Herbaceous Climbers:** *Pentarrhinum insipidum, Cyphostemma cirrhosum*.
- **Graminoids:** *Elionurus muticus, Eragrostis lehmanniana, Setaria sphacelata, Themeda triandra, Aristida scabrivalvis subsp. scabrivalvis, Fingerhuthia africana, Heteropogon contortus, Hyperthelia dissoluta, Melinis nerviglumis, Pogonarthria squarrosa.*
- **Herbs:** *Hermannia depressa, Ipomoea obscura, Barleria macrostegia, Dianthus mooiensis subsp. mooiensis, Ipomoea oblongata, Vernonia oligocephala.*
- **Geophytic Herbs:** *Ledebouria revoluta, Ornithogalum tenuifolium, Sansevieria aethiopica*.

Conservation status of the Moot Plains Bushveld

According to Mucina and Rutherford (2006), this vegetation type is classified as Vulnerable, with its national conservation target being 19%. About 28% has been transformed by cultivation as well as urban and built-up areas (Mucina & Rutherford, 2006).

8.7.2.2 EXPECTED FLORA SPECIES

The Plants of South Africa (POSA) database indicates that 318 species of indigenous plants are expected to occur within the PAOI. No Species of Conservation Concern (SCC) is expected to occur within the PAOI based on the POSA database. The Screening Tool list no additional flora SCC expected for the area.

8.7.3 FAUNAL ASSESSMENT

8.7.3.1 AMPHIBIANS

Based on the IUCN Red List Spatial Data and FrogMap, 22 amphibian species are expected to occur within the area. No amphibian SCCs are expected to occur within the area. No species were listed by the Screening Tool.

8.7.3.2 REPTILES

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 66 reptile species are expected to occur within the area. One (1) species is regarded as threatened (Table 23Table 23). One (1) species was listed by the Screening Tool.

Table 23: Threatened reptile species that are expected to occur within the PAOI

Species	Common Name	Screening Tool Sensitivity	Conservation Status		Likelihood of Occurrence	Reason
			Regional	IUCN		
Kinixys lobatsiana	Lobatse Hinged Tortoise	Medium	VU	VU	Moderate	Some suitable habitat might be

Species	Common Name	Screening Tool Sensitivity	Conservation Status		Likelihood of Occurrence	Reason
			Regional	IUCN		
						present within the PAOI.

8.7.3.3 MAMMALS

Based on the IUCN Red List Spatial Data and the MammalMAP database lists 86 mammal species that could be expected to occur within the area (The full list will be provided in the final assessment). This list excludes large mammal species that are normally restricted to protected areas. Thirteen of these expected species are regarded as SCC (Table 24). Two (2) species were listed by the Screening Tool.

Table 24: Threatened mammal species that are expected to occur within the PAOI

Species	Common Name	Screening Tool Sensitivity	Conservation Status		Likelihood of occurrence	Reason
			Regional	IUCN		
Aonyx capensis	Cape Clawless Otter	-	NT	NT	Low	No likely suitable habitat within the PAOI.
Atelerix frontalis	South African Hedgehog	-	NT	LC	Moderate	Some suitable habitat might be present within the PAOI.
Cloeotis percivali	Short-eared Trident Bat	-	EN	LC	Low	No likely suitable habitat within the PAOI.
Crocidura mariquensis	Swamp Musk Shrew	Medium	NT	LC	Low	No likely suitable habitat within the PAOI.
Dasymys robbertsii	African Marsh Rat	Medium	NT	LC	Low	No likely suitable habitat within the PAOI.
Eidolon helvum	African Straw-coloured Fruit Bat	-	LC	NT	Low	No likely suitable habitat within the PAOI.
Felis nigripes	Black-footed Cat	-	VU	VU	Moderate	Some suitable habitat might be present

Species	Common Name	Screening Tool Sensitivity	Conservation Status		Likelihood of occurrence	Reason
			Regional	IUCN		
						within the PAOI.
Hydrictis maculicollis	Spotted-necked Otter	-	VU	NT	Low	No likely suitable habitat within the PAOI.
Mystromys albicaudatus	White-tailed Rat	-	VU	EN	Low	No likely suitable habitat within the PAOI.
Ourebia ourebi	Oribi	-	EN	LC	Low	No likely suitable habitat within the PAOI.
Panthera pardus	Leopard	-	VU	VU	Low	No likely suitable habitat within the PAOI.
Parahyaena brunnea	Brown Hyaena	-	NT	NT	Moderate	Some suitable habitat might be present within the PAOI.
Pelea capreolus	Grey Rhebok	-	NT	LC	Low	No likely suitable habitat within the PAOI.
Redunca fulvorufula	Mountain Reedbuck	-	EN	LC	Low	No likely suitable habitat within the PAOI.

8.7.3.4 AVIFAUNA

The SABAP2 Data lists 359 avifauna species that could be expected to occur within the PAOI and surrounding landscape (the full list will be provided in the final assessment). Twenty-one of these expected species are regarded as SCC (Table 25Table 25). Three (3) species were listed by the Screening Tool.

Table 25: Threatened avifauna species that are expected to occur within the PAOI

Common Name	Scientific Name	Screening Tool Sensitivity	Regional	Global	Likelihood of Occurrence	Reason
Abdim's Stork	*Ciconia abdimii*	-	NT	LC	Moderate	Some suitable habitat might be

Common Name	Scientific Name	Screening Tool Sensitivity	Regional	Global	Likelihood of Occurrence	Reason
						present within the PAOI.
Black Stork	*Ciconia nigra*	-	VU	LC	Moderate	Some suitable habitat might be present within the PAOI.
Black-winged Pratincole	*Glareola nordmanni*	-	NT	NT	Moderate	Some suitable habitat might be present within the PAOI.
Cape Vulture	*Gyps coprotheres*	-	EN	VU	Moderate	Some suitable habitat might be present within the PAOI.
Caspian Tern	*Hydropogne caspia*	Medium	VU	LC	Low	No likely suitable habitat within the PAOI.
Curlew Sandpiper	*Calidris ferruginea*	-	LC	NT	Low	No likely suitable habitat within the PAOI.
Greater Flamingo	*Phoenicopterus roseus*	-	NT	LC	Low	No likely suitable habitat within the PAOI.
Greater Painted-snipe	*Rostratula benghalensis*	-	NT	LC	Moderate	Some suitable habitat might be present within the PAOI.

Common Name	Scientific Name	Screening Tool Sensitivity	Regional	Global	Likelihood of Occurrence	Reason
Half-collared Kingfisher	*Alcedo semitorquata*	-	NT	LC	Low	No likely suitable habitat within the PAOI.
Lanner Falcon	*Falco biarmicus*	-	VU	LC	High	Suitable habitat might be present within the PAOI.
Lesser Flamingo	*Phoeniconaias minor*	-	NT	NT	Low	No likely suitable habitat within the PAOI.
Maccoa Duck	*Oxyura maccoa*	-	NT	EN	Low	No likely suitable habitat within the PAOI.
Martial Eagle	*Polemaetus bellicosus*	-	EN	EN	Moderate	Some suitable habitat might be present within the PAOI.
Secretarybird	*Sagittarius serpentarius*	Medium	VU	EN	High	Suitable habitat might be present within the PAOI.
Tawny Eagle	*Aquila rapax*	Medium	EN	VU	Moderate	Some suitable habitat might be present within the PAOI.
Verreaux's Eagle	*Aquila verreauxii*	-	NA	LC	Low	No likely suitable habitat within the PAOI.

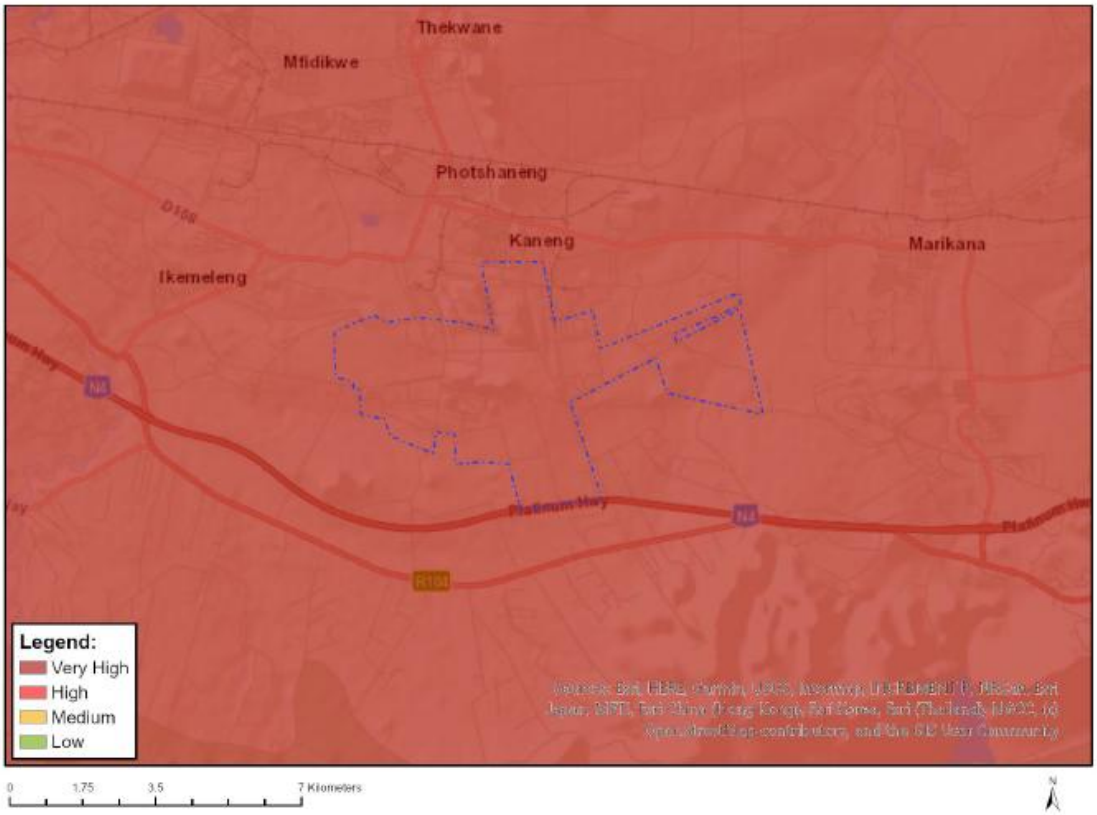
Common Name	Scientific Name	Screening Tool Sensitivity	Regional	Global	Likelihood of Occurrence	Reason
White-backed Vulture	*Gyps africanus*	-	CR	CR	Moderate	Some suitable habitat might be present within the PAOI.
Yellow-billed Stork	*Mycteria ibis*	-	EN	LC	High	Suitable habitat might be present within the PAOI.
Yellow-throated Sandgrouse	*Pterocles gutturalis*	-	NT	LC	High	Suitable habitat might be present within the PAOI.

8.7.4 DEA SCREENING TOOL

According to the Screening Tool Report generated (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended), the following sensitivity classifications were gathered from the National Web-based Environmental Screening Tool (Figure 46 to Figure 50):

- Terrestrial Biodiversity Theme sensitivity is Very High for the PAOI, with the possibility of CBA 2, ESA 1, ESA 2, NPAES and an EN ecosystem being present;
- Plant Species Theme sensitivity is Low for the PAOI;
- Animal Species Theme sensitivity is Medium for the PAOI, with the possibility of six (6) medium sensitivity (3 avifauna, 2 mammals, and 1 reptile) species being present;
- Aquatic Biodiversity Theme sensitivity is Very High for the PAOI, with the possibility of aquatic ESA 1 and ESA 2, and wetland bioregions being present; and
- Agricultural Theme sensitivity is High for the PAOI, with the possibility of annual crop production and high land capability being present.

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



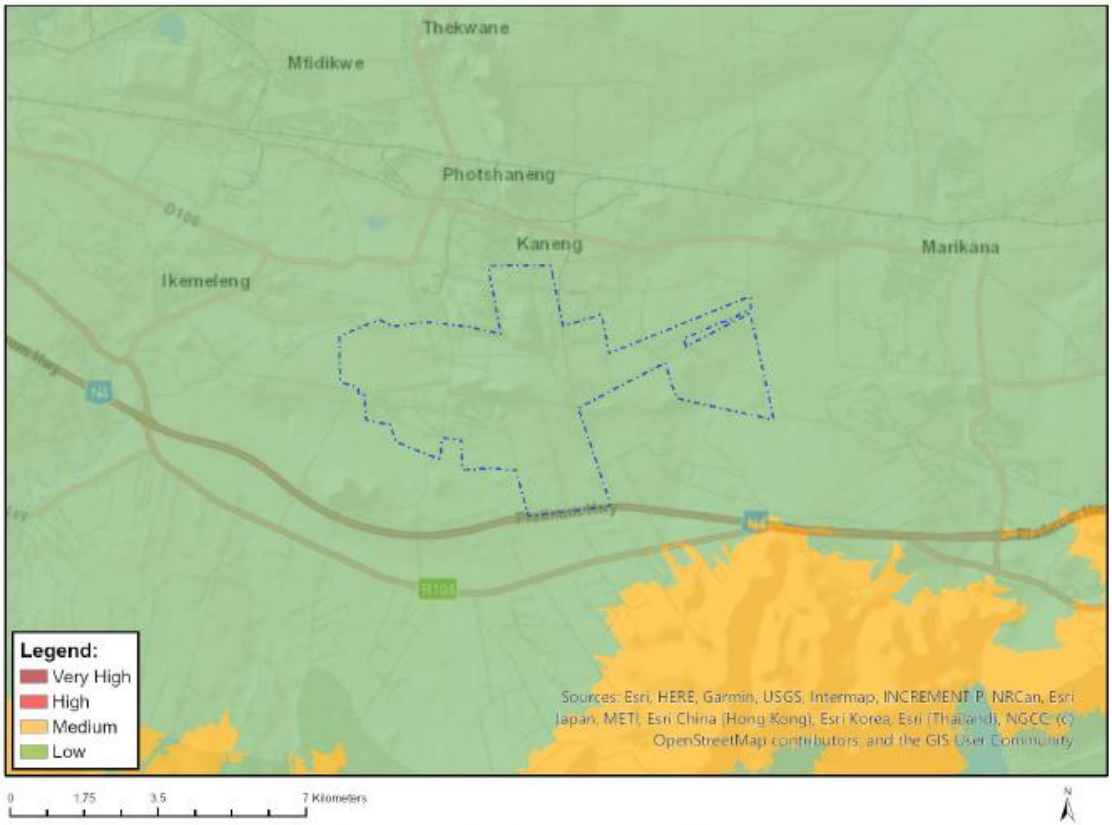
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA 2
Very High	ESA 1
Very High	ESA 2
Very High	National Protected Area Expansion Strategy (NPAES)
Very High	EN_Marikana Thornveld

Figure 46: Relative terrestrial biodiversity theme sensitivity for the PAOI

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

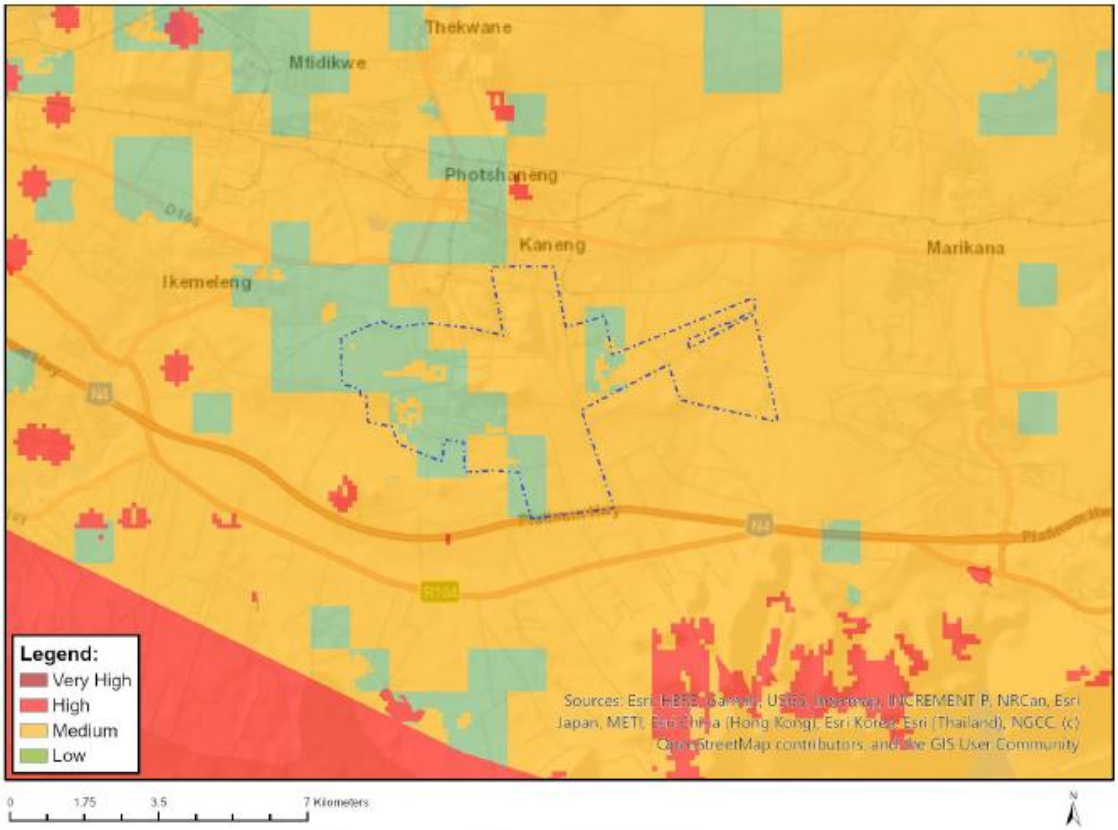
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Figure 47: Relative plant species theme sensitivity for the PAOI.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

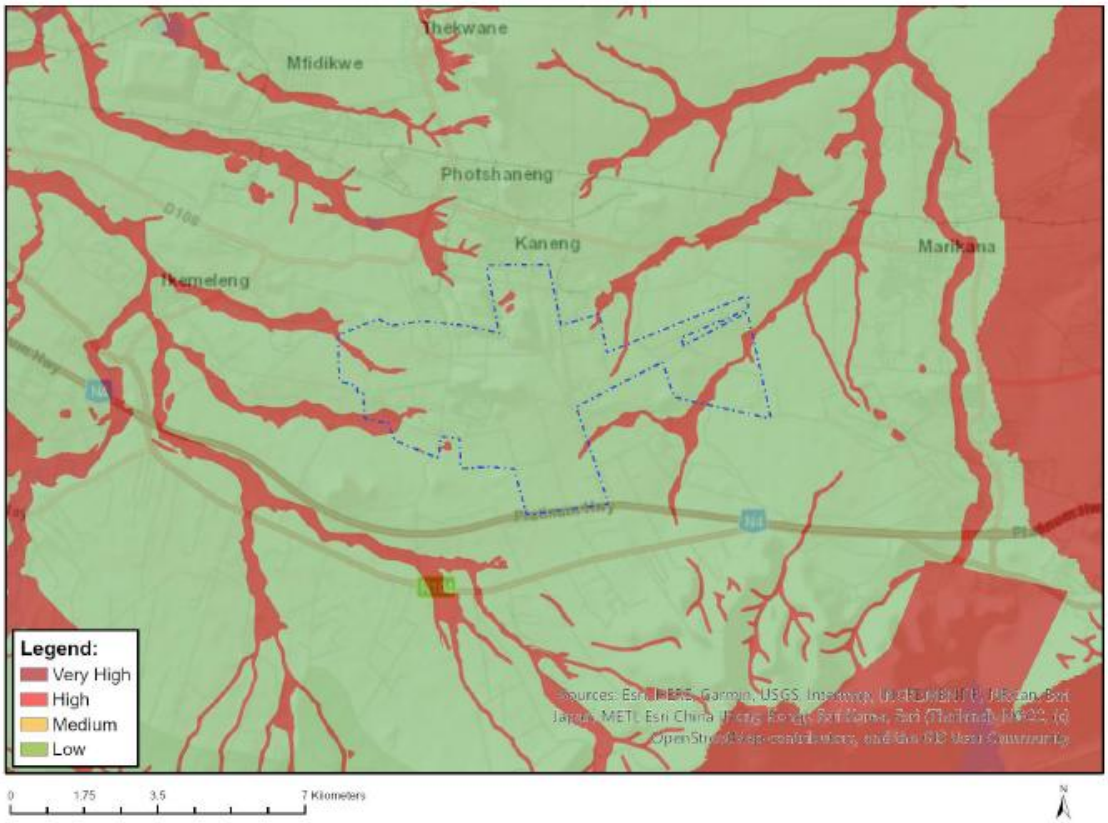
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Aves-Hydroprogne caspia
Medium	Aves-Sagittarius serpentarius
Medium	Aves-Aquila rapax
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii
Medium	Reptilia-Kinixys lobatsiana

Figure 48: Relative animal species theme sensitivity for the PAOI

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



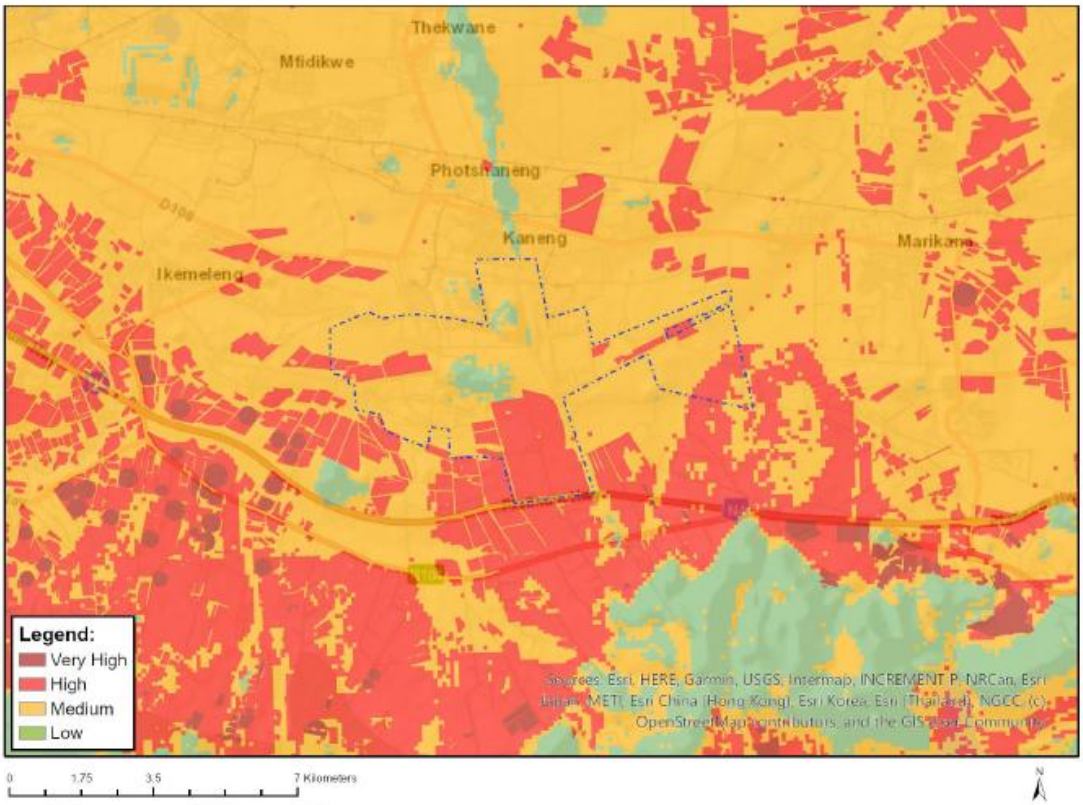
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	ESA 1
Very High	ESA 2
Very High	Wetlands_Central Bushveld Bioregion (Depression)

Figure 49: Relative aquatic biodiversity theme sensitivity for the PAOI

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;09. Moderate-High/10. Moderate-High
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

Figure 50: Relative agriculture theme sensitivity for the PAOI

8.8 HYDROLOGY AND AQUATIC BIODIVERSITY

8.8.1 HYDROLOGICAL SETTING

The study area spans two Quaternary Catchments, namely the A22H and A21K. A21K is located within the Gwathle River system, which drains parts of the Magaliesberg mountains and flows through areas like Rustenburg, Marikana, and Buffelspoort. A22H is located in the Upper Crocodile River catchment drains in a north–easterly direction via the Hex River. Both catchments fall within the Crocodile West and Marico Water Management Area (WMA).

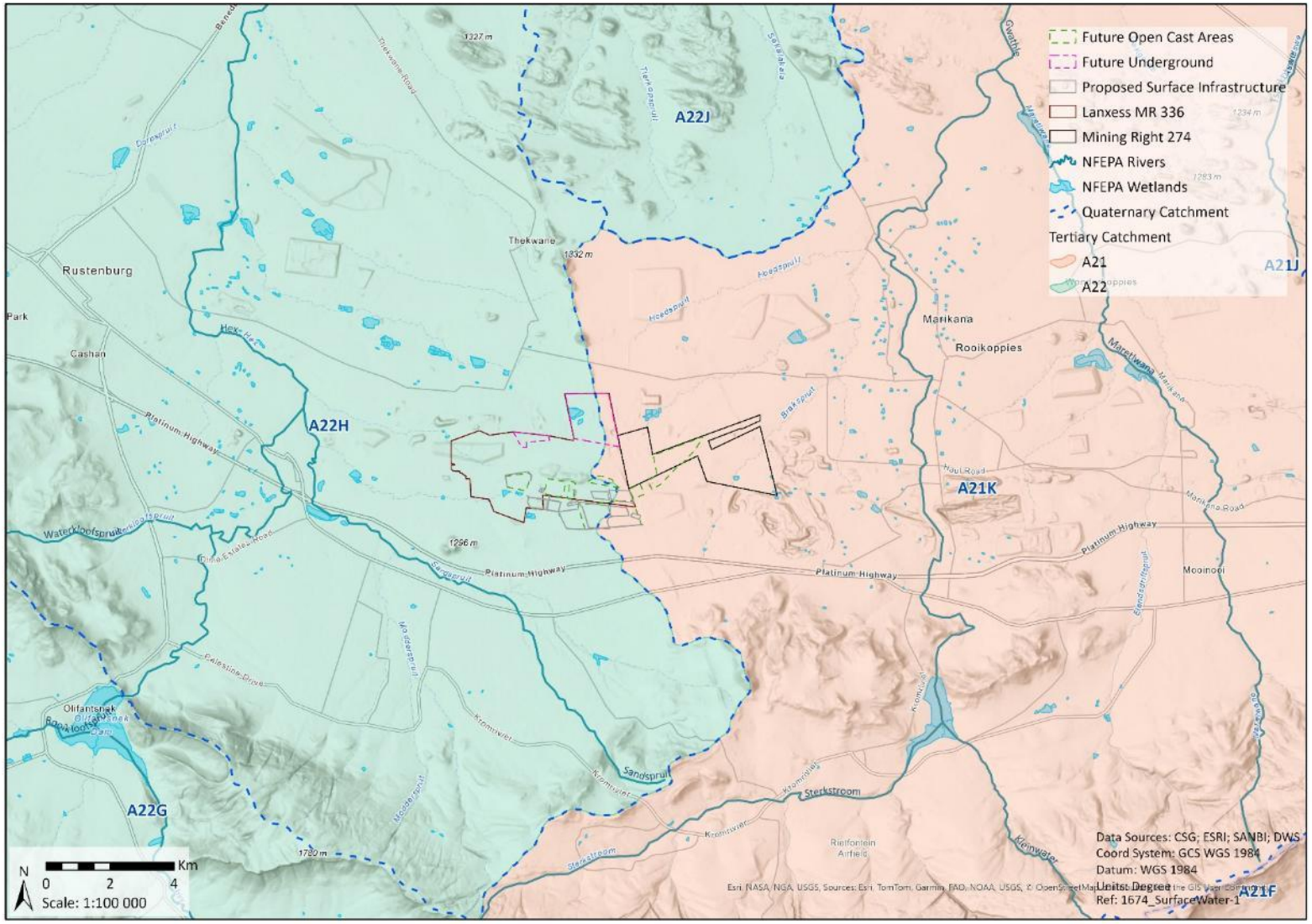


Figure 51: The Study Area in relation to the Quaternary Catchments.

Surface drainage at the Rustenburg Chrome Mine site occurs mainly towards the west in the direction of the Hex River. Runoff is taken by two tributaries which flow towards the west into the Hex River, of which one of the tributaries originates at the RCM site. The elevation of this area ranges from 1130 mamsl to 1150 mamsl. Surface drainage at the Rietfontein Chrome Plant area occurs mainly towards the South, directly into the Sandspruit as this site is situated approximately 1 km from the Sandspruit.

The main water course in the A22H quaternary catchment is the Hex River found on the western side of the study area; this river joins the Elands River which is a tributary to Crocodile River.

8.8.1.1 SOUTH AFRICAN INVENTORY OF INLAND AQAUTIC ECOSYSTEMS (SAIIAE)

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019). Neither the PAOI nor the 500 m regulated area overlaps with any SAIIAE wetlands or Rivers (Figure 52).

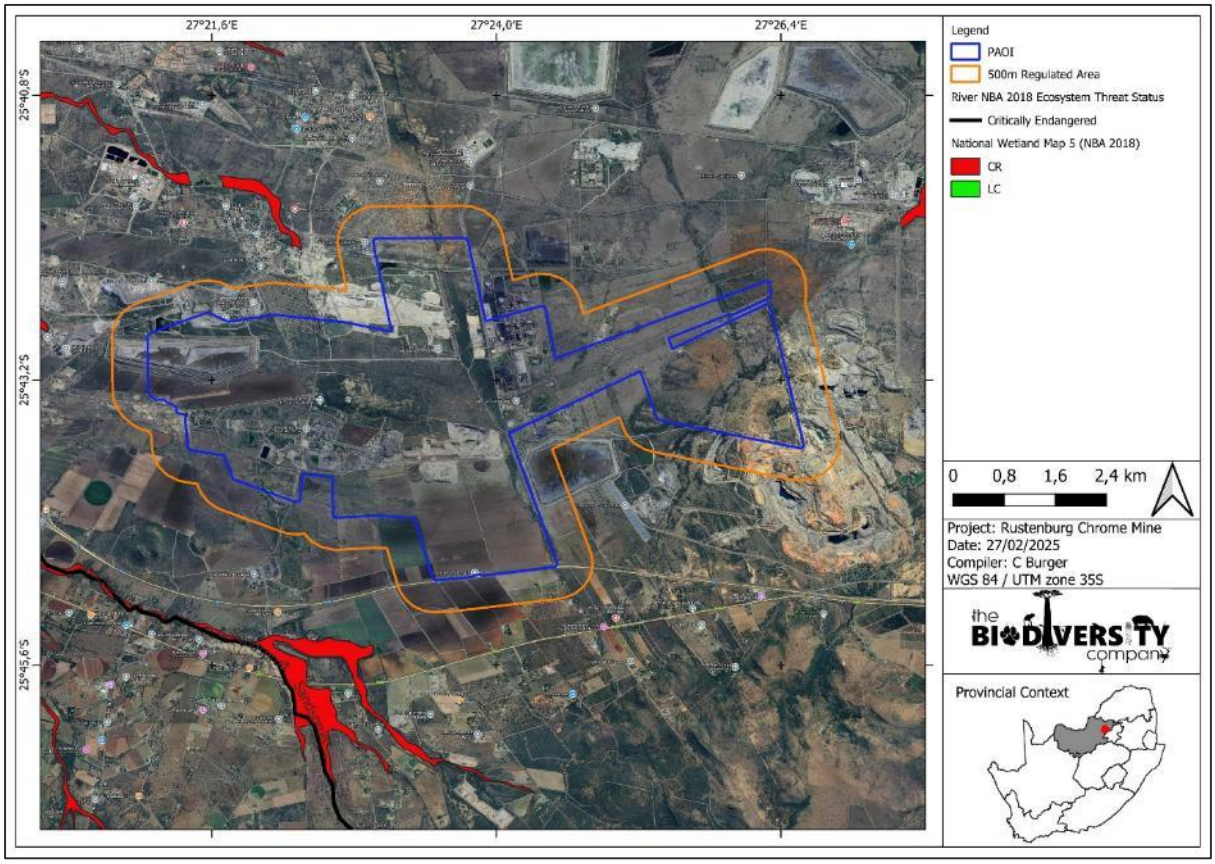


Figure 52: Map illustrating the ecosystem threat status of rivers and wetland ecosystems in the PAOI.

8.8.1.2 NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREAS

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.,* 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals (Nel *et al.,* 2011).

Figure 53 shows that the 500 m regulated area and the PAOI overlaps non-priority (unclassified) FEPA wetlands.

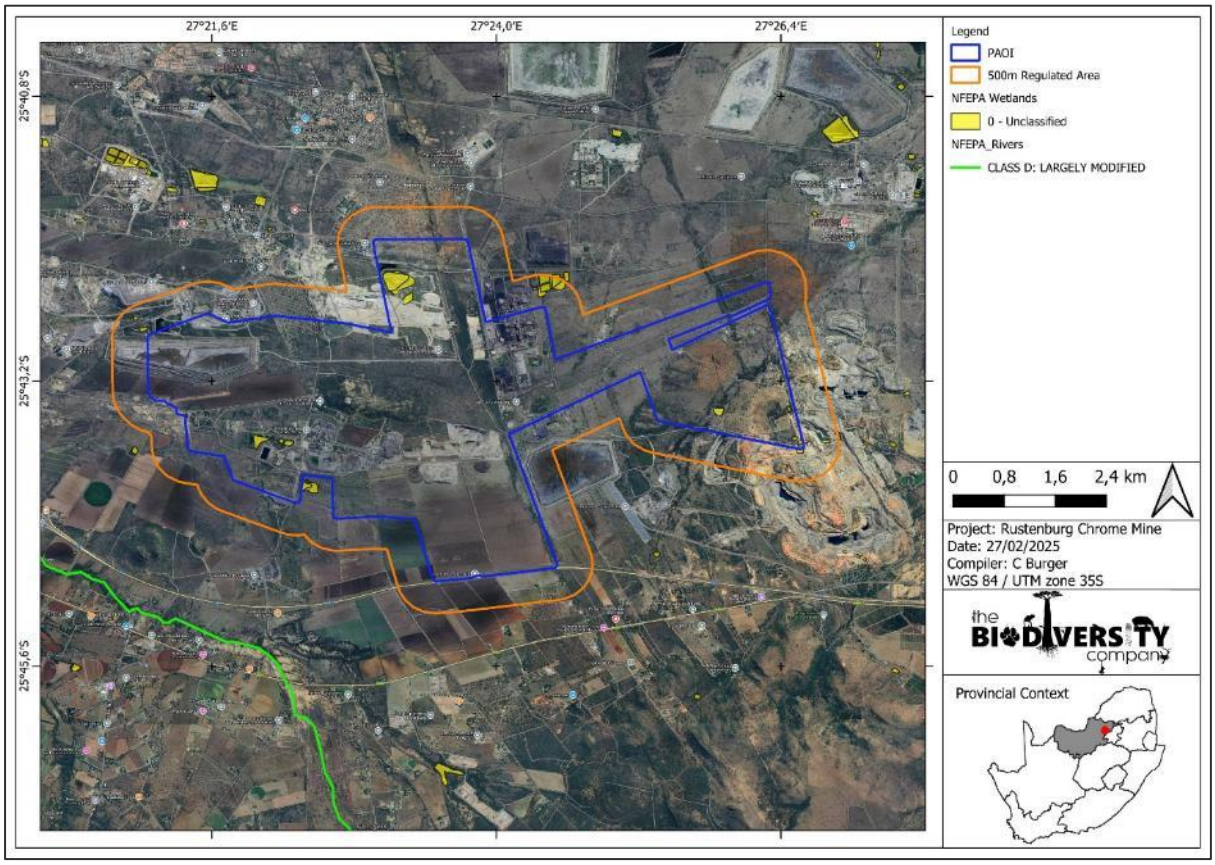


Figure 53: The PAOI in relation to the National Freshwater Ecosystem Priority Areas.

8.8.1.3 NORTH WEST BIODIVERSITY SECTOR PLAN

As per the North West Biodiversity Sector Plan (NWBSP) (North West READ, 2015) the aquatic areas of importance in relation to the proposed project are ESA 1 and ESA 2 categories which overlap with the proposed study area (Figure 54). The ESA 1 and ESA 2 areas refer to areas containing wetland features and water movement areas such as non-perennial river lines. The ESA's are required to maintain landscape connectivity to the CBA's.

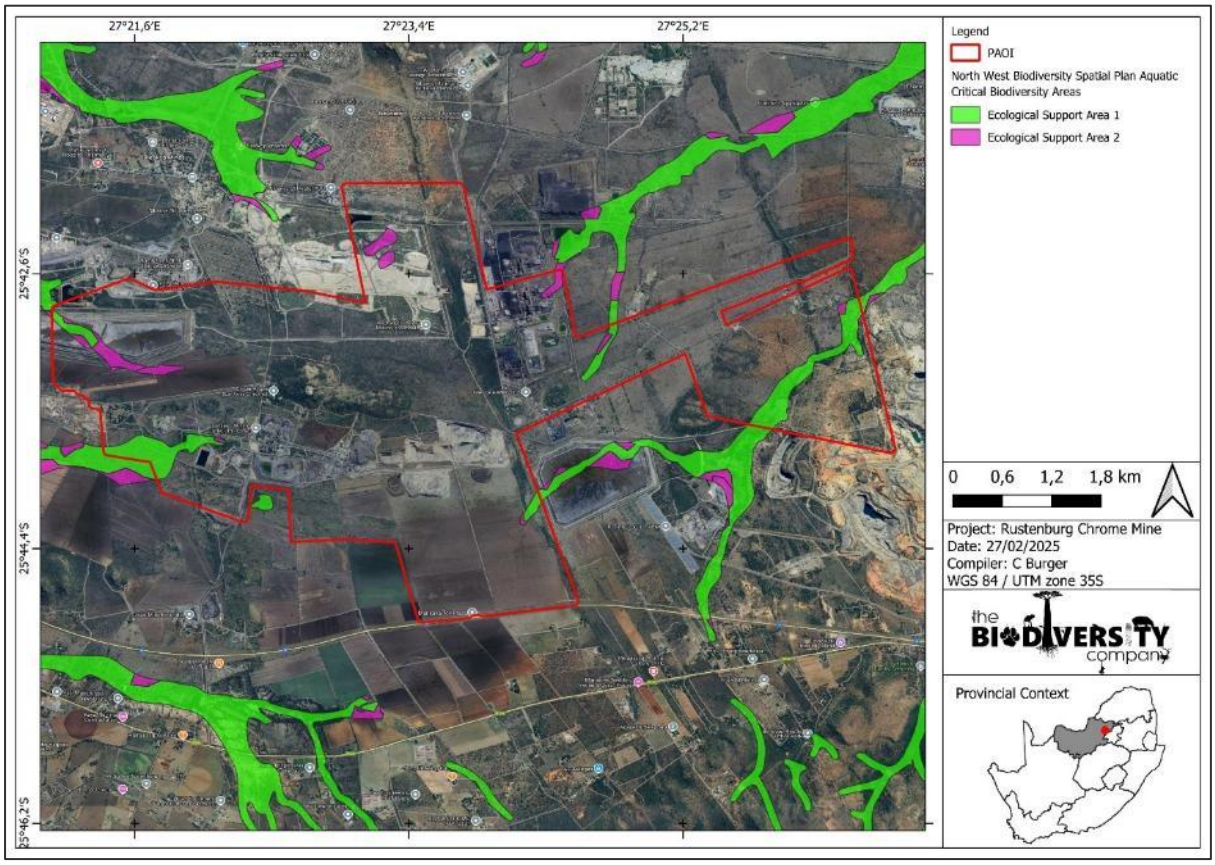


Figure 54: Aquatic CBAs and ESAs present within the Project Area of Influence (NWBSP, 2015).

8.8.1.4 STRATEGIC WATER SOURCE AREAS

SWSAs are defined as areas of land that supply a disproportionate quantity of mean annual surface water runoff in relation to their size, and therefore contribute considerably to the overall water supply of the country, as well as national aquatic and terrestrial biodiversity resources. These are considered key ecological infrastructure assets and the effective protection of SWSAs is vital for national security because a lack of water security will compromise national security and human wellbeing on all levels.

The PAOI overlaps the Kroondal / Marikana Groundwater SWSA (Figure 55Figure 55).

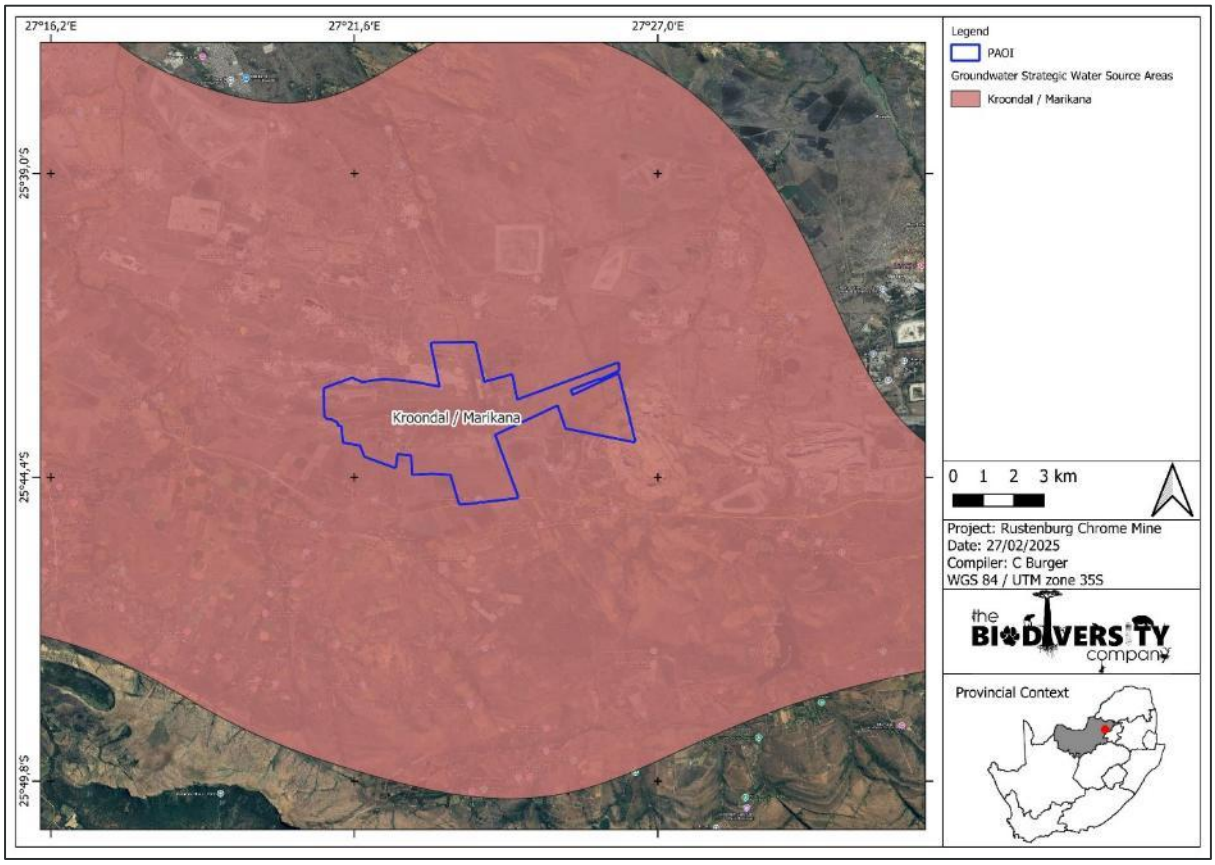


Figure 55: The PAOI in relation to the SWSA dataset

8.9 GROUNDWATER

8.9.1 AQUIFER AND GROUNDWATER OCCURENCE

8.9.1.1 UNSATURATED ZONE – SHALLOW, SAPROLITIC AQUIFER

The main source of recharge into the shallow aquifer is rainfall that infiltrates the aquifer through the unsaturated (vadose) zone. Vertical movement of water is faster than lateral movement in this system as water moves predominantly under the influence of gravity. This aquifer may contain coarse, anorthositic sediment or turf clay sediment when underlain by anorthosite or gabbro-norite respectively. The hydraulic conductivity of this aquifer ranges between 10^{-8} and 10^{-2}m.day^{-1} and porosity ranges between 0.4 and 0.7 for turf clay sediments. The hydraulic conductivity of the coarse, anorthositic sediment can reach up to 20 m/d with porosities ranging between values of 0.25 to 0.5.

8.9.1.2 SATURATED ZONE – FRACTURED BEDROCK AQUIFER

Groundwater movement is predominantly associated with secondary structures in this aquifer (fractures, faults, dykes, etc.). The average water level depth in the area ranges between 5 and 40 mbgl. Borehole yields in the Rustenburg Layered Suite fractured aquifers are generally low and can be expected to be between 0.1 and 2 l/s with regional flow resembling flow in the porous medium (i.e. obeying Darcy's law). These formations contain limited quantities of water resources due to the poor storage capacity of the igneous rock. Groundwater quality in the area is also expected to be intermediate to poor with EC values ranging from 4.4 to 120 mS/m and possibly elevated Ca, Mg, Cl, and SO4 as well as carbonate alkalinity concentrations. Both the porosity and the hydraulic conductivity of the Rustenburg Layered Suite fractured aquifers are known to be low.

The commonly expected values of porosity and permeability for igneous rock types, similar to those present in the Rustenburg Layered Suite, are 0.05 (porosity) and 10-5 m.d-1 (hydraulic conductivity) respectively (Kruseman & de Ridder, 1994). Movement of groundwater in this aquifer will be preferential in secondary structures such as joints, faults and fractures. Dolerite intrusions in the form of dykes and sills are often encountered in this area.

The dykes are found to run in a north-northeast / south-southwest direction and can serve both as aquifers and aquifuges. Thick, unbroken dykes inhibit the flow of water, while the baked and cracked contact zones can be highly conductive. These structures thus tend to dominate the flow of groundwater. Unfortunately, their location and properties are rather unpredictable. Their influence on the flow of groundwater is incorporated by using higher than usual flow parameters for the rocks of the aquifer. According to the groundwater study done by Future Flow (2010) in the direct vicinity of the dyke the weathering depth tends to be more than that of the general valley area due to the effect of fracturing and subsequent higher groundwater recharge and flows associated with the intrusion of the dolerite dyke.

JMA (2009) indicated that the weathering depth at the Wonderkop segment varies between 9 and 25 meters below ground level (mbgl), with an average depth of approximately 15 meters. However, the depth of weathering is not evenly distributed across the Wonderkop site, and it appears that the weathering may be slightly deeper to the north. Given the data gaps for the Klipfontein and Kroondaal sections, a conceptual weathering depth of 20 mbgl has been assumed for those areas.

Simultec (2009) investigated the influence of groundwater on pillar instability in the deep, north-central portion of the underground mine. The study concluded that higher yielding groundwater-bearing fractures exist north of the east-west dyke traversing the mine voids. In contrast, the north-south dykes in the study area yield very little groundwater.

Boreholes drilled into the syenite dyke, according to JMA (2009), yielded less than 0.02 liters per second (ℓ/s) or were dry, further indicating the low groundwater yield in some areas of the deeper fractured aquifer. This information is essential for understanding the potential for groundwater-related issues, such as stability and water inflows, in the mining operations.

8.9.1.3 WATER STRIKE DEPTHS

No new borehole drilling was conducted as part of this study; however, previous studies were relied upon for data collection. According to the Digby Wells (2014) report, blow yields were recorded for two out of three boreholes drilled, with yields ranging between 0.02 and 5 L/s. These measurements were obtained from the shallow weathered aquifer. Similarly, JMA (2009) recorded yields from nine out of fifteen boreholes drilled, with six boreholes recorded as dry. The successful boreholes intercepted the shallow weathered aquifer, while the dry boreholes encountered weathered and fractured zones that did not yield water, likely due to dewatering of the shallow weathered zone.

The Digby Wells (2017) report noted that water strikes in the vicinity of the TSF were typically encountered between 10 and 15 meters below ground level (mbgl). In the eastern part of the site, deeper water strikes occurred between 20 and 30 mbgl. The average depth of weathering across the site is reported as 24 mbgl, indicating a moderate weathering depth consistent with the observed water strikes. This data is important for understanding the distribution of groundwater resources and the challenges associated with dewatering, especially given the variability in water strikes across different areas of the site.

8.9.1.4 DEPTH TO GROUNDWATER, PIEZOMETRIC HEADS AND FLOW DIRECTIONS

According to the Digby Wells Groundwater Specialist Study (2015), regional shallow groundwater levels are primarily influenced by topography and are less affected by underground mining activities. Consequently, groundwater levels below 11 meters below ground level (mbgl) can be used as a steady baseline for model calibration.

Recent data from the hydrocensus study conducted in February 2025 shows that groundwater levels in the area range from 5.2 to 46.5 mbgl, with an average level of 16.43 mbgl. The deeper groundwater levels (>30 mbgl) measured are associated with the underground workings, where groundwater is being abstracted. It can be assumed that these deeper groundwater levels are influenced by underground mining. In contrast, shallow groundwater levels (<8 mbgl) in boreholes located near the TSF and dams, are more likely to be affected by seepage from these facilities. These predictions will be validated through quality sampling.

It is important to note that groundwater levels around the current opencast pits remain unknown, as no boreholes have been drilled in these areas. To address this data gap, it is recommended to site and drill monitoring boreholes near the opencast mining areas to obtain a clearer understanding of groundwater

behaviour in these zones. This information will be valuable for managing water resources and mitigating potential environmental impacts related to the opencast mining operations.

As expected in natural systems, groundwater levels generally follow the topography of the land surface. The general flow direction is towards the major drainage Hex River in the west. Locally the groundwater flow directions are altered through abstraction from boreholes and potential seepages from waste areas. Most of the data available are in the eastern part of the mine.

8.9.2 GROUNDWATER QUALITY

During the hydrocensus conducted around the RCM site, a total of 26 boreholes were visited which was a combination of monitoring and production boreholes. Hydrocensus information proved sufficient to determine groundwater quality and contamination of groundwater on site at RCM. Monitoring boreholes on site indicated elevated Nitrate, Sulphate, Electrical Conductivity and Iron concentrations which confirm that mining operations contributes to groundwater contamination.

8.9.3 AQUIFER CHARACTERISTICS

8.9.3.1 AQUIFER VULNERABILITY

The aquifer vulnerability assessment determines how likely it is that contaminants can reach groundwater. Using the DRASTIC method, which considers factors like depth to groundwater, recharge, soil type, and hydraulic conductivity, the study found the area's aquifer is classified as having medium vulnerability with a rating of 114. This means some natural protection exists, but additional measures are needed to prevent surface contaminants from impacting groundwater.

8.9.3.2 AQUIFER CLASSIFICATION

The aquifer in the study area is classified as a Minor Aquifer System, which typically provides water for local needs and supports river base flow, though it rarely yields large quantities. The area's aquifer system and its vulnerability were both rated as "medium," each scoring 2 points. Using the Groundwater Quality Management (GQM) Index formula (system management rating × vulnerability rating), the study area received a GQM Index of 4, indicating that a medium level of groundwater protection is required.

8.10 AIR QUALITY

This chapter provides details of the receiving environment which is described in terms of:

- The identification of Air Quality Sensitive Receptors (AQSRs) from available maps and Google Earth imagery;
- A study of the atmospheric dispersion potential of the area taking into consideration local meteorology, land-use and topography;
- The identification of existing sources of emissions in the study area; and
- The analysis of all available ambient air quality information/data to determine pre-development ambient pollutant levels and dustfall rates.

8.10.1 RECEIVING ENVIRONMENT

AQSRs primarily refer to places where people reside; however, it may also refer to other sensitive environments that may adversely be affected by air pollutants. Ambient air quality guidelines and standards, as discussed under Section 4.1.9, have been developed to protect human health. Ambient air quality, in contrast to occupation exposure, pertains to areas outside of an industrial site/mine boundary where the public has access to and according to the NEMAQA, excludes areas regulated under the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (Dept of Labour, 1993).

AQSRs within this area includes several households, farmsteads, and schools in the immediate vicinity of the mine as shown in Figure 56. The town of Marikana is approximately 6 km to the east with Nkaneng ~2.6 km to the north of the surface mine boundary and Photsaneng ~4 km to the north.

Figure 56: Potential sensitive receptors within the study area.

8.10.2 ATMOSPHERIC DISPERSION POTENTIAL

Physical and meteorological mechanisms govern the dispersion, transformation, and eventual removal of pollutants from the atmosphere. The analysis of hourly average meteorological data is necessary to facilitate a comprehensive understanding of the dispersion potential of the site. Parameters useful in describing the dispersion and dilution potential of the site i.e. wind speed, wind direction, temperature and atmospheric stability, are briefly discussed in Section 8.3.

The AERMOD dispersion model requires terrain data to facilitate computation of air flow around hills. Terrain will be included in the dispersion model. Topographical data to be used is SRTM (30m, 1 arc sec) obtained from the USGS. The natural landscape of the study area is characterised by a rolling topography, with an increase in height toward the Magalies Mountains approximately 8 km to the south.

8.10.3 EXISTING SOURCES OF EMISSIONS

Mining and processing activities, farming and residential land-uses occur in the region. These land-uses contribute to baseline pollutant concentrations via vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute to background fine particulate concentrations within the South African boundary (Andreae, et al., 1996; Garstang, Tyson, Swap, & Edwards, 1996; Piketh, Annegarn, & Kneen, 1996).

8.10.3.1 MINING AND INDUSTRIAL OPERATIONS

Fugitive emissions from opencast and underground mining operations mainly comprise of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas, drilling and blasting. These activities mainly result in particulates and dust emissions, with small amounts of oxides of nitrogen (NOx), carbon monoxide (CO), SO2, methane and CO2 being released during blasting operations.

Tharisa Chrome and Platinum mine is located approximately 5 km to the east of RCM's surface boundary with a dormant mine directly to the east. Samancor western chrome mine is roughly 8 km to the east. Further afield are Bleskop Mines, Kroondal Mine, and Rustenburg Platinum Mine. Anglo Platinum Smelter Operation (Waterval Smelter) and Impala Platinum are all located around Rustenburg, about 20 km to the west-northwest. Rhovan

Vanadium is to the north of Brits and Vanchem to the east, both with associated mining operations. Most of the smelters have mining operations associated with it, with tailings storage facilities, unpaved roads and other materials handling activities generating dust.

8.10.3.2 AGRICULTURAL OPERATIONS

Agriculture is a land-use within the area surrounding the site. Particulate matter is the main pollutant of concern from agricultural activities deriving from windblown dust, biomass burning, and dust entrainment as a result of vehicles travelling along dirt roads. The quantity of windblown dust is a function of the wind speed, the extent of exposed areas and the moisture and silt content of such areas.

Amongst the mining and industrial operations between Brits and Rustenburg, there are a number of citrus farms and other agricultural activities. Crop farming and mixed crop farming include land tilling operations, fertiliser and pesticide applications, and harvesting. By applying fertiliser and pesticides use are typically made of vehicles (tractors) driving on unpaved roads and exposed soil. Land tilling includes dust entrainment on exposed surfaces, windblown dust and scraping and grading type activities resulting in fugitive dust releases. Both particulate matter (PM) and gaseous air emissions (mainly NO, NO2, NH3, SO2 and VOCs) are generated from the application of nutrients as fertilizers or manures (EPA, 1999).

8.10.3.3 UNPAVED ROADS

Vehicle entrained dust emissions from paved and unpaved roads represent a potentially significant source of fugitive dust in the area surrounding RCM. Unpaved roads include industrial, mine, local farming, and community access roads. The extent of particulate emissions from the main roads will depend on the number of vehicles using the roads and the silt loading on the roadways. The extent, nature and duration of road-use activity and the moisture and silt content of soils are required to be known in order to quantify fugitive emissions from this source.

8.10.3.4 VEHICLE TAILPIPE EMISSIONS

Air pollution from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, and secondary, those pollutants formed in the atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. Notable primary pollutants emitted by vehicles include CO2, CO, hydrocarbons (HCs), SO2, NOx, DPM and Pb. Secondary pollutants include: NO2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field.

Both small and heavy private and industrial vehicles travelling along the N4 as well as the unpaved roads, are notable sources of vehicle tailpipe emissions.

8.10.3.5 HOUSEHOLD FUEL BURNING

Domestic households are known to have the potential to be one of the most significant sources that contribute to poor air quality within residential areas. Pollutants arising from the combustion of wood include respirable particulates, CO and SO_2 with trace amounts of PAHs, in particular benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

Informal settlements in the region are likely to use coal and wood as energy sources. Coal burning emits a large amount of gaseous and particulate pollutants including SO_2, total and respirable particulates including heavy metals and inorganic ash, CO, PAHs, NO_2 and various toxins such as benzo(a)pyrene. Pollutants from wood burning include respirable particulates, NO_2, CO, PAHs, particulate benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

8.10.3.6 CROP BURNING AND WILDFIRES

Crop-residue burning, and general wildfires (veld fires) represent significant sources of combustion-related emissions associated with agricultural areas. Emissions are greater from sugar cane burning than for savannas wildfires due to sugar cane areas being associated with a greater availability of available material to be burned. The quantity of dry, combustible matter per unit area is on average 4.5 tons per hectare for savannas areas.

The quantification of background particulate concentration, which is of particular importance for the current study, is complicated due to the large number of sources in the region. Sources of particulates also include a significant proportion of fugitive emissions from diffuse sources (e.g. vehicle-entrained dust from roadways, wind-blown dust from stockpiles and open areas, dust generated by materials handling) which are more difficult to quantify than are emissions from point sources. Dust fallout typically impacts in close vicinity of the emission source (up to 3 km) whereas PM10 can remain in the atmosphere for days and impact far afield.

8.10.4 LOCAL AIR QUALITY

It is expected that various local and far-a-field sources are expected to contribute to ambient concentrations in the region. Local sources include wind erosion from exposed areas, fugitive dust from agricultural activities and mining activities, vehicles on roadways and veld burning. Long range particulates can result from remote tall stack emissions and from large scale biomass burning in countries to the north of South Africa. These have been found to contribute significantly to background fine particulate concentrations over the interior of South Africa ((Andreae, 1996), (Garstang, 1996), (Piketh, et al., 1996)).

Particulates represent the main pollutant of concern in the assessment of mining operations. The particulates in the atmosphere may contribute to visibility reduction, pose a threat to human health, or simply be a nuisance due to their soiling potential.

A dustfall network comprising of 10 dustfall units exist at RCM. Dustfall data from 2021 indicated no exceedances of the NDCR limits, according to the EIA and EMPR conducted in 2022 (Digby Wells, 2022). No recent data was provided for inclusion into the study.

Ambient air quality monitoring data from the Rustenburg Local Municipality's Marikana AQMS that is located ~6.9 km to the east-northeast of the RCM surface mine boundary was used. A summary of the PM measurements is provided in Table 26. The data availability at the station is below the required 90% (SANAS 2010) ranging between 71% and 76% for the period (1 January 2021 – 31 December 2023). The 99th percentile PM_{10} concentrations (311.5, 209.6 and 233.3 µg/m³) were higher than the NAAQS limit value (75 µg/m³) in 2021, 2022 and 2023 respectively. There were 158, 139 and 151 daily exceedances to the NAAQS for PM_{10} in 2021, 2022 and 2023 respectively. Similarly, the 99th percentile $PM_{2.5}$ concentrations (70.6, 60.4 and 74.3 µg/m³) were higher than the NAAQS limit value (40 µg/m³) in 2021, 2022 and 2023 respectively. There were 59, 28 and 50 daily exceedances to the NAAQS for $PM_{2.5}$ in 2021, 2022 and 2023 respectively. The annual average PM_{10} and $PM_{2.5}$ concentrations also exceeded their respective NAAQS (40 and 20 µg/m³) in 2021, 2022 and 2023.

Table 26: Summary of the PM measurements at the Marikana AQMS (Jan 2021 – Dec 2023).

Period	Data Availability (%)	Daily 99th Percentile	Annual Average	No of recorded daily exceedances
PM_{10} (µg/m³)				
Criteria		*75 µg/m³*	*40 µg/m³*	*4 days per year*
2021	76%	311.5	103.0	158
2022	71%	209.6	77.7	139
2023	72%	223.3	78.7	151

Period	Data Availability (%)	Daily 99th Percentile	Annual Average	No of recorded daily exceedances
$PM_{2.5}$ (µg/m³)				
Criteria		*40 µg/m³*	*20 µg/m³*	*4 days per year*
2021	76%	70.6	25.0	59
2022	71%	60.4	21.1	28
2023	72%	74.3	24.1	60

The NAAQS set requirements for air quality that are defined in terms of an indicator, an averaging time for the measurement, a concentration, and a form. PM_{10} and $PM_{2.5}$ are a percentile standard based on 3-years of data. From the data measured at the Marikana AQMS, is evident that the air quality in the region with respect to particulates (PM_{10} and $PM_{2.5}$) is not compliant to the set regulations. The daily 99th percentile concentration of both PM fractions is not to be exceeded for more than 4 days in a year. It must be noted that the station is 6.9 km to the east-northeast of the RCM and the contributions to these elevated concentrations cannot be pinpointed to specific sources. Figure 57 and Figure 58Figure 58 illustrate the average daily PM_{10} and $PM_{2.5}$ concentrations over the three-year measurement period in comparison to the NAAQS.

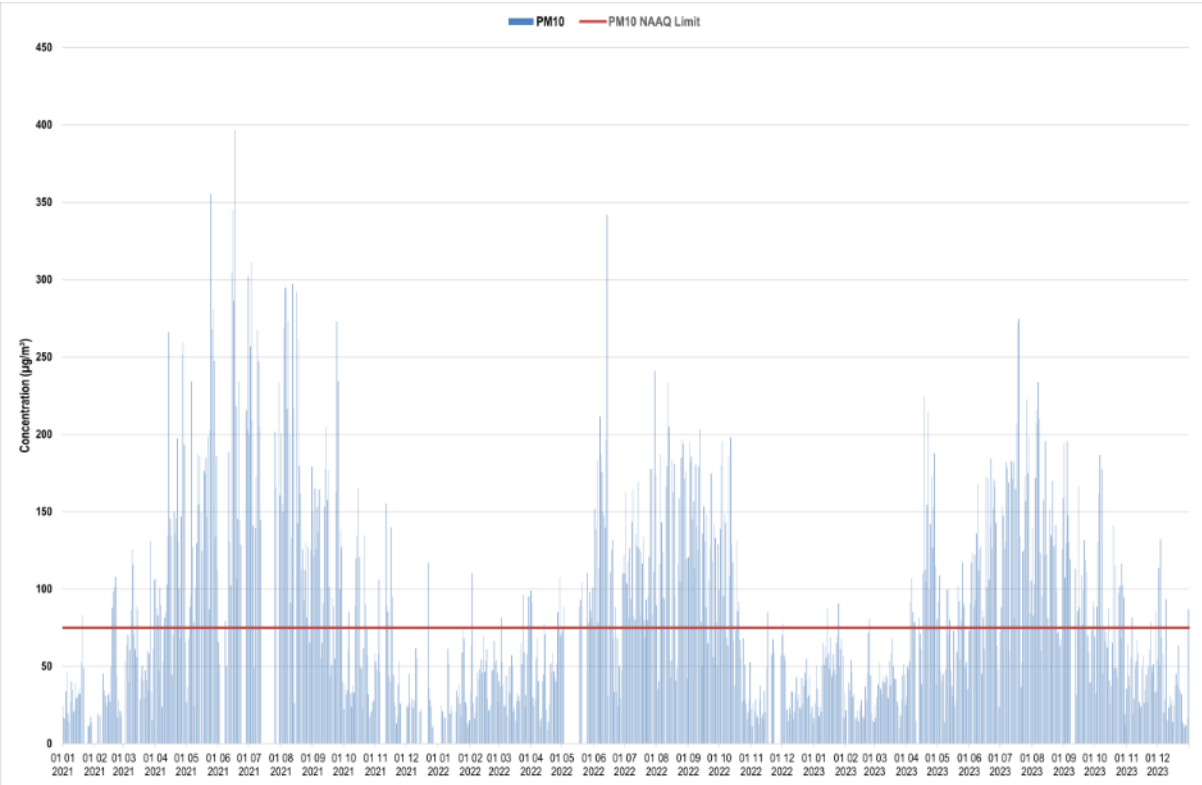


Figure 57: PM10 timeseries plot for measured ambient data from Marikana AQMS (Jan 2021 – Dec 2023).

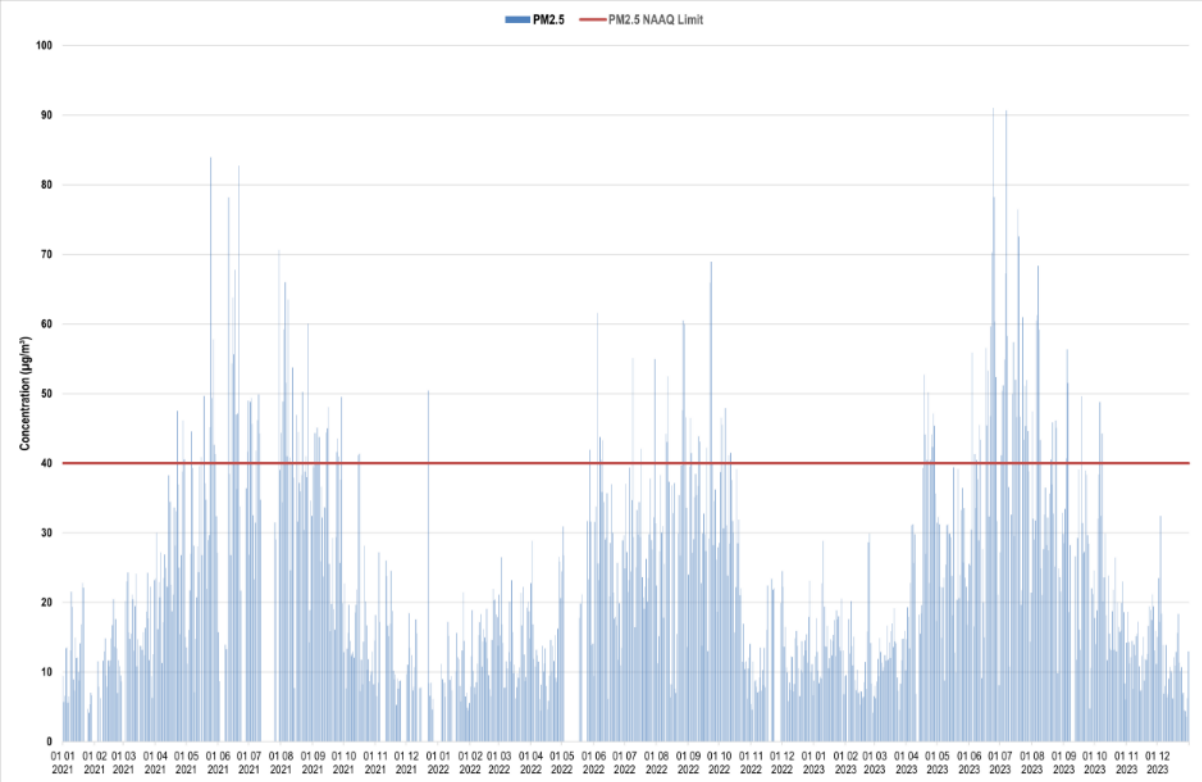


Figure 58: PM2.5 timeseries plot for measured ambient data from Marikana AQMS (Jan 2021 – Dec 2023).

Polar plots provide an indication of the directional contribution as well as the dependence of concentrations on wind speed. An interpretation of the potential sources that contribute to the elevated emissions can be made using pollutions roses and timeseries plots generated using the R software (Carslaw and Ropkins, 2012; Carslaw, 2013). Whereas the directional display is obvious, i.e., when higher concentrations are shown to occur in a certain sector, e.g., northwest, centrally and northeast for both PM_{10} and $PM_{2.5}$, it is understood that most of the high concentrations occur when winds blow from the northwest sector. When the high concentration pattern is more symmetrical around the centre of the plot, it is an indication that the contributions are near-equally distributed. Although not centrally located, there is an indication that there are sources close by.

It is expected that high ground level concentrations from elevated sources would be more prevalent during stronger wind speeds during stable conditions than daytime, convective conditions, when the plume buoyancy is often not as effective in lifting the plume centreline. Low-level emissions behave differently, and higher concentrations would normally be observed during moderate to weak-wind conditions. It should be noted, however, that some low-level emissions from mines are wind speed dependant (such as materials handling and wind erosion) and will result in significantly higher impacts from these sources during high wind speed conditions.

Elevated PM_{10} and $PM_{2.5}$ concentrations at Marikana AQMS show contributions from the southwest at low to moderate (3 – 5 m/s) wind speeds. The likely sources contributing to these elevated concentrations are residential activities to the southwest and wind erosion from nearby mine dumps towards the south, southeast and east of the AQMS. At very high wind speeds (>10 m/s) the plots show a PM contribution of elevated concentrations from the northwest and northeastern sectors, most likely a result of residential activities such as household and biomass burning coupled with mining activities from the northwest and northeast (Figure 59).

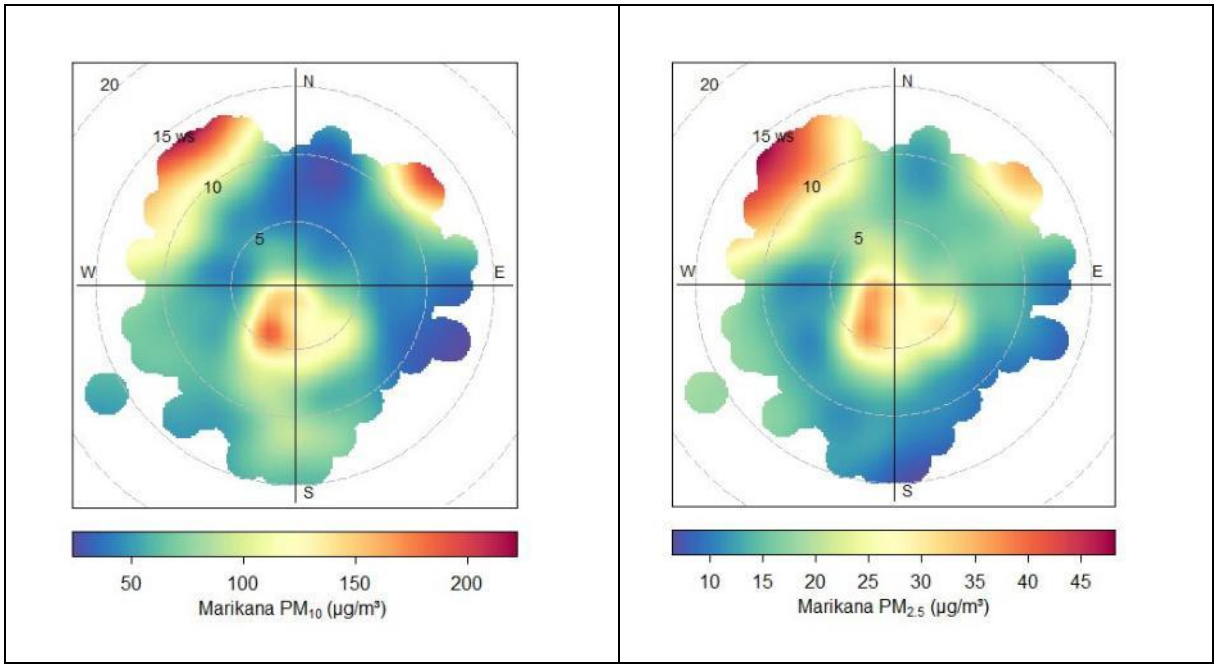


Figure 59: Polar plot of hourly median PM10 and PM2.5 concentrations observations at Marikana AQMS (Jan 2021 – Dec 2023).

8.10.5 POLLUTANTS OF CONCERN

The main pollutants resulting from the current and future operations at RCM are particulate matter (PM) and gaseous emissions such as sulfur dioxide (SO2), oxides of nitrogen (NOx) and carbon monoxide (CO). PM is the main pollutant of concern from the mining operations with smaller amounts of gaseous emissions mainly released from vehicle and other mining equipment.

The impact of particles on human health is largely dependent on: (i) particle characteristics, particularly particle size and shape, and chemical composition; and (ii) the duration, frequency and magnitude of exposure. The potential of particles to be inhaled and deposited in the lung is a function of the particle size, shape and density. Airborne particulate matter may range from relatively uniform soil particles (e.g. during dust storms) to very complex mixtures of extremely small organic and inorganic particles and liquid droplets (e.g. industrial sites). These particles could be made up of a number of components, including salts and acids (such as sulfates and nitrates), organic chemicals, metals, and soil or dust particles. The nasal openings permit large dust particles (less than few mm's) to enter the nasal region, along with much finer airborne particulates. Larger particles are deposited in the nasal region by impaction on the hairs of the nose or at the bends of the nasal passages.

Smaller particles, typically less than 10 µm, pass through the nasal region and are deposited in the tracheobronchial and pulmonary regions. Particles are removed by impacting with the wall of the bronchi when they are unable to follow the gaseous streamline flow through subsequent bifurcations of the bronchial tree. As the airflow decreases near the terminal bronchi, the smallest particles (less than 2.5 µm) are removed by Brownian motion, which pushes them to the alveolar membrane (CEPA/FPAC Working Group, 1998; Dockery & Pope, 1994).

Ambient air pollution PM can therefore be divided into three classes based on their size:

- *Inhalable coarse particulate matter* (PM10) consists of particles with a diameter between 2.5 and 10 micrometres (µm) that deposit efficiently along the airways. Particles larger than 10 µm are generally not inhaled into the lungs. These particles are typically found near roadways and dusty industries.

- *Fine particulate matter* (PM2.5) consists of particles with a diameter less than 2.5 µm and can be inhaled deeply into the lungs. These particles can be directly emitted from sources such as vegetation fires, or they can form when gases emitted from power plants, industries and automobiles react in the air.

- *Ultrafine particles* (PM0.1) consist of particles with a diameter smaller than 0.1 µm and have widespread deposition within the respiratory tract. These particles are typically as a result of secondary chemical reactions in the atmosphere.

Air quality standards and guidelines for airborne particulates are given for various particle size fractions, including total suspended particulates (TSP), and thoracic (PM10) and respirable (PM2.5) particulates.

Metals associated with chromium mining include chromite and to a lesser extent iron, aluminium, titanium, nickel, cobalt and platinum.

8.11 NOISE

8.11.1 POTENTIAL SENSITIVE RECEPTORS

Potential sensitive receptors within the study area (indicated in Figure 60), include individual households and residential areas (i.e. Nkaneng, Photsaneng, and Waterkloof).

Figure 60: Potential sensitive receptors within the study area.

8.11.2 ENVIRONMENTAL NOISE PROPAGATION AND ATTENUATION POTENTIAL

8.11.2.1 ATMOSPHERIC ABSORPTION AND METEOROLOGY

The main meteorological parameters affecting the propagation of noise include wind speed, wind direction and temperature. These along with other parameters such as relative humidity, air pressure, solar radiation and cloud cover affect the stability of the atmosphere and the ability of the atmosphere to absorb sound energy.

Wind speed increases with altitude. This results in the 'bending' of the path of sound to 'focus' it on the downwind side and creating a 'shadow' on the upwind side of the source. Depending on the wind speed, the downwind level may increase by a few dB but the upwind level can drop by more than 20 dB (Brüel & Kjær Sound & Vibration Measurement A/S, 2000). It should be noted that at wind speeds of more than 5 m/s, ambient noise levels are mostly dominated by wind generated noise.

Meteorological data from WRF1 data, for the period 2022 to 2024, was used for the baseline assessment. During the day the predominant wind direction is from the northern sector with the predominant wind direction during the night from the east-southeast. On average, noise impacts are expected to be more notable to the south during the day and to the west-northwest during the night.

Temperature gradients in the atmosphere create effects that are uniform in all directions from a source. On a sunny day with no wind, temperature decreases with altitude and creates a 'shadowing' effect for sounds. On a clear night, temperatures may increase with altitude thereby 'focusing' sound on the ground surface. Noise impacts are therefore generally more notable during the night.

8.11.2.2 TERRAIN, GROUND ABSORPTION AND REFLECTION

Noise reduction caused by a barrier (i.e., natural terrain, installed acoustic barrier, building) feature depends on two factors namely the path difference of a sound wave as it travels over the barrier compared with direct transmission to the receiver and the frequency content of the noise (Brüel & Kjær Sound & Vibration Measurement A/S, 2000).

Sound reflected by the ground interferes with the directly propagated sound. The effect of the ground is different for acoustically hard (e.g., concrete or water), soft (e.g., grass, trees or vegetation) and mixed surfaces. Ground attenuation is often calculated in frequency bands to take into account the frequency content of the noise source and the type of ground between the source and the receiver (Brüel & Kjær Sound & Vibration Measurement A/S, 2000). Based on observations made during the visit to site, ground cover was found to be acoustically mixed.

8.11.3 BASELINE NOISE SURVEY

8.11.3.1 SITE SELECTION

Survey sites were selected after careful consideration of future activities, accessibility, potential noise sensitive receptors, and safety restrictions. A total of 6 survey sites were selected for the survey conducted in April 2025. The locations of the survey sites are provided in Figure 61.

Figure 61: Location of the noise survey sites.

8.11.3.2 MEASURED NOISE LEVELS

The first noise survey campaign was undertaken on the 7th to the 9th of April 2025. The survey results are summarised in Table 27 and visually presented in Figure 62 (day-time results) and Figure 63 (night-time results).

The acoustic climate in the area is mainly influenced by insects, vehicle traffic and mining activities. Day-time noise survey results indicate that the acoustic climate in the study area is within the draft Environmental Noise Standards for urban areas. The night-time noise survey levels measured in the study area exceed the draft Environmental Noise Standards for urban areas at Site 1, Site 2, and Site 5.

Table 27: Project baseline environmental noise survey results summary.

Sampling point	Visual and acoustic observations	General weather conditions	Time of day	Start date and time	Duration	LAFmax (dBA)	LAFmin (dBA)	LAeq (dBA)	LAIeq (dBA)	LA90 (dBA)	LAeq,d and LAeq,n[(a)]	Draft Noise Standards (dBA)
Site 1	Survey site is located at a housing complex inside the mine boundary. Noise sources include insects, road traffic, and mining operations.	Winds of 0.7 m/s (N); 19.4°C; 77% humidity; 40% cloud cover	Day	2025/04/08 20:12	00:15:02	64.0	41.3	47.5	55.2	44.4	47.5	55
		Winds of 0.2 m/s; 22°C; 68% humidity; 60% cloud cover	Day	2025/04/09 18:50	00:15:07	72.7	28.2	47.4	47.5	30.8		
		No wind; 21.2°C; 67% humidity; 25% cloud cover	Night	2025/04/07 23:02	00:20:01	76.2	41.1	51.4	50.6	43.2	**48.9**	45
		No wind; 22°C;										

Sampling point	Visual and acoustic observations	General weather conditions	Time of day	Start date and time	Duration	LAFmax (dBA)	LAFmin (dBA)	LAeq (dBA)	LAIeq (dBA)	LA90 (dBA)	LAeq,d and LAeq,n[(a)]	Draft Noise Standards (dBA)
		63% humidity; 25% cloud cover	Night	2025/04/08 23:23	00:20:08	64.7	37.9	42.2	56.9	39.1		
Site 2	Survey site is located at settlement. Noise sources include insects and mining activities.	No wind; 21.7°C; 69% humidity; 40% cloud cover	Day	2025/04/08 21:20	00:15:07	65.3	42.3	47.1	55.5	44.6	46.0	55
		Winds of 0.2 m/s; 22°C; 66% humidity; 60% cloud cover	Day	2025/04/09 19:59	00:15:03	58.4	33.0	44.4	46.3	36.7		
		No wind; 22.1°C; 66% humidity; 10% cloud cover	Night	2025/04/08 00:52	00:20:02	70.0	29.2	38.0	46.7	33.0	**46.7**	45

Sampling point	Visual and acoustic observations	General weather conditions	Time of day	Start date and time	Duration	LAFmax (dBA)	LAFmin (dBA)	LAeq (dBA)	LAIeq (dBA)	LA90 (dBA)	LAeq,d and LAeq,n[(a)]	Draft Noise Standards (dBA)
		No wind; 20°C;										
		70% humidity; 50% cloud cover	Night	2025/04/08 22:03	00:20:05	77.8	42.9	49.4	54.8	45.9		
Site 3	Survey site is located near a homestead on a farm. Noise sources include insects, and road traffic.	No wind; 23.5°C; 71% humidity; 50% cloud cover	Day	2025/04/07 21:27	00:15:22	84.7	36.3	50.9	47.8	38.6	53.9	55
		Winds of 0.7 m/s (N); 19.7°C; 73% humidity; 60% cloud cover	Day	2025/04/08 17:59	00:15:01	65.8	44.5	55.6	56.7	50.0		
		No wind; 22.3°C;	Night	2025/04/08 02:28	00:20:02	62.9	31.8	45.3	52.7	34.5	43.5	45

Sampling point	Visual and acoustic observations	General weather conditions	Time of day	Start date and time	Duration	LAFmax (dBA)	LAFmin (dBA)	LAeq (dBA)	LAIeq (dBA)	LA90 (dBA)	LAeq,d and LAeq,n[(a)]	Draft Noise Standards (dBA)
		68% humidity; 40% cloud cover										
		No wind; 21°C;										
		74% humidity; 50% cloud cover	Night	2025/04/09 01:08	00:20:02	61.2	33.4	40.4	56.2	36.1		
Site 4	Survey site is located near farmstead ~1km from the N4. Noise sources include insects, community activity and road traffic.	Winds of 0.1 m/s; 22.8°C; 72% humidity; 50% cloud cover	Day	2025/04/07 20:53	00:15:01	80.0	38.9	51.4	55.6	43.4	54.6	55
		Winds of 0.5 m/s (N); 20°C; 70% humidity; 60% cloud cover	Day	2025/04/08 18:21	00:15:01	68.9	44.8	56.4	56.2	48.9		

Sampling point	Visual and acoustic observations	General weather conditions	Time of day	Start date and time	Duration	LAFmax (dBA)	LAFmin (dBA)	LAeq (dBA)	LAIeq (dBA)	LA90 (dBA)	LAeq,d and LAeq,n[(a)]	Draft Noise Standards (dBA)
		No wind; 22.4°C; 63% humidity; 40% cloud cover	Night	2025/04/08 02:00	00:20:03	62.0	27.0	36.9	46.8	29.4	38.4	45
		No wind; 21°C;										
		74% humidity; 60% cloud cover	Night	2025/04/09 00:38	00:20:09	71.5	31.5	39.5	55.2	34.9		
Site 5	Survey site is located at a homestead next to the mine and close to the N4. Noise sources include insects, community	Winds of 0.4 m/s; 21°C; 68% humidity; 60% cloud cover	Day	2025/04/08 19:34	00:15:02	54.2	39.2	45.1	49.9	43.0	44.2	55
		Winds of 0.7 m/s (N); 22°C; 72%	Day	2025/04/09 18:00	00:15:02	60.0	31.5	43.0	48.2	36.7		

Sampling point	Visual and acoustic observations	General weather conditions	Time of day	Start date and time	Duration	LAFmax (dBA)	LAFmin (dBA)	LAeq (dBA)	LAIeq (dBA)	LA90 (dBA)	LAeq,d and LAeq,n[(a)]	Draft Noise Standards (dBA)
	activity, mining activities and road traffic.	humidity; 60% cloud cover										
		No wind; 22.3°C; 70% humidity; 25% cloud cover	Night	2025/04/07 22:05	00:20:24	59.5	40.6	47.2	49.6	43.0	**45.8**	45
		No wind; 22.4°C; 67% humidity; 40% cloud cover	Night	2025/04/09 00:02	00:20:02	70.2	37.2	43.8	56.1	40.0		
Site 6	Survey site located near informal	No wind; 22.5°C; 65% humidity; 40% cloud cover	Day	2025/04/08 20:46	00:15:06	62.8	35.6	40.3	47.8	37.1	39.0	55

Sampling point	Visual and acoustic observations	General weather conditions	Time of day	Start date and time	Duration	LAFmax (dBA)	LAFmin (dBA)	LAeq (dBA)	LAIeq (dBA)	LA90 (dBA)	LAeq,d and LAeq,n[(a)]	Draft Noise Standards (dBA)
	settlement near the mine. Noise sources include insects, and other mining operations.	No wind; 20°C; 63% humidity; 75% cloud cover	Day	2025/04/09 19:25	00:15:15	58.4	27.6	37.1	46.0	30.9		
		No wind; 21.4°C; 65% humidity; 25% cloud cover	Night	2025/04/08 00:03	00:20:01	65.3	34.6	39.6	48.1	36.4	39.1	45
		No wind; 20°C;										
		78% humidity; 50% cloud cover	Night	2025/04/08 22:43	00:20:03	63.3	31.2	38.6	49.3	33.1		

(a) Exceedances of the IFC residential noise level guideline is provided in bold

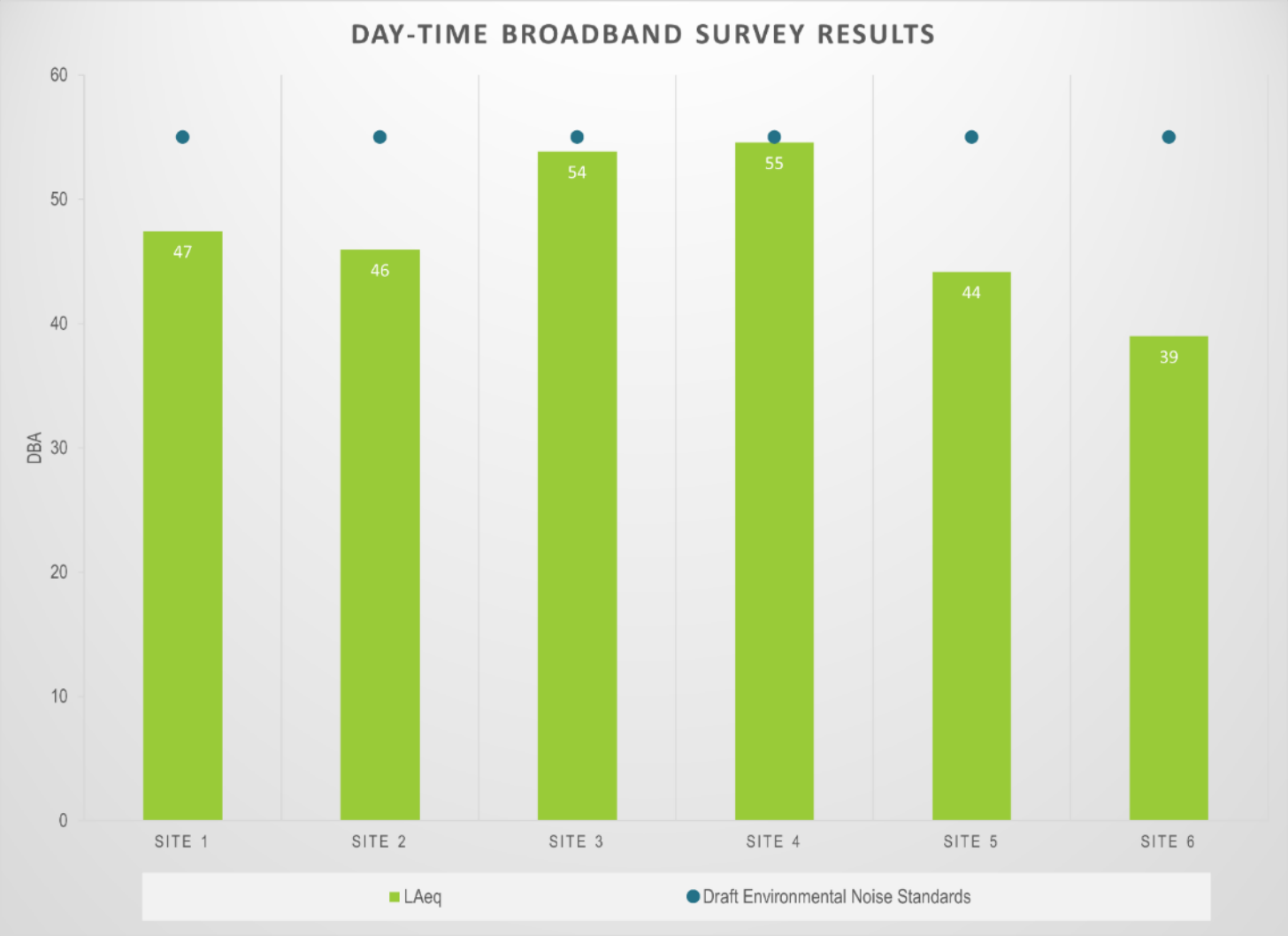


Figure 62: Day-time broadband survey results.

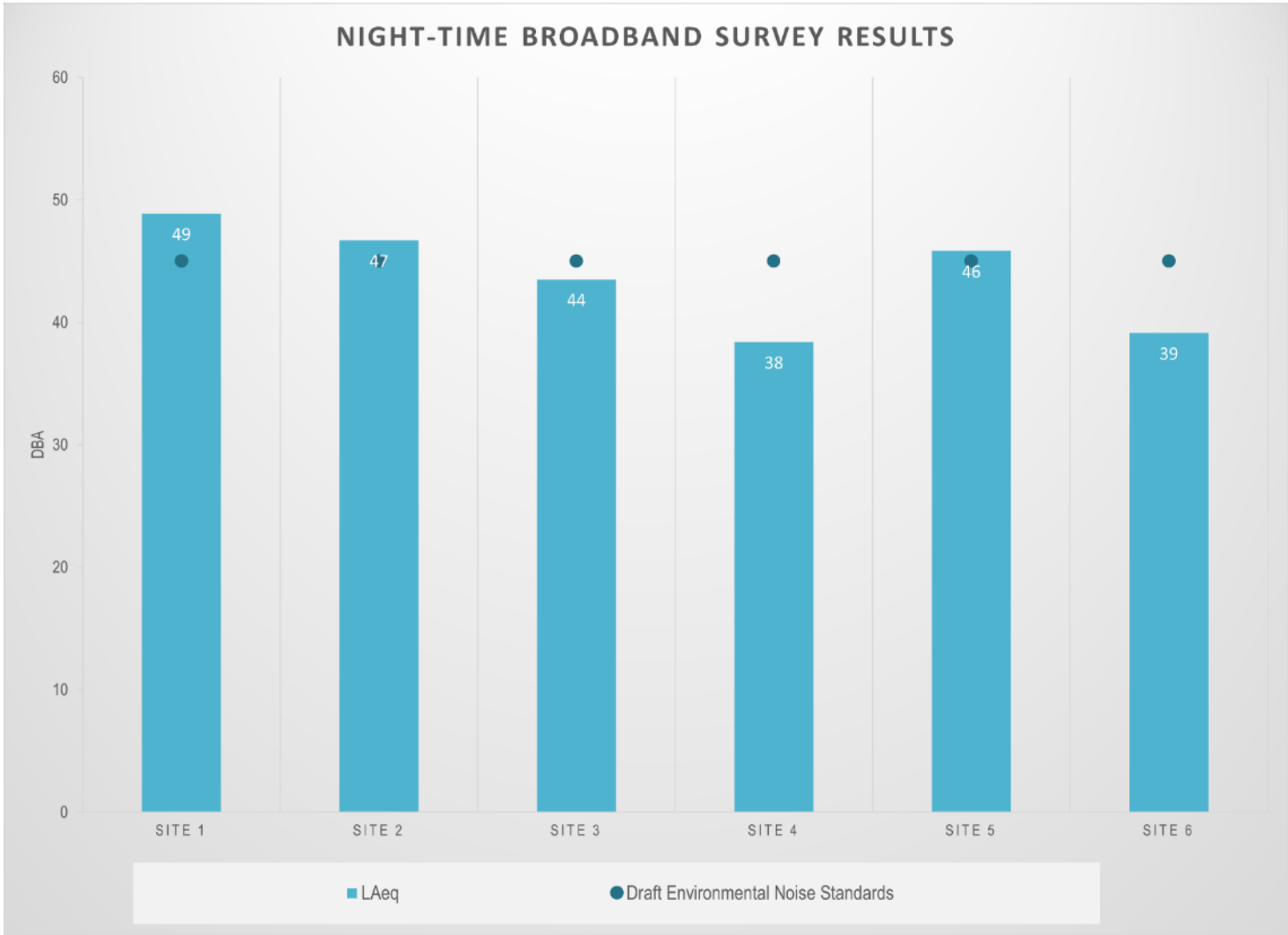


Figure 63: Night-time broadband survey results.

8.11.4 SENSITIVITY AREAS

The sensitivity zones for the study area for construction, operation and closure phases may be classified as follows:

- Industrial areas:
    - Medium sensitivity: 100 m from project activity;
    - Low sensitivity: 200 m from project activity.
- Residential areas:
    - High sensitivity: 500 m from project activity;
    - Medium sensitivity: 1000 m from project activity; and,
    - Low sensitivity: 2000 m from project activity.

9 ENVIRONMENTAL IMPACT ASSESSMENT

This section aims to identify and do a preliminary assessment on the potential environmental impacts associated with the proposed RCM project. This impact assessment will be used to guide the identification and selection of preferred alternatives, and management and mitigation measures, applicable to the proposed activities. The preliminary assessment will also serve to focus the subsequent EIA phase on the key issues and impacts.

9.1 IMPACT ASSESSMENT METHODOLOGY

The impact significance rating methodology, as presented herein is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The broad approach to the significance rating methodology is to determine the significance (S) of an environmental risk or impact by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relating this to the probability/ likelihood (P) of the impact occurring. The S is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the S to determine the overall final significance rating (FS). The impact assessment will be applied to all identified alternatives.

9.1.1 DETERMINATION OF ENVIRONMENTAL RISK

The final significance (FS) of an impact or risk is determined by applying a prioritisation factor (PF) to the post-mitigation environmental significance. The significance is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$\boldsymbol{C = \frac{(E + D + M + R) * N}{4}}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 28 below.

Table 28: Criteria for Determining Impact Consequence

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact

Aspect	Score	Definition
Extent	1	Activity (i.e. Highly localised, limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property or site boundary, or the area within a few hundred meters of the site)
	3	Local (i.e. beyond the site boundary within the Local administrative boundary (e.g. Local Municipality) or within consistent local geographical features, or the area within 5 km of the site)
	4	Regional (i.e. Far beyond the site boundary, beyond the Local administrative boundaries within the Regional administrative boundaries (e.g. District Municipality), or extends into different distinct geographical features, or extends between 5 and 50 km from the site).
	5	Provincial / National / International (i.e. extends into numerous distinct geographical features, or extends beyond 50 km from the site).
Duration	1	Immediate (<1 year, quickly reversible)
	2	Short term (1-5 years, less than project lifespan)
	3	Medium term (6-15 years)
	4	Long term (15-65 years, the impact will cease after the operational life span of the project)
	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction/ operation/ decommissioning).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected, or affected environmental components are already degraded)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; moderate improvement for +ve impacts; or where change affects area of potential conservation or other value, or use of resources).
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease; high improvement for +ve impacts; or where change affects high conservation value areas or species of conservation concern)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts; or disturbance to pristine areas of critical conservation value or critically endangered species)
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.

Aspect	Score	Definition
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring very high time and cost.
	5	Irreversible Impact.

Once the C has been determined, the significance is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 29.

It is noted that both environmental risks as well as environmental impacts should be identified and assessed. Environmental Risk can be regarded as the potential for something harmful to happen to the environment, and in many instances is not regarded as something that is expected to occur during normal operations or events (e.g. unplanned fuel or oil spills at a construction site). Probability and likelihood are key determinants or variables of environmental risk. Environmental Impact can be regarded as the actual effect or change that happens to the environment because of an activity and is typically an effect that is expected from normal operations or events (e.g. vegetation clearance from site development results in loss of species of concern). Typically, the probability of an unmitigated environmental impact is regarded as highly likely or certain (management and mitigation measures would ideally aim to reduce this likelihood where possible). In summary, environmental risk is about what could happen, while environmental impact is about what does happen.

Table 29: Probability/ Likelihood Scoring

Probability		
	2	Low probability (Unlikely, impact could occur but not realistically expected; >5% and <20% chance).
	3	Medium probability (Possible, the impact may occur; >20% and <50% chance).
	4	High probability (Likely, it is most probable that the impact will occur- > 50 and <90% chance).
	5	Definite (Almost certain, the impact is expected to, or will, occur, >90% chance).

The result is a qualitative representation of relative significance associated with the impact. Significance is therefore calculated as follows:

$$\boldsymbol{S = C\,x\,P}$$

Table 30: Determination of Significance

Consequence	5- Very High[5]	5	10	15	20	25
	4- High	4	8	12	16	20
	3- Medium	3	6	9	12	15
	2- Low	2	4	6	8	10

[5] In the event that an impact or risk has very high or catastrophic consequences, but the likelihood/ probability is low, then the resultant significance would be Low-medium. This does in certain instances detract from the relative important of this impact or risk and must consequently be flagged for further specific consideration, management, mitigation, or contingency planning.

	1- Very low	1	2	3	4	5
		1- Improbable	2- Low	3- Medium/ Possible	4- High/ Probable	5- Highly likely/ Definite
	Probability					

The outcome of the significance assessment will result in a range of scores, ranging from 1 through to 25. These significance scores are then grouped into respective classes as described in Table 31Table 31.

Table 31: Significance Scores

S Score	Description
≤4.25	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
>4,25, ≤8.5	Low-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>8.5, ≤13.75	High-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>13.75	High (i.e. where the impact will have a significant environmental risk/ reward).

The impact significance will be determined for each impact without relevant management and mitigation measures (pre-mitigation significance), as well as post implementation of relevant management and mitigation measures (post-mitigation significance). This allows for a prediction in the degree to which the impact can be managed/mitigated.

9.1.2 IMPACT PRIORITISATION

Further to the assessment criteria presented in the section above, it is necessary to consider each potentially significant impact in terms of:

Cumulative impacts; and

The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impacts' post-mitigation significance (post-mitigation). This prioritisation factor does not aim to detract from the significance ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the post-mitigation significance based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 32: Criteria for Determining Prioritisation

Cumulative Impact (CI)	**Low (1)**	**Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.**
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.

Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 33Table 32. The impact priority is therefore determined as follows:

$$\boldsymbol{Priority = CI + LR}$$

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to Table 34.

Table 33: Determination of Prioritisation Factor

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375
6	1.5

In order to determine the final impact significance (FS), the PF is multiplied by the post-mitigation significance scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a higher significance).

Table 34: Final Environmental Significance Rating

Significance Rating	Description
<-25	**Very High (Impacts in this class are extremely significant and pose a very high environmental risk. In certain instances these may represent a fatal flaw. They are likely to have a major influence on the decision and may be difficult or impossible to mitigate. Offset's may be necessary.**
<-13.75 to -25	High negative (These impacts are significant and must be carefully considered in the decision-making process. They have a high environmental risk or impact and require extensive mitigation measures).
-8.5 to -13.75	Medium-High negative (i.e. Impacts in this class are more substantial and could have a significant environmental risk. They may influence the decision to develop in the area and require more robust mitigation measures).

Significance Rating	Description
<-4.25 to <-8.5	Medium- Low negative (i.e. These impacts are slightly more significant than low impacts but still do not pose a major environmental risk. They might require some mitigation measures but are generally manageable).
-1 to -4.25	Low negative (i.e. Impacts in this class are minor and unlikely to have a significant environmental risk. They do not influence the decision to develop in the area and are typically easily mitigated.
0	No impact
1 to 4.25	Low positive
>4.25 to <8.5	Medium-Low positive
8.5 to 13.75	Medium-High positive
>13.75	High positive

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

9.2 IMPACTS IDENTIFIED

This Section presents the potential impacts that have been identified during the scoping phase assessment. It should be noted that this report will be made available to I&AP's for review and comment and their comments and concerns will be addressed in the final Scoping report submitted to the CA for adjudication. The results of the public consultation will be used to update the identified potential impacts which will be further refined during the course of the EIA assessment and consultation process.

Potential environmental impacts were identified during the scoping process. These impacts were identified by the EAP, the appointed specialists, as well as the public. Table 35 provides the list of potential impacts identified.

Without proper mitigation measures and continual environmental management, most of the identified impacts may potentially become cumulative, affecting areas outside of their originally identified zone of impact. The potential cumulative impacts have been identified, evaluated, and mitigation measures suggested which will be updated during the detailed EIA level investigation.

When considering cumulative impacts, it is important to bear in mind the scale at which different impacts occur. There is potential for a cumulative effect at a broad scale, such as regional deterioration of air quality, as well as finer scale effects occurring in the area surrounding the activity. The main impacts which have a cumulative effect on a regional scale are related to the transportation vectors that they act upon. For example, air movement patterns result in localised air quality impacts having a cumulative effect on air quality in the region. Similarly, water acts as a vector for distribution of impacts such as contamination across a much wider area than the localised extent of the impacts source. At a finer scale, there are also impacts that have the potential to result in a cumulative effect, although due to the smaller scale at which these operate, the significance of the cumulative impact is lower in the broader context.

Table 35: Identified environmental impacts

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
Site preparation (Construction)	Vegetation clearance Planned placement of infrastructure Topsoil stripping	○ Erosion ○ Dust pollution ○ Sedimentation	○ Temporary disturbance of wildlife	○ Dust ○ Noise	○ Disturbance/ destruction of archaeological sites or historic structures (if any)
Human resources management (Construction)	Employment/recruitment I&AP consultations Environmental awareness training HIV/AIDS Awareness programmes Integration with Municipalities' strategic long-term planning			○ Employment opportunities. ○ Health impacts.	
Earthworks (Construction)	Stripping and stockpiling of soils Levelling, grubbing and bulldozing Removal of waste and cleared vegetation Preparing trenches and foundations Establishing storm water management measures Establishment of firebreak	○ Erosion due to storm water runoff ○ Soil compaction and erosion due to topsoil stripping ○ Surface and ground water contamination ○ Loss of fertility ○ Loss of flow paths ○ Emissions and dust ○ Impacts on wetlands	○ Loss/ destruction of natural habitat and potential of loss of Species of Conservation Concern (SCC) ○ Introduction/ Invasion by Alien Species ○ Displacement of faunal species	○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e. noise, dust, etc.). ○ Safety and security (i.e. access to properties, theft, fire hazards, etc.). ○ Impact on existing infrastructure (i.e. roads, fences, etc.) ○ Health impacts due to dust and noise ○ Perceptions and expectations ○ Employment opportunities	○ Disturbance/ destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
Civil Works (Construction)	Establishment of infrastructure and services Mixing of concrete and concrete works Establishment of dewatering pipelines Sewage and sanitation Establishment of waste area Access control and security General site management	○ Erosion due to storm water runoff ○ Impact due to topsoil stripping ○ Surface ground water contamination ○ Loss of fertility ○ Loss of flow paths ○ Emissions and dust ○ Impacts on wetlands	○ Loss/ destruction of natural habitat ○ Introduction/ Invasion by Alien Species ○ Displacement of faunal species	○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e. noise, dust, etc.). ○ Safety and security (i.e. access to properties, theft, fire hazards, etc.). ○ Impact on existing infrastructure (i.e. roads, fences, etc.) ○ Perceptions and expectations ○ Employment opportunities	○ Disturbance/ destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils
Underground and Opencast Mining (Construction and Operation)	Land clearing (scraping, dozing, excavating) Materials handling (i.e. tipping, off-loading and loading, conveyor transfer points) Vehicle entrainment from haul roads Drilling and blasting Generation of general and hazardous waste Handling and storage of hazardous substances used in mining	○ Undermining and subsidence ○ Particulates and dust emissions, with small amounts of oxides of nitrogen (NOx), carbon monoxide (CO), SO_2, methane and CO^2 being released during blasting operations; ○ Soil erosion from wind over open areas ○ Pollution of water resources	○ Disturbance of fauna due to accidental killing, noise, vibration, fly rock and dust, as well a lighting on nocturnal animals ○ Impact of dust and particulate matter emissions on surrounding vegetation and agricultural crops and farm animals.	○ Visual impact and impact on sense of place. ○ Noise and vibration. ○ Impact of emissions, noise, vibration, fly rock, on surrounding land uses including agriculture and residential areas and single homesteads. ○ Health and safety of surrounding residents and employees of the mine.	

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
		○ Surface and groundwater contamination ○ Impacts on wetlands ○ Water and soil pollution due to hazardous and general waste inappropriately handled.			
Beneficiation of ore to extract chrome and other metals (Operation)	Generation and storage of general and hazardous waste Emissions Maintenance and management of stormwater system Pollution control dams Handling and storage of hazardous substances Crushing, screening, hauling of ore	○ Dust and particulate matter reduce air quality ○ Waste may pollute the environment if not handled, stored and disposed of correctly	○ Disturbance of fauna due to accidental killing, noise, vibration and dust, as well a lighting on nocturnal animals ○ Impact of dust and particulate matter emissions on surrounding vegetation and agricultural crops and farm animals.	○ Visual impact and impact on sense of place. ○ Noise and vibration. ○ Impact of emissions, noise, vibration on surrounding land uses including agriculture and residential areas and single homesteads. ○ Health and safety of surrounding residents and employees of the mine	○
Deposition at TSF and WRD (Operation)	Deposition of tailings and waste rock Maintenance and management of stormwater system Water management	○ Subsidence effects ○ Risk of TSF failure ○ Impacts on surface and/or groundwater quality due to leachate and potential spillages ○ Loss of fertility	○ Loss/ destruction of natural habitat ○ Introduction/ Invasion by Alien Species ○ Displacement and killing of faunal species	○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e. noise, dust, etc.). ○ Safety aspects related to radiation and health as well as stability.	○ Damage to surrounding heritage resources in the instance of dam failure

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
		○ Loss of flow paths ○ Emissions and dust			
Closure and Rehabilitation of mining infrastructure, TSF, pollution control dams, stormwater system, WRDs etc. (Decommissioning and Closure)	Revegetation Slope stabilisation Erosion control Water resource management Backfilling of open cast areas	○ Emissions and dust ○ Impacts on surface and/or groundwater ○ Soil erosion	○ Alien and invasive species ○ Impacts on faunal species ○	○ Visual ○ Safety and security (i.e. access to properties, theft, fire hazards, etc.). ○ Perceptions and expectations ○ Visual and dust ○ Loss of permanent employment ○ Temporary employment creation	
Maintenance (Post closure)	Initiate maintenance and aftercare program Environmental aspect monitoring	○ Emissions and dust ○ Erosion ○ Surface and groundwater quality	○ Alien and invasive species ○ Vegetation establishment	○ Visual ○ Site security and access control	

9.3 DESCRIPTION AND PRELIMINARY ASSESSMENT OF IMPACTS

The following potential impacts were identified during the scoping phase assessment and were assessed in terms of nature, significance, consequence, extent, duration and probability. These preliminary impact descriptions and calculations will be subject to amendment based on the EIA phase assessment and the results of public consultation undertaken during the Scoping as well as EIA phases. Preliminary mitigation / management measures to minimise potential negative impacts or enhance potential benefits are put forward in this Scoping Report and will be adjusted where relevant during the EIA phase, once detailed specialist assessments are concluded and input from the public has been considered. Table 36 provides a summary of the preliminary impact assessment and significance ratings.

9.3.1 CONSTRUCTION PHASE IMPACTS

9.3.1.1 AIR QUALITY

- ***#1[6]: Air pollution as a result from dust generation activities and gaseous emissions from vehicles and equipment.***

Potential existing impacts on air quality was identified through documentation received from the applicant and the specialist baseline information on air quality. Sources of emissions from the baseline include active ventilation shafts, materials handling points, crushing and screening, vehicle entrainment on unpaved roads, and windblown dust from the topsoil and ore stockpiles, TSF, WRD and existing opencast areas within RCM operation as well as from surrounding mining operations.

Existing sources of emissions near the study area include mining and processing activities, farming and residential land-uses that occur in the region. These land-uses contribute to baseline pollutant concentrations via vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute to background fine particulate concentrations within the South African boundary (Andreae, *et al*., 1996; Garstang, Tyson, Swap, & Edwards, 1996; Piketh, Annegarn, & Kneen, 1996).

Fugitive emissions from opencast and underground mining operations typically comprise of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas, drilling and blasting. These activities mainly result in particulates and dust emissions, with small amounts of oxides of nitrogen (NOx), carbon monoxide (CO), SO_2, methane and CO^2 being released during blasting operations.

Tharisa Chrome and Platinum mine is located approximately 5 km to the east of RCM's surface boundary with a dormant mine directly to the east. Samancor western chrome mine is roughly 8 km to the east. Further afield are Bleskop Mines, Kroondal Mine, and Rustenburg Platinum Mine. Anglo Platinum Smelter Operation (Waterval Smelter) and Impala Platinum are all located around Rustenburg, about 20 km to the west-northwest. Rhovan Vanadium is to the north of Brits and Vanchem to the east, both with associated mining operations. Most of the smelters have mining operations associated with it, with tailings storage facilities, unpaved roads and other materials handling activities generating dust.

Air pollution from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, and secondary, those pollutants formed in the atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. Notable primary pollutants emitted by vehicles include CO^2, CO, hydrocarbons (HCs), SO_2, NOx, DPM and Pb. Secondary pollutants include: NO_2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene

[6] *These numbers refers to the identifier of each impact in the impact assessment summary in Table 36.*

emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field.

Both small and heavy private and industrial vehicles travelling along the N4 as well as the unpaved roads, are notable sources of vehicle tailpipe emissions.

Additional air quality impacts that will result from the construction of the new infrastructure at the mine during the construction phase, will involve dust generation activities such as land clearing, vehicle entrainment on gravel and temporary roads and from wind erosion on bare areas and from vehicle emissions from construction vehicles.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent and magnitude of the impact. The impact is unlikely to cause an irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore medium-low. Preliminary mitigation measures are listed in Table 36Table 36.

9.3.1.2 NOISE & VIBRATION

- ***#5: Increased noise and vibrations from earth-moving equipment affecting nearby communities and wildlife.***

Existing impacts from noise and vibration in and near the study area is mainly caused by insects, vehicles and mining machinery.

Additional noise and vibration impacts that will result from the construction of the new infrastructure at the mine during the construction phase, will involve vibration and noise from earth-moving equipment and vehicles for the removal of vegetation and land clearing and other construction vehicles. More accurate impact and noise levels that may be expected as a result of the construction activities, will be quantified by the noise specialist during the EIA phase and will be included in the EIA Report.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. The impact is unlikely to cause an irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore low. Preliminary mitigation measures are listed in Table 36.

9.3.1.3 TERRESTRIAL BIODIVERSITY

The following potential impacts on the biodiversity were identified and considered for the construction phase of the mine project. This phase refers to the period during construction when the proposed infrastructure is constructed or upgraded. This phase usually has the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered.

- ***#8: Destruction, loss and fragmentation of the vegetation community***

Through site clearing, more of the vegetation communities will be lost. Unmitigated, this will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion.

- Activities that will contribute to this impact:
    - Driving/ moving outside of designated areas;
    - Physical removal of vegetation;
    - Temporary site establishment (laydown, chemical toilets etc.);
    - Soil dust precipitation as a result of site establishment;
    - Dumping of waste products;
    - Hydrocarbon storage and leakages; and

        - Random events such as fire (cooking fires or cigarettes).
    - Cumulative Impacts
        - Further loss of EN vegetation type.
    - Irreplaceable Loss of Resources
        - Loss of EN vegetation type; and
        - Loss of CBA, ESA and NPAES areas.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to medium-high post-mitigation, mainly by reducing the duration and probability ratings of the impact. The impact is likely to cause an irreplaceable loss of resources, but the value of these resources is limited and the cumulative impact is rated as medium. The final significance is therefore higher and rated as high. These ratings will be confirmed during the EIA phase. Preliminary mitigation measures are listed in Table 36 and further mitigation options will be explored to lower the final significance score.

- ***#9: Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching)***

Faunal community will be influenced in a number of ways, including the loss of habitat, disturbances that will either make them move out of the area if possible or have to adapt and possible deaths due to physical harm or indirect harm.

    - Activities that will contribute to this impact:
        - Clearing of vegetation;
        - Roadkill due to vehicle collision;
        - Pollution of water resources due to dust effects and run-off;
        - Intentional killing of fauna for food (hunting) or otherwise (killing of snakes);
        - Disease caused by increased dust levels;
        - Increase in pest species in the area due to new food source created; and
        - Vibrations, noise and rock chips skidding out due to the construction activities.
    - Cumulative Impacts
        - Loss of usable water resources for fauna species; and
        - Loss of viable habitat.
    - Irreplaceable Loss
        - Irreplaceable loss of the following resources:
        - Loss of usable water resources for fauna species resulting in loss of fauna species.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to a slightly lower medium-high rating post-mitigation, mainly by reducing the magnitude of the impact. The impact is unlikely to cause an irreplaceable loss of resources, and the cumulative impact is rated as medium. The final significance is therefore a slightly higher medium-high rating. These ratings will be confirmed during the EIA phase. Preliminary mitigation measures are listed in Table 36 and further mitigation options will be explored to lower the final significance score.

- ***#10: Clearing of vegetation leading to soil erosion and loss of topsoil***

Erosion will lead to the loss of vegetation, the removal/ relocation of the topsoil and the destruction of habitat.

  - Activities that will contribute to this impact:
    - Storm water runoff from roads, and other paved areas;
    - Vehicles driving outside demarcated areas;
    - Footpaths outside demarcated areas;
    - Clearing of vegetation;
    - Water runoff from areas with bare soil; and
    - Compacting of roads.
  - Cumulative Impacts
    - Removal of topsoil; and
    - Loss of habitat for indigenous species.
  - Irreplaceable Loss of Resources
    - Irreplaceable loss of the following resources:
    - Loss of CBA, ESA and NPAES areas.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to a slightly lower medium-low rating post-mitigation, mainly by reducing the extent, duration, reversibility and probability of the impact. The impact is unlikely to cause an irreplaceable loss of resources, and the cumulative impact is rated as medium. The final significance is therefore a slightly higher medium-high rating. These ratings will be confirmed during the EIA phase. Preliminary mitigation measures are listed in Table 36 and further mitigation options will be explored to lower the final significance score.

- ***#11: Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.***

Pollutants spilling or leaking into the surrounding area will result in the loss of usable water resources, the loss of fauna and flora species and the associated habitat.

  - Activities that will contribute to this impact:
    - Stormwater runoff from opencast areas; and
    - Pipeline leakages or damage.
  - Cumulative Impacts
    - Loss of usable water resources for fauna species; and
    - Loss of viable habitat.
  - Irreplaceable Loss of Resources
    - Irreplaceable loss of the following resources:
    - Loss of usable water resources for fauna species resulting in loss of indigenous species.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to a medium-low rating post-mitigation, mainly by reducing the magnitude, reversibility and

probability of the impact. The impact is likely to cause an irreplaceable loss of resources, but the value of these resources is limited, and the cumulative impact is rated as medium. The final significance is therefore a medium-low rating. Preliminary mitigation measures is included in Table 36.

- ***#12: Introduction of alien species, especially plants***

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. It can also contribute to the spreading of potentially dangerous diseases due to invasive - and pest species. Overall, the fauna assemblage will be changed.

  - Activities that will contribute to this impact:
    - Vegetation removal and disturbance of soil;
    - Vehicles potentially spreading seed;
    - Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive; and
    - Eating area increasing pest species such as rats and flies.
  - Cumulative Impacts
    - Loss of habitat for indigenous species; and
    - Spread of disease to surrounding areas.
  - Irreplaceable Loss of Resources
    - Irreplaceable loss of the following resources:
    - Loss of CBA, ESA and NPAES areas.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced low rating post-mitigation, mainly by reducing the extent, duration magnitude, reversibility and probability of the impact. The impact is unlikely to cause an irreplaceable loss of resources, and the cumulative impact is rated as medium. The final significance is therefore a slightly higher low significance rating. Preliminary mitigation measures is included in Table 36.

9.3.1.4 IMPACTS ASSOCIATED WITH WETLANDS

- ***#21: Indirect loss, disturbance and degradation of wetlands.***

The development of the project will result in the loss of watercourse habitats where infrastructure traverses or is placed inside of the wetland.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of these resources is limited. and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#22: Increased bare surfaces, runoff and potential for erosion***

The clearing of topsoil and vegetation will be required for the installation and placement of infrastructure, which may result in more bare areas, especially during construction. Stormwater may then cause potential erosion.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to a lower medium-low rating post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of

resources, but the value of these resources is limited. and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher medium-low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#23: Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation.***

The development across and/or within wetlands can also cause a disruption to the biotic community structure due to the fragmentation and deterioration of habitat. Thus, the loss, fragmentation and/or deterioration of wetland habitat will reduce the level of ecosystem service benefit provided by the affected systems.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of these resources is limited. and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore medium-low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#24: Increased sediment loads to downstream reaches.***

The development of the area in proximity of the watercourses would also create erosion hotspots which could contribute to the sedimentation of any receiving watercourses.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of these resources is limited. and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a medium-low low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#25: Contamination of wetlands***

Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste. During the construction phase ablution facilities may leak or spill during transportation within the wetland areas.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of these resources is limited. and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher medium-low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#26: Alteration of hydrological regime.***

Hydrological regime refers to the long-term pattern of water flow in a river or stream, influenced by factors such as climate, topography, and human activities. Construction of infrastructure in proximity to watercourses and located on a suitable slope could create preferential flow paths, causing increased surface run-off volumes and velocities causing erosion to the area and therefore impact on the long-term pattern of water flow in river or stream which may in turn have impacts on the health of the water course and ecosystem.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of these resources is limited. and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher low significance rating. Preliminary mitigation measures are listed in Table 36.

9.3.1.5 HYDROPEDOLOGY

Soil erosion, sedimentation or overland flows can occur due to increased traffic on the surface during the construction phase which can also result in compaction and surface sealing. Overland flow and potential erosion of terrestrial and wetlands soils can occur which can lead to loss of fertile topsoil. Soil erosion can also contribute to water pollution and siltation of rivers. Surface sealing will also promote head cutting instreams and loss of fertile topsoil. Existing sealed areas can intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the water regimes negatively, even though the impact should be acceptable. The draw-down effect on the water flows can also occur impacting the water regimes as well especially on the proposed opencast pits.

- ***#30: Soil compaction, Soil erosion, Land degradation – Associated Infrastructure***

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the duration, magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher medium-low rating. Preliminary mitigation measures are listed in Table 36.

- ***#34: Decrease in subsurface lateral flow and return flow - Associated Infrastructure.***

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent, duration and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher medium-low rating. Preliminary mitigation measures are listed in Table 36.

- ***#38: Soil compaction, Soil erosion, Land degradation - Opencast Mining Activities.***

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent, duration, magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher medium-low rating. Preliminary mitigation measures are listed in Table 36.

- ***#42: Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.***

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent, duration, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore calculated as having a medium-high significance. Preliminary mitigation measures are listed in Table 36.

9.3.1.6 SURFACE WATER RESOURCES DEGRADATION AND POLLUTION

- ***#47: Infrastructure within Floodlines: Altering the beds, banks, course or characteristics of a watercourse.***

The development of the project may result in the loss of watercourse habitats where infrastructure traverses or is placed inside of the 1:100 year floodline of a watercourse. Hydrological regime refers to the long-term pattern of water flow in a river or stream, influenced by factors such as climate, topography, and human activities. Construction of infrastructure in proximity to watercourses and located on a suitable slope could create preferential flow paths, causing increased surface run-off volumes and velocities causing erosion to the area and

therefore impact on the long-term pattern of water flow in river or stream which may in turn have impacts on the health of the water course and ecosystem.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of these resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher medium-low rating. Preliminary mitigation measures are listed in Table 36.

9.3.1.7 CULTURAL & HERITAGE IMPACTS

- ***#53: Potential destruction of Late Iron Age (LIA) Archaeological sites***

Depending on the final layout of the infrastructure and opencast areas, the LIA sites may be destroyed or disturbed by construction activities. The EIA phase impact study and all specialist studies will provide clearer guidance on the exact impact on these sites and whether the impact can be avoided. If the impact cannot be avoided, the mitigation hierarchy will be followed to lower the potential negative impact.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as low. The final significance is therefore a slightly higher low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#54: Potential destruction of historical homesteads with potential infant burial***

Depending on the final layout of the infrastructure and opencast areas, the historical homesteads with potential infant burial sites may be destroyed or disturbed by construction activities. The EIA phase impact study and all specialist studies will provide clearer guidance on the exact impact on these sites and whether the impact can be avoided. If the impact cannot be avoided, the mitigation hierarchy will be followed to lower the potential negative impact.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as low. The final significance is therefore a slightly higher low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#55: Potential destruction of graveyards***

Depending on the final layout of the infrastructure and opencast areas, the graveyards may be destroyed or disturbed by construction activities. The EIA phase impact study and all specialist studies will provide clearer guidance on the exact impact on these graveyards and whether the impact can be avoided. If the impact cannot be avoided, the mitigation hierarchy will be followed to lower the potential negative impact.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as low. The final significance is therefore a slightly higher low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#56: Potential destruction of historical Infrastructure***

Depending on the final layout of the infrastructure and opencast areas, the historical infrastructure may be destroyed or disturbed by construction activities. The EIA phase impact study and all specialist studies will provide clearer guidance on the exact impact on this infrastructure and whether the impact can be avoided. If the impact cannot be avoided, the mitigation hierarchy will be followed to lower the potential negative impact.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. The impact is unlikely to result in irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore a low significance rating. Preliminary mitigation measures are listed in Table 36.

9.3.1.8 PALAEONTOLOGICAL RESOURCES

- ***#57: Loss of Palaeontological Resources.***

The proposed Rustenburg Chrome Mine Project in North-West Province is underlain by Mathlagame Norite-Anorthosite and Bronzitite, Harzburgite and Norite of the Rustenburg Layered Suite (Bushveld Complex). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Rustenburg Layered Suite (Bushveld Complex) is Zero (Almond and Pether, 2009; Almond et al., 2013, Groenewald et al 2014). The suggested location is classified as having a Medium Palaeontology Theme Sensitivity in the DFFE (Department of Forestry Fisheries and the Environment) Screening Report. Updated Geology (Council of Geosciences) refined the geological map and indicate that the proposed development is underlain by the Schilpadnest and Vlakfontein Subsuite (Rustenburg Layered Subsuite of the Bushveld Complex).

Desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest in the development area is rare. A low significance has thus been allocated to the development footprint. This is in agreement with the Zero Palaeontological Sensitivity allocated to the development area by the SAHRIS Palaeontological Sensitivity Map.

A Low Palaeontological Significance has been allocated for impacts associated with the construction phase of the project pre-mitigation and post-mitigation. The construction phase will be the only development phase with the potential of impacting Palaeontological Heritage, and no significant impacts are expected to impact the Decommissioning phase. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The Cumulative impacts of the project is considered to be Low (as the area is not highly fossiliferous), and falls within the acceptable limits for the project. The project is also unlikely to cause any irreplaceable loss of resources. The final significance is low.

It is therefore considered that the proposed project will not lead to damaging impacts on the palaeontological resources of the area. The project may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required, pending the discovery of newly discovered fossils.

9.3.1.9 EMPLOYMENT & ECONOMIC CONTRIBUTIONS

- ***#60: Job creation and economic benefits for surrounding communities.***

The project will ensure job security for currently employed people, as they will be able to continue with their current jobs. This impact would be experienced on a wider level since it will allow them to meet the needs of their family members. It is not clear how long the construction phase will be, or how many jobs will be created, these numbers will be researched in the EIA phase of the application. The majority of jobs during the construction phase will expected to be unskilled or semi-skilled. Wages that employees receive will increase their spending power in the study area. This will be especially beneficial to retail and other service providers. The job creation will be a significant positive impact during the construction phase. There are some levels of poverty and unemployment in the area, and this may cause significant competition for jobs. Competition for jobs may cause significant conflict in the area, and therefore this aspect must be handled with care.

Apart from the direct economic impacts of the proposed project, there will also be secondary economic opportunities that can potentially benefit local service providers. The use of local service providers will ensure that the local economy benefits directly from the proposed project. The positive impact of the mine on the local economy will continue for the life of the mine. The SLP also commits to secondary economic development in the area, and if it is implemented as planned should be a significant contribution.

The preliminary scoping phase significance rating for this impact was rated as high+ pre-mitigation and post-mitigation. The impact is highly likely to provide important economic resources for the local community and the cumulative impact is rated as high. The final significance is therefore a slightly higher significance rating. Preliminary mitigation measures are listed in Table 36.

9.3.2 OPERATIONAL PHASE IMPACTS

9.3.2.1 AIR QUALITY

Potential existing impacts on air quality was identified through documentation received from the applicant and the specialist baseline information on air quality. Sources of emissions from the baseline include active ventilation shafts, materials handling points, crushing and screening, vehicle entrainment on unpaved roads, and windblown dust from the topsoil and ore stockpiles, TSF, WRD and existing opencast areas within RCM operation as well as from surrounding mining operations.

Existing sources of emissions near the study area include mining and processing activities, farming and residential land-uses that occur in the region. These land-uses contribute to baseline pollutant concentrations via vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute to background fine particulate concentrations within the South African boundary (Andreae, et al., 1996; Garstang, Tyson, Swap, & Edwards, 1996; Piketh, Annegarn, & Kneen, 1996).

Fugitive emissions from opencast and underground mining operations typically comprise of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas, drilling and blasting. These activities mainly result in particulates and dust emissions, with small amounts of oxides of nitrogen (NOx), carbon monoxide (CO), SO_2, methane and CO^2 being released during blasting operations.

Tharisa Chrome and Platinum mine is located approximately 5 km to the east of RCM's surface boundary with a dormant mine directly to the east. Samancor western chrome mine is roughly 8 km to the east. Further afield are Bleskop Mines, Kroondal Mine, and Rustenburg Platinum Mine. Anglo Platinum Smelter Operation (Waterval Smelter) and Impala Platinum are all located around Rustenburg, about 20 km to the west-northwest. Rhovan Vanadium is to the north of Brits and Vanchem to the east, both with associated mining operations. Most of the smelters have mining operations associated with it, with tailings storage facilities, unpaved roads and other materials handling activities generating dust.

Air pollution from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, and secondary, those pollutants formed in the atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. Notable primary pollutants emitted by vehicles include CO^2, CO, hydrocarbons (HCs), SO^2, NOx, DPM and Pb. Secondary pollutants include: NO_2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field.

Both small and heavy private and industrial vehicles travelling along the N4 as well as the unpaved roads, are notable sources of vehicle tailpipe emissions.

- ***#2: Air pollution as a result from dust generation activities (i.e. blasting, hauling, crushing, drilling and stockpiling).***

Additional air quality impacts that will result from the operation of the new infrastructure at the mine during the operational phase and from new opencast mining activities and areas will comprise mainly of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas, drilling

and blasting. These activities mainly result in particulates and dust emissions, with small amounts of oxides of nitrogen (NOx), carbon monoxide (CO), SO_2, methane and CO^2 being released during blasting operations.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to a slightly lower medium-high post-mitigation, mainly by reducing the extent and magnitude of the impact. The impact is likely to cause an irreplaceable loss of resources, however, these resources has a value that is limited, and the cumulative impact is rated as medium. The final significance is therefore a slightly lower than pre-mitigation significance, but slightly higher post-mitigation significance of medium-high. Preliminary mitigation measures are listed in Table 36.

- ***#3: Air Quality as a result from gaseous emissions from vehicles and equipment***

Additional air pollution from vehicle emissions during the operational phase may result. These may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, and secondary, those pollutants formed in the atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. Notable primary pollutants emitted by vehicles include CO^2, CO, hydrocarbons (HCs), SO_2, NOx, DPM and Pb. Secondary pollutants include: NO_2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent, magnitude and reversibility of the impact. The impact is unlikely to cause an irreplaceable loss of resources and the cumulative impact is rated as medium. The final significance is therefore a slightly higher medium-low significance. Preliminary mitigation measures are listed in Table 36.

9.3.2.2 NOISE & VIBRATION

- ***#6: Continuous low-frequency noise affecting local settlements and livestock.***

Existing impacts from noise and vibration in and near the study area is mainly caused by insects, vehicles and mining machinery.

Additional noise and vibration impacts that will result from the operation of the new infrastructure at the mine and the new mining activities, will involve vibration and noise from earth-moving equipment and vehicles for land clearing, blasting, hauling, crushing and drilling. More accurate impact and noise levels that may be expected as a result of the operational activities, will be quantified by the noise specialist during the EIA phase once more detailed activity and equipment descriptions is available, and will be included in the EIA Report.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. The impact is unlikely to cause an irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore low. Preliminary mitigation measures are listed in Table 36.

- ***#7: Regular blasting leading to structural damage in nearby properties and disturbance to communities.***

Additional or ongoing impacts leading to structural damage on nearby properties and disturbance to nearby communities will result from blasting. A more detailed assessment of the amount and frequency of blasting, as well as sensitive nearby buildings, will be provided and assessed during the EIA phase, once more detailed activity descriptions is available, and will be included in the EIA Report.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact.

The impact is unlikely to cause an irreplaceable loss of resources and the cumulative impact is rated as medium. The final significance is therefore medium-low. Preliminary mitigation measures are listed in Table 36.

- **BIODIVERSITY**

It is anticipated that daily activities associated with the operation phase will lead to further spread of alien and invasive plants, as well as the deterioration of the habitats due to the increase of traffic, dust and edge effect impacts. Dust reduces the ability of plants to photosynthesise and thus leads to degradation/retrogression of the veld. Moving maintenance vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions, the roads and fences lead to the barrier effect reducing movement and dispersal. Environmental pollution due to water/ mine drainage runoff is also expected during this phase.

- ***#13: Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting***

Through operation of the mine, more of the vegetation communities will be lost. Unmitigated, this will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion. Continued operations will result in disturbance to the faunal community through the production of noise, dust, artificial lightning, as well as other factors, such as direct mortality.

- Activities that will contribute to this impact:
  - Driving/ moving outside of designated areas;
  - Physical removal of vegetation and spread of AIPs;
  - Pollution (noise, light, dust, chemical, etc.);
  - Dumping of waste products; and
  - Direct persecution of wildlife.
- Cumulative Impacts
  - Further loss of EN vegetation type;
  - Loss of local wildlife.
- Irreplaceable Loss of Resources
  - Loss of EN vegetation type; and
  - Loss of CBA, ESA and NPAES areas.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. The impact is unlikely to cause an irreplaceable loss of resources and the cumulative impact is rated as medium. The final significance is therefore only slightly higher than post-mitigation, but again falls in the medium-high category. Preliminary mitigation measures are listed in Table 36.

- ***#14: Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.)***

Daily operation of the mine will result in increased risk of direct interactions between people and the local fauna community. This subsequently results in the increased risk of road mortalities, poaching and direct persecution. This may also increase of risk of harm to staff by wildlife through these interactions.

- Activities that will contribute to this impact:
  - Driving within the facility;
  - Poaching and setting of traps/placement of poisons;

        - Dumping of waste products; and
        - Direct persecution of wildlife due to fear and/or cultural beliefs.
    - Cumulative Impacts
        - Loss of local wildlife.
    - Irreplaceable Loss of Resources
        - Loss of local wildlife.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the magnitude, reversibility and probability ratings of the impact. The impact is unlikely to cause an irreplaceable loss of resources and the cumulative impact is rated as medium. The final significance is therefore only slightly higher medium-low significance than post-mitigation. Preliminary mitigation measures are listed in Table 36.

- ***#15: Environmental pollution due to water/ mine drainage runoff***

Pollutants spilling or leaking into the surrounding area will result in the loss of usable water resources, the loss of fauna and flora species and the associated habitat.

    - Activities that will contribute to this impact:
        - Stormwater runoff from opencast areas; and
        - Pipeline leakages or damage.
    - Cumulative Impacts
        - Loss of usable water resources for fauna species; and
        - Loss of viable habitat.
    - Irreplaceable Loss of Resources
        - Loss of usable water resources for fauna species resulting in loss of indigenous species.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. The impact is likely to cause an irreplaceable loss of resources, but the value of the resources is limited, and the cumulative impact is rated as medium. The final significance is therefore only slightly higher medium-low significance than post-mitigation. Preliminary mitigation measures are listed in Table 36.

- ***#16: Continuous stripping of topsoil for opencast mining, leading to ongoing land degradation, including erosion***

Ongoing opencast activities will result in the need to keep stripping topsoil. This will result in ongoing degradation of the surrounding habitats and increase the risk of erosion.

    - Activities that will contribute to this impact:
        - Opencast mining activities;
        - Clearing of vegetation;
        - Water runoff from areas with bare soil; and
        - Compacting of roads.

- Cumulative Impacts:
    - Removal of topsoil; and
    - Loss of habitat for indigenous species.
- Irreplaceable Loss of Resources
    - Irreplaceable loss of the following resources:
    - Loss of CBA, ESA and NPAES areas.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation and can be reduced, but only to a slightly lower medium-high post-mitigation, mainly by reducing the magnitude rating of the impact. The impact is unlikely to cause an irreplaceable loss of resources, and the cumulative impact is rated as medium. The final significance is therefore only medium-high. Preliminary mitigation measures are listed in Table 36. Further detailed mitigation measures will be explored during the EIA phase, which may impact the final significance.

- ***#17: Continued encroachment by alien and invasive plant species***

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. Overall, the flora assemblage will be changed.

- Activities that will contribute to this impact:
    - Vehicles potentially spreading seed;
    - Unsanitary conditions during infrastructure removal promoting the establishment of alien and/or invasive;
    - Vehicles driving outside demarcated areas; and
    - Footpaths outside demarcated areas.
- Cumulative Impacts
    - Loss of habitat; and
    - Loss of indigenous flora species due to competition.
- Irreplaceable Loss of Resources
    - Loss of habitat and food sources for Fauna.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation and can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility as well as the probability ratings of the impact. The impact is unlikely to cause an irreplaceable loss of resources, and the cumulative impact is rated as medium. The final significance is therefore only low. Preliminary mitigation measures are listed in Table 36.

9.3.2.3 HYDROPEDOLOGY

Soil erosion, sedimentation or overland flows can occur due to increased traffic on the surface during the operational phase, which can also result in compaction and surface sealing. Overland flow and potential erosion of terrestrial and wetlands soils can occur which can lead to loss of fertile topsoil. Soil erosion can also contribute to water pollution and siltation of rivers. Surface sealing will also promote head cutting instreams and loss of fertile topsoil. Existing sealed areas can intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the water regimes negatively, even though the impact should be acceptable. The draw-down effect on the water flows can also occur impacting the water regimes as well especially on the proposed opencast pits.

- ***#31: Soil compaction, Soil erosion, Land degradation – Associated Infrastructure***

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the duration and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher medium-low rating. Preliminary mitigation measures are listed in Table 36.

- ***#35: Decrease in subsurface lateral flow and return flow - Associated Infrastructure.***

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the duration and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly higher medium-low rating. Preliminary mitigation measures are listed in Table 36.

- ***#39: Soil compaction, Soil erosion, Land degradation - Opencast Mining Activities.***

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a medium-low. Preliminary mitigation measures are listed in Table 36.

- ***#43: Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.***

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a medium-low. Preliminary mitigation measures are listed in Table 36.

9.3.2.4 WATER RESOURCES & POLLUTION

- ***#27: Increased water inputs (clean) to downstream wetlands***

Increased water inputs (clean) to downstream wetlands may result from dewatering opencast mines, treating the water and releasing excess water into the watercourse. This increased water inputs may alter he functioning of the wetlands.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of these resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a medium-low. Preliminary mitigation measures are listed in Table 36.

- ***#48: Infrastructure within Floodlines: Damage caused to infrastructure as a result of flood event.***

Flood events can cause severe damage to infrastructure located within floodlines, leading to widespread disruption and long-term economic consequences. Roads, bridges and service networks such as water, electricity, and telecommunications are particularly vulnerable. Floodwaters can erode foundations, collapse structures, and short-circuit electrical systems, rendering essential services inoperable. This not only hampers emergency response and recovery efforts but also affects daily life and business continuity. In addition, the cost

of repairing or replacing damaged infrastructure can be immense, often requiring significant investment and time. Repeated flooding can further degrade infrastructure resilience, emphasizing the need for adaptive planning and flood-resistant design.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a medium-low. Preliminary mitigation measures are listed in Table 36.

- ***#49: Dewatering impacts on ground water table***

Several boreholes on site and surrounding the mine could be affected by the drawdown of the groundwater table, in that their yield and/or water levels might decrease due to open cast and underground mine dewatering. No private owned boreholes were identified within the 2 km hydrocensus radius.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to a slightly lower medium-high rating post-mitigation, mainly by reducing the extent, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of the resources is limited and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore medium-high, slightly lower pre-mitigation. Preliminary mitigation measures are listed in Table 36.

- ***#50: Water Quality Risks: Impacts on groundwater quality during mining***

Several boreholes surrounding the mine could be affected by the contamination emerging from the opencasts, stockpiles and Tailings Storage facilities. The water quality analysis results proved that the aquifer is already affected by mining operations through the elevated EC, Nitrate and Sulphate concentrations in monitoring boreholes on site. A detailed monitoring program needs to be implemented.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to a slightly lower medium-high rating post-mitigation, mainly by reducing the extent, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of the resources is limited and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore medium-high, slightly lower pre-mitigation. Preliminary mitigation measures are listed in Table 36.

9.3.2.5 SOCIO-ECONOMIC IMPACTS

- ***#59: Community Health & Safety: Risk of accidents related to mining activities and transport of hazardous materials.***

Community health and safety can be significantly impacted by the risks associated with mining operations and the handling and transport of hazardous materials. The movement of heavy machinery, drilling, blasting, and the handling of toxic substances pose serious threats to employees and nearby communities. Accidents involving the spillage or leakage of hazardous materials during transport can contaminate local water sources and soil, leading to long-term health issues. Additionally, increased traffic from mining vehicles raises the risk of road accidents, especially in areas with limited infrastructure. These dangers highlight the need for stringent safety protocols, effective emergency response plans, and continuous community engagement to mitigate risks and protect public health.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as low. The final significance is therefore low. Preliminary mitigation measures are listed in Table 36.

- ***#61: Job Continuation: Continuation of jobs at the mine if Life of Mine is extended and economic benefits for the surrounding communities.***

The project will ensure job security for currently employed people, as they will be able to continue with their current jobs. This impact would be experienced on a wider level since it will allow them to meet the needs of their family members. This will be especially beneficial to retail and other service providers. The job continuation will be a significant positive impact during the operational phase, since the country is experience unusually high unemployment rates currently.

Apart from the direct economic impacts of the continued mining activities, there will also be secondary economic opportunities that can potentially continue to benefit local service providers. The use of local service providers will ensure that the local economy benefits directly from the continuation of mining. The positive impact of the mine on the local economy will continue for the life of the mine. The SLP also commits to secondary economic development in the area, and if it is implemented as planned should be a significant contribution.

The preliminary scoping phase significance rating for this impact was rated as high+ pre-mitigation and post-mitigation. The impact is highly likely to provide important economic resources for the local community and the cumulative impact is rated as high. The final significance is therefore an even higher significance rating. Preliminary measures to enhance this beneficial impact are listed in Table 36.

- ***#62: Employment & Economic Contributions: Potential skills development and training programs for employees.***

Continued employment and economic contributions are closely tied to the implementation of skills development and training programs for employees. These initiatives not only enhance the technical capabilities and safety awareness of the workforce but also foster long-term career growth and job stability. By continuing to investing in training, the mine can cultivate a pool of skilled workers who are better equipped to operate advanced machinery, manage environmental risks, and uphold regulatory standards. This, in turn, contributes to improved operational efficiency and productivity. Moreover, such programs can uplift surrounding communities by creating employment opportunities and stimulating local economies, reinforcing the mine's role as a driver of socio-economic development. The authorisation of the proposed activities will allow the mine to continue current programs and potentially initiate new training and skills development programs and projects.

The preliminary scoping phase significance rating for this impact was rated as high+ pre-mitigation and post-mitigation. The impact is likely to provide important economic resources for the local community and the cumulative impact is rated as medium. The final significance is therefore an even higher significance rating. Preliminary measures to enhance this beneficial impact are listed in Table 36.

- ***#63: Livelihood & Land Use Conflicts: Reduced availability of arable land for farming due to mining expansion into southern areas.***

The expansion of mining operations into southern areas can lead to livelihood and land use conflicts, particularly due to the reduced availability of arable land for farming. This encroachment may disrupt agricultural activities that local communities rely on for food security and income. As fertile land is converted into mining zones, farmers may be forced to relocate or abandon their practices altogether, resulting in economic hardship and social tension. The loss of agricultural space also threatens local food systems and can increase dependency on external sources.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to medium-high post-mitigation, mainly by reducing the extent and reversibility ratings of the impact. It is unlikely that the impact will result in irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore medium-high. This impact rating may change when more information is available during the EIA phase. A precautionary approach was followed during the scoping phase assessment of the impact. Preliminary mitigation measures are listed in Table 36.

- ***#64: Livelihood & Land Use Conflicts: Competition for water resources between the mine and surrounding farmers.***

The expansion of the mine may intensify competition for vital water resources, leading to livelihood and land use conflicts between mining operations and surrounding farming communities. As the mine scales up, its demand for water—used in mineral processing, dust suppression, and other industrial activities—can strain local supplies, reducing availability for agricultural use. This creates tension with farmers who rely on consistent water access for irrigation and livestock, threatening crop yields and food security. In regions where water is already scarce, such competition can escalate into disputes over rights, access, and environmental stewardship, undermining traditional land uses and destabilising economies.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. It is unlikely that the impact will result in irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore low. Preliminary mitigation measures are listed in Table 36.

9.3.2.6 TAILINGS & WASTE ROCK MANAGEMENT

- ***#70: Risk of tailings dam failure causing serious environmental and socio-economic damage.***

The risk of tailings dam failure poses a serious threat to both the environment and surrounding communities. Tailings dams, which store waste materials from mineral processing, can release massive volumes of toxic sludge if breached, contaminating rivers, groundwater, and agricultural land. Such a disaster not only devastates ecosystems—killing aquatic life and degrading soil—but also disrupts livelihoods, displaces populations, and burdens local economies with costly cleanup and recovery efforts. The socio-economic fallout can be long-lasting, eroding trust in mining operations and prompting legal, regulatory, and reputational consequences for the companies involved.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as low. The final significance is therefore low. Preliminary mitigation measures are listed in Table 36.

Important. It should be noted that the potentially severe impact of a dam wall break on livelihoods is not adequately conveyed by the impact table since the probability is low, resulting in the impact appearing less significant than may be warranted.

- ***#71: Heavy metal leaching from waste rock dump affecting soil and water quality.***

Heavy metal leaching from chrome mine waste rock dumps poses a serious environmental hazard, particularly to soil and water quality in surrounding areas. As rainwater and groundwater percolate through these waste rock dumps, they can mobilize toxic elements such as chromium, lead, and cadmium, which then seep into nearby soils and water bodies. This contamination degrades soil fertility, harms aquatic ecosystems, and can render water unsafe for human consumption, agriculture, and livestock. Over time, the accumulation of heavy metals may lead to long-term ecological damage and health risks for local communities, especially where monitoring and remediation efforts are insufficient.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact is likely to result in irreplaceable loss of resources, but the resources value is limited, and the cumulative impact is rated as medium. The final significance is therefore low, post mitigation and taking into consideration prioritisation factors. Preliminary mitigation measures are listed in Table 36.

- ***#72: TSF footprint expansion resulting in permanent alteration of surface land use.***

The expansion of a mine's footprint often leads to the permanent alteration of surface land use, fundamentally transforming the landscape and its ecological functions. As mining operations grow, natural habitats, agricultural lands, and recreational areas may be replaced by opencast pits, waste rock dumps, tailings storage facilities, and

access and haul roads. This change is typically irreversible, disrupting local ecosystems, displacing wildlife, and limiting future land use options. In many cases, the altered terrain cannot be restored to its original condition, resulting in long-term impacts on biodiversity, water resources, and community livelihoods. Such transformations underscore the importance of careful land use planning and post-mining rehabilitation strategies.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resources, but the value of these resources is limited. The cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore low. Preliminary mitigation measures are listed in Table 36.

9.3.3 DECOMMISSIONING PHASE IMPACTS

9.3.3.1 AIR QUALITY

- ***#4: Increased dust from demolition activities.***

During the decommissioning phase of an underground and opencast chrome mine, increased dust generation from demolition activities can pose environmental and health challenges. As infrastructure such as processing plants, conveyor systems, and support buildings are dismantled, mechanical disruption of materials and the movement of heavy machinery release fine particulate matter into the air. This dust can reduce air quality, impair visibility, and pose respiratory risks to workers and nearby communities. Additionally, if not properly managed, dust can settle on surrounding vegetation and water bodies, potentially affecting local ecosystems.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, and can be reduced to a lower medium-low rating post-mitigation, mainly by reducing the extent and magnitude, ratings of the impact. It is unlikely that the impact may result in irreplaceable loss of resources. The cumulative impact is rated as low. The final significance is therefore medium-low. Preliminary mitigation measures are listed in Table 36.

9.3.3.2 BIODIVERSITY

Although beneficial overall, this phase can result in increased disruptions to the surrounding habitats and fauna community through the use of machinery and the removal of long term infrastructure. This phase also carries the risk of permanent environmental damage if not carried out correctly. A crucial component of this phase to manage risks is the correct and effective rehabilitation of habitats on site at mine closure.

- ***#18: Increased risk of soil erosion and instability due to removal of infrastructure***

The removal of infrastructure during this phase carries the same risks of the construction phase due to the reintroduction of heavy machinery for the removal and transport of infrastructure. Removal of long term infrastructure will result in soil erosion due to increased areas of bare ground that have not yet been rehabilitated and revegetated.

- Activities that will contribute to this impact:
  - Removal of infrastructure and associated areas of bare ground;
  - Movement of heavy vehicles and machinery through the site;
  - Footpaths outside demarcated areas;
  - Water runoff from areas with bare soil; and
  - Compacting of roads and areas that no longer house infrastructure.
- Cumulative Impacts
  - Areas of bare ground; and

        - Loss of habitat for indigenous species.
    - Irreplaceable Loss of Resources
        - Loss of CBA, ESA and NPAES areas.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, and can be reduced to a lower medium-low rating post-mitigation, mainly by reducing the extent, magnitude and probability ratings of the impact. It is unlikely that the impact may result in irreplaceable loss of resources. The cumulative impact is rated as low. The final significance is therefore medium-low. Preliminary mitigation measures are listed in Table 36.

- ***#19: Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting***

Through the removal of infrastructure during the closure of the mine, there is expected to be increased human traffic and movement of heavy vehicles and machinery. This phase carries the same risks as the construction phase in terms of pollution, such as chemical, noise, light and dust. These disruptions also carry the risk of impacting surrounding habitat.

    - Activities that will contribute to this impact:
        - Driving/ moving outside of designated areas;
        - Physical removal of vegetation and spread of AIPs;
        - Pollution (noise, light, dust, chemical, etc.); and
        - Dumping of waste products.
    - Cumulative Impacts
        - Further loss of EN vegetation type;
        - Loss of local wildlife.
    - Irreplaceable Loss of Resources
        - Loss of EN vegetation type; and
        - Loss of CBA, ESA and NPAES areas.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, and can be reduced to a low rating post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. It is unlikely that the impact may result in irreplaceable loss of resources. The cumulative impact is rated as medium. The final significance is therefore a lower medium-low. Rating than pre-mitigation, but higher due to the prioritization of cumulative impact significance. Preliminary mitigation measures are listed in Table 36.

9.3.3.3 SOIL AND LAND STABILITY RISKS

- ***#69: Subsidence issues from abandoned underground mining operations.***

Subsidence issues resulting from abandoned underground mining operations at a chrome mine can have serious negative impacts on both the bio-physical and socio-economic environment. Physically, the collapse or gradual sinking of land due to unsupported underground voids can lead to surface deformation, damage to ecosystems, and disruption of natural drainage patterns. This can result in soil instability, loss of vegetation, and contamination of nearby water resources through altered hydrology. Socio-economically, subsidence poses risks to infrastructure such as roads, buildings, and service lines, potentially endangering local communities and increasing maintenance costs. It can also reduce land usability for agriculture or development, lower property values, and create long-term safety concerns.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, and can be reduced to a low rating post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. It is likely that the impact may result in irreplaceable loss of resources, but the value of the resources is limited. The cumulative impact is rated as medium. The final significance is therefore a low. Preliminary mitigation measures are listed in Table 36.

9.3.3.4 HYDROPEDOLOGY

Soil erosion, sedimentation or overland flows can occur due to increased traffic on the surface during the decommissioning phase which can also result in compaction and surface sealing. Overland flow and potential erosion of terrestrial and wetlands soils can occur which can lead to loss of fertile topsoil. Soil erosion can also contribute to water pollution and siltation of rivers. Surface sealing will also promote head cutting instreams and loss of fertile topsoil. Existing sealed areas can intercept lateral flow paths and remove connectivity between recharge zones and lateral flow zones. Alteration of this flow path will likely change the water regimes negatively, even though the impact should be acceptable. The draw-down effect on the water flows can also occur impacting the water regimes as well especially on the opencast pits.

- ***#30: Soil compaction, Soil erosion, Land degradation – Associated Infrastructure***

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resources of high value, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly lower medium-low rating than the pre-mitigation rating. Preliminary mitigation measures are listed in Table 36.

- ***#34: Decrease in subsurface lateral flow and return flow - Associated Infrastructure.***

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly lower medium-low rating than the pre-mitigation rating. Preliminary mitigation measures are listed in Table 36.

- ***#38: Soil compaction, Soil erosion, Land degradation - Opencast Mining Activities.***

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly lower medium-low rating than the pre-mitigation rating. Preliminary mitigation measures are listed in Table 36.

- ***#42: Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.***

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore a slightly lower medium-low rating than the pre-mitigation rating. Preliminary mitigation measures are listed in Table 36.

9.3.3.5 WATER RESOURCES & POLLUTION

- ***#28: Degradation of wetland vegetation and proliferation of alien and invasive species.***

The decommissioning of infrastructure across and/or within and/or close to wetlands can also cause a disruption to the biotic community structure due to the fragmentation and deterioration of habitat. Thus, the loss, fragmentation and/or deterioration of wetland habitat will reduce the level of ecosystem service benefit provided by the affected systems.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore medium-low significance rating, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary mitigation measures are listed in Table 36.

- ***#29: Disruption of wetland soil profile, hydrological regime and increased sediment loads.***

Hydrological regime refers to the long-term pattern of water flow in a river or stream, influenced by factors such as climate, topography, and human activities. Decommissioning of infrastructure in proximity to watercourses and located on a suitable slope could create preferential flow paths, causing increased surface run-off volumes and velocities causing erosion to the area and therefore impact on the long-term pattern of water flow in river or stream which may in turn have impacts on the health of the water course and ecosystem. This may also disrupt the soil profile and cause increased sediment loads in the water courses.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to a lower medium-low rating post-mitigation, mainly by reducing the extent, duration, magnitude and reversibility ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore a lower medium-low significance rating pre-mitigation and slightly higher than the post-mitigation rating, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary mitigation measures are listed in Table 36.

- ***#51: Water Quality Risks: Impacts on groundwater quality during mining***

Several boreholes surrounding the mine could be affected by the contamination emerging from the opencasts, stockpiles and Tailings Storage facilities, PCDs during the decommissioning phase. The water quality analysis results proved that the aquifer is already affected by mining operations through the elevated EC, Nitrate and Sulphate concentrations in monitoring boreholes on site. A detailed monitoring program needs to be implemented also during the decommissioning phase.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore a lower medium-low significance rating, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary mitigation measures are listed in Table 36.

9.3.3.6 WASTE GENERATION & DISPOSAL

- ***#58: Large volumes of demolition waste requiring appropriate disposal.***

During the decommissioning phase large volumes of demolition waste pose a serious environmental and logistical challenge. The dismantling of infrastructure such as shafts, tunnels, processing plants, haul roads, and support buildings generates massive quantities of waste. This includes concrete, steel, timber, piping, insulation, and contaminated materials. Improper disposal can lead to leaching of hazardous substances (e.g., heavy metals, hydrocarbons) into surrounding soils and groundwater. Dust and particulate matter from demolition activities and waste transport can degrade air quality and affect nearby communities. Not all demolition waste is inert.

Some may be classified as hazardous due to chemical residues, oils, or asbestos, requiring specialized handling and disposal protocols. Municipal landfills may lack capacity or licensing to accept industrial waste, leading to illegal dumping or long-haul transport to distant facilities—both costly and carbon-intensive. Waste piles left unmanaged can disrupt local ecosystems, attract scavengers, and hinder natural rehabilitation of the mined area. Failure to manage demolition waste responsibly can result in non-compliance with environmental laws, fines, reputational damage, and community opposition to future mining projects.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore a medium-low significance rating, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary mitigation measures are listed in Table 36.

9.3.3.7 SOCIO-ECONOMIC

- ***#65: Community Safety & Security Risks: Illegal occupation of abandoned mine infrastructure.***

The illegal occupation of abandoned mine infrastructure poses serious risks to community safety and security. These sites, often left unsecured and structurally unstable, attract unauthorized individuals who may use them for shelter, criminal activity, or informal mining operations. Such occupation increases the likelihood of accidents, including cave-ins, exposure to hazardous materials, and fire outbreaks, endangering both occupants and nearby residents. Moreover, these areas can become hubs for illicit trade or violence, undermining law enforcement efforts and fostering a climate of fear and instability. The lack of oversight and proper rehabilitation of these sites exacerbates the problem, making it harder for communities to feel safe and for authorities to maintain public order.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore a low significance rating, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary mitigation measures are listed in Table 36.

- ***#66: Job Losses & Economic Decline: Retrenchments leading to social and economic hardship in local communities.***

Following mine closure, retrenchments can trigger indirect social and economic hardship within local communities. The sudden loss of employment disrupts household incomes, leading to increased poverty, food insecurity, and reduced access to essential services like healthcare and education. Small businesses that relied on mine workers as customers may also collapse, deepening the economic downturn. Over time, these challenges can erode community cohesion, fuel migration in search of work, and strain local government resources tasked with managing the fallout.

The preliminary scoping phase significance rating for this impact was rated as high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore a low significance rating, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary mitigation measures are listed in Table 36.

9.3.4 REHABILITATION AND CLOSURE PHASE IMPACTS

9.3.4.1 LAND RESTORATION & VEGETATION RECOVERY

- ***#20: Slow regrowth of natural vegetation and potential further spread of alien and invasive species.***

If not implemented correctly, rehabilitation may not be successful, resulting in ongoing degradation of the natural habitats adjacent to the project site through the spread of alien and invasive vegetation, as well as stormwater runoff and erosion. Without the implementation of a rehabilitation plan, the project site will not recover to a natural state that is capable of supporting local fauna once more and contributing the functioning of ecosystem.

- Activities that will contribute to this impact:
  - Previously modified areas left bare;
  - Ongoing spread of alien and invasive plants;
  - Dumping of decommissioning phase waste; and
  - Newly vegetated areas left unfenced.
- Cumulative Impacts
  - Further loss of EN vegetation type;
  - Loss of local wildlife.
- Irreplaceable Loss of Resources
  - Loss of EN vegetation type; and
  - Loss of CBA, ESA and NPAES areas.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to medium-low post-mitigation, mainly by reducing the duration, magnitude and probability ratings of the impact. It is unlikely that the impact may result in irreplaceable loss of resource and the cumulative impact is rated as low. The final significance is therefore is therefore a medium-low significance rating. Preliminary mitigation measures are listed in Table 36.

9.3.4.2 HYDROPEDOLOGY

- ***#33: Soil compaction, Soil erosion, Land degradation - Associated Infrastructure.***

Improper rehabilitation or failed rehabilitation of the decommissioned infrastructure areas, may have negative consequences on soil and land through causing soil erosion, compaction and degradation.

The preliminary scoping phase significance rating for this impact was rated as low pre-mitigation, but can be reduced to a lower low significance rating post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. It is unlikely that the impact will result in irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore is therefore a low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#37: Decrease in subsurface lateral flow and return flow - Associated Infrastructure.***

Improper rehabilitation or failed rehabilitation of the decommissioned infrastructure areas may have negative consequences including a decrease in subsurface lateral flow and return flow in soil profiles during rehab and closure.

The preliminary scoping phase significance rating for this impact was rated as low pre-mitigation, but can be reduced to a lower low significance rating post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. It is unlikely that the impact will result in irreplaceable loss of resources and the cumulative

impact is rated as low. The final significance is therefore is therefore a low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#41: Soil compaction, Soil erosion, Land degradation - Opencast Mining Activities.***

Improper rehabilitation or failed rehabilitation of the opencast areas, may have negative consequences on soil and land through causing soil erosion, compaction and degradation.

The preliminary scoping phase significance rating for this impact was rated as low pre-mitigation, but can be reduced to a lower low significance rating post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. It is unlikely that the impact will result in irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore is therefore a low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#45: Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.***

Improper rehabilitation or failed rehabilitation of the opencast areas, may result in a decrease in subsurface lateral flow and return flow in the soil profiles.

The preliminary scoping phase significance rating for this impact was rated as low pre-mitigation, but can be reduced to a lower low significance rating post-mitigation, mainly by reducing the magnitude and probability ratings of the impact. It is unlikely that the impact will result in irreplaceable loss of resources and the cumulative impact is rated as low. The final significance is therefore is therefore a low significance rating. Preliminary mitigation measures are listed in Table 36.

9.3.4.3 WATER RESOURCE MANAGEMENT

- ***#46: Remediation of contaminated water sources in the unlikely event of post closure contamination.***

During the rehabilitation and closure phase of the mine, the potential need for remediation of contaminated water sources—though considered unlikely—poses a significant environmental and financial risk. If post-closure contamination occurs, it can compromise local groundwater and surface water quality, affecting ecosystems and nearby communities that rely on these resources. Remediation efforts may involve complex and costly interventions such as pump-and-treat systems, constructed wetlands, or chemical treatments to neutralize pollutants. These activities can delay final closure certification, strain post-mining budgets, and erode public trust in the mine's environmental stewardship. Moreover, the long-term monitoring required to detect and address such contamination adds an enduring burden to closure planning and may necessitate institutional controls or legal liabilities that persist well beyond the operational life of the mine.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore a low significance rating. Preliminary mitigation measures are listed in Table 36.

- ***#52: Water Quality Risks: Impacts on groundwater quality during mining***

Several boreholes surrounding the mine could be affected by the contamination emerging from the opencasts, stockpiles and Tailings Storage facilities. The water quality analysis results proved that the aquifer is already affected by mining operations through the elevated EC, Nitrate and Sulphate concentrations in monitoring boreholes on site. A detailed monitoring program needs to be implemented.

The preliminary scoping phase significance rating for this impact was rated as medium-low pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore a slightly higher low significance

rating, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary mitigation measures are listed in Table 36.

9.3.4.4 ALTERNATIVE LAND USE OPPORTUNITIES

- ***#67: Potential conversion of rehabilitated land for agriculture, conservation, or community use.***

Following the closure of the mine, the successful rehabilitation of land presents a valuable opportunity for positive transformation. Once environmental restoration is complete—such as soil stabilization, re-vegetation, and water quality improvement—the land can be repurposed for productive agricultural use, supporting local food security and livelihoods. Alternatively, areas with restored ecosystems may be designated for conservation, enhancing biodiversity and creating green corridors that benefit wildlife and climate resilience. In some cases, the land can be converted into community assets like parks, educational centres, or recreational spaces, fostering social cohesion and long-term economic development. These adaptive reuses not only mitigate the legacy of mining but also empower surrounding communities with sustainable land-use options.

The preliminary scoping phase significance rating for this impact was rated as low-medium+ pre-mitigation, but can be increased to a high+ post-mitigation significance, mainly by increasing the extent, duration, magnitude, reversibility and probability ratings of the impact. It is highly likely that this impact will result in high value resources and increase the value of resources, but the cumulative impact is rated as low. The final significance is therefore is therefore a higher high significance rating than post-mitigation, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary measures to maximise the benefits of the impacts are listed in Table 36.

- ***#68: Opportunities for eco-tourism or renewable energy projects.***

After the closure of the mine, the rehabilitated land offers opportunities for eco-tourism and renewable energy development. Restored natural areas, such as revegetated zones, wetlands, and scenic open spaces, can be transformed into eco-tourism destinations that attract visitors for hiking, birdwatching, and educational tours, fostering environmental awareness and generating sustainable income for local communities. Simultaneously, the expansive, cleared land and existing infrastructure—such as roads and power connections—make ideal sites for renewable energy projects like solar farms or wind installations. These initiatives not only repurpose post-mining land for green innovation but also contribute to regional energy security and climate resilience, turning a once-extractive site into a hub of sustainable progress.

The preliminary scoping phase significance rating for this impact was rated as low-medium+ pre-mitigation, but can be increased to a high+ post-mitigation significance, mainly by increasing the extent, duration, magnitude, reversibility and probability ratings of the impact. It is highly likely that this impact will result in high value resources and increase the value of resources, but the cumulative impact is rated as low. The final significance is therefore is therefore a higher high significance rating than post-mitigation, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary measures to maximise the benefits of the impacts are listed in Table 36.

9.3.4.5 LONG-TERM ENVIRONMENTAL MONITORING NEEDS

- ***#73: TSF basement liner or capping failure resulting in contamination of the surface and/or groundwater resources.***

During the closure and rehabilitation phase of the mine, failure of the Tailings Storage Facility (TSF) basement liner or capping system can lead to serious environmental consequences. If the liner or cap is compromised, residual tailings—often containing heavy metals and other toxic substances—can leach into surrounding soils and infiltrate surface and groundwater resources. This contamination poses risks to aquatic ecosystems, agricultural productivity, and human health, particularly in communities reliant on these water sources. Remediation becomes complex and costly, involving extensive groundwater treatment, soil excavation, and long-term monitoring. Moreover, such failures can delay closure certification, erode stakeholder trust, and trigger legal liabilities, undermining the mine's legacy and rehabilitation objectives.

The preliminary scoping phase significance rating for this impact was rated as medium-high pre-mitigation, but can be reduced to low post-mitigation, mainly by reducing the extent, duration, magnitude, reversibility and probability ratings of the impact. The impact may result in irreplaceable loss of resource, but the value of the resources is limited, and the cumulative impact is rated as medium as it is probable that the impact will result in spatial and temporal cumulative change. The final significance is therefore is therefore a slightly higher low significance rating, taking the prioritisation factors into account (replaceability and cumulative impacts). Preliminary mitigation measures are listed in Table 36.

Table 36: Preliminary impact assessment summary and preliminary mitigation measures.

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance

1	Air pollution as a result from dust generation activities and gaseous emissions from vehicles and equipment.	Construction	Medium to high -	• Dust fall monitoring ensuring dust fall rate in compliance with the NDCR limits.
				• Mitigation measures aimed at reducing wind erosion from the active TSFs, WRDs etc. i.e. the grassing of TSF side slopes and open areas as soon as possible and concurrently.
				• Update of the current Dust Management Plan (DMP) follow an iterative process, including: implementation, monitoring, reporting, reviewing and adjustment to the necessary steps.
				  ○ The establishment of objectives and targets with regards to fugitive emissions are important to minimise the impacts of these emissions on the surrounding environment. The objective of the DMP generally is to reduce dust emissions within specific target ranges, by employing appropriate dust suppression strategies.
				  ○ Windblown dust from the current and future operations could be significant sources of dust emissions if not managed.
				  ○ Dust Management Measures: Target control efficiencies are presented for the main dust emission sources identified in the emissions inventory, so that the overall objective is achieved.
				• Wind Erosion
				  ○ Any approach that either binds the particles together and make it more resistant to wind erosion or reduce to the
					Medium to low -

2	Air pollution as a result from dust generation activities (i.e. blasting, hauling, crushing, and stockpiling).	Operation	Medium to high -		Medium to high -
3	Air Quality as a result from gaseous emissions from vehicles and equipment	Operation	Medium to high -		Medium to low -
4	Increased dust from demolition activities.	Decommissioning	Medium to low -		Medium to low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				force of the wind will result in a reduction in windblown dust emissions. ○ Surface treatment techniques to reduce dust generation include: wet suppression, chemical stabilisation, covering of surface with less erodible aggregate material and the vegetation of open areas. Wet suppression (the use of sprinklers) can achieve results in the short-term but will require constant maintenance and management to remain effective. ○ Substantial research has been done on erosion from tailings open cast pits etc. at chrome mines. Parameters which have the potential to impact on the rate of emission of fugitive dust include the extent of surface compaction, moisture content, ground cover, the shape of the storage pile, particle size distribution, wind speed and precipitation. Any factor that binds the erodible material or otherwise reduces the availability of erodible material on the surface, decreases the erosion potential of the fugitive source. High moisture contents, whether due to precipitation or deliberate wetting, promote the aggregation and cementation of fines to the surfaces of larger particles, thus decreasing the potential for dust emissions. Surface compaction and ground cover similarly reduces the potential for dust generation .	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				○ Rock cladding or armouring of the sides of tailings dams has been shown in various international studies to be effective in various instances in reducing wind erosion of slopes. ○ In addition, screens could be installed on the crest of the tailings dam walls mainly to act as windbreaks and to reduce the potential for dust deposition on the vegetated side walls, hence curbing the growth of the grass. ○ Vegetal cover retards erosion by binding the residue with a root network, by sheltering the residue surface and by trapping material already eroded. Vegetation is also considered the most effective control measure in terms of its ability to also control water erosion. In investigating the feasibility of vegetation types the following properties are normally taken into account: indigenous plants; ability to establish and regenerate quickly; proven effective for reclamation elsewhere; tolerant to the climatic conditions of the area; high rate of root production; easily propagated by seed or cuttings; and nitrogen-fixing ability. ○ The removal of the TSFs, WRDs would be the most effective mitigation measure, providing the exposed footprint be vegetated and rehabilitated.	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				○ Performance indicators are usually selected to reflect both the source of the emission directly (source monitoring) and the impact on the receiving environment (ambient air quality monitoring). Ensuring that no visible evidence of windblown dust exists represents an example of a source-based indicator, whereas maintaining off-site dust fall levels, at AQSRs. • It is recommended that the current dust fall monitoring network be maintained and updated where required, and the monthly dust fall results used as indicators to tract the effectiveness of the applied mitigation measures. Dust fall collection should follow the ASTM method as per the NDCRs. The ASTM method covers the procedure of collection of dust fall and its measurement and employs a simple device consisting of a cylindrical container exposed for one calendar month (30 ±2 days). • Periodic inspections and external audits are essential for progress measurement, evaluation, and reporting purposes. It is recommended that site inspections and progress reporting be undertaken at regular intervals (at least quarterly), with annual environmental audits being conducted. Annual environmental audits should be continued at least until closure. Results from site inspections and monitoring efforts should be combined to determine progress against source- and receptor-based performance indicators. Progress should be reported to all interested and affected parties	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				(I&APs), including authorities and persons affected by pollution. The criteria to be taken into account in the inspections and audits must be made transparent by way of minimum requirement checklists included in the management plan. Corrective action or the implementation of contingency measures must be proposed to the stakeholder forum in the event that progress towards targets is indicated by the quarterly/annual reviews to be unsatisfactory. • Stakeholder forums provide possibly the most effective mechanisms for information dissemination and consultation. Management plans should stipulate specific intervals at which forums will be held and provide information on how people will be notified of such meetings. Given the proximity of the study site to the nearby communities and farmsteads, it is recommended that such meetings be scheduled and held at least on an annual basis. A complaints register must be kept at all times.	
5	Increased noise and vibrations from earth-moving equipment affecting nearby communities and wildlife.	Construction	Medium to high -	• Existing mitigation measures as per the approved EMPr for the operational, decommissioning, closure and post-closure phases to continue being implemented; • Additional mitigation measures specific to the expansion activities to be added during the EIA phase, once all information is available and specialist studies are completed.	Low -
6	Continuous low-frequency noise affecting local settlements and livestock.	Operation	Medium to high -		Medium to low -
7	Regular blasting leading to structural damage in nearby	Operation	Medium to high -	• The Mandatory Code of Practice (COP) issued under the Mine Health and Safety Act (MHSA), which sets minimum standards should be implemented,	Medium to low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
	properties and disturbance to communities.			minimum standards for the following should be included in the EMPr: ○ Ground vibrations; ○ Noise; ○ Air-blast; ○ Flyrock. • Blasting design and control can limit charge size per delay to reduce vibration intensity. • The use of electronic detonators for precise timing and reduced peak particle velocity could be implemented. • Increase stemming length in blast holes to contain explosive energy. • Apply buffer zones between blasting sites and sensitive structures, based on vibration modelling. • Install seismographs at strategic locations to monitor ground vibrations and air-blast levels. • Conduct United States Bureau of Mines (USBM) analysis to compare measured vibrations against safe thresholds. • Use predictive modelling to estimate vibration impacts before each blast. • Offer free structural surveys to all properties within a defined radius (e.g., 500 m to 1 km). • Document existing cracks and structural conditions using photos, videos, and written reports. • Restrict blasting to weekday daytime hours; avoid weekends and public holidays. • Provide advance notice to affected communities, including: Blasting times and dates. • Audible warning signals before detonation.	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				• Establish a complaints and claims process for residents to report damage. • Maintain a log of blasting events, including vibration readings and community feedback. • Implement dust suppression and fume control measures. • Monitor and mitigate fly rock risks using blast mats or containment barriers. • Ensure compliance with air-blast noise limits to prevent hearing damage and structural stress. • Conduct regular community meetings to share monitoring results and address concerns. • Include local representatives in the environmental oversight committee. • Provide transparent access to blasting data and mitigation reports.	
8	Destruction, loss and fragmentation of the vegetation community and loss of SCC.	Construction	High -	• Mitigation measures and buffers must be implemented as stipulated in the wetland report (TBC, 2025). • The Norite Koppies Bushveld habitat must be avoided and designated as a 'no-go' area for the life of operation. • Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to already modified areas and should take up the smallest footprint possible. • It is recommended that areas to be developed/disturbed be specifically demarcated so that during the construction/activity phase, only the demarcated areas be impacted upon. • Areas of indigenous vegetation, even secondary communities outside of the direct project footprint,	High -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				should not be fragmented or disturbed further if possible. • All vehicles and personnel must make use of existing roads and walking paths as far as possible, especially construction/operational vehicles.	
9	Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	Medium to high -	• A qualified environmental control officer must be on site when activities begin. A site walk through must be performed by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources. • A dust management plan must be compiled and implemented. • Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and	Medium to high -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard. • Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. In this case, activities should take place during the day.	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				• Any holes/deep excavations must be dug in a progressive manner and should not be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling. • If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.	
10	Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	High -	• The clearing of vegetation must be minimised where possible. All activities must be restricted to within the authorised areas.	Medium to high -
11	Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	Medium to high -	• Materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. The water resources must to be protected and all activities	Medium to low -

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				that could result in a spill should occur away from them. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. • All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI. • All construction waste must be removed from site at the closure of the construction phase. • Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. • Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				controlled according to the waste management plan. • Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site. • Toilets at the recommended Health and Safety standards must be provided. These should be emptied regularly and once no longer required, they must be pumped dry to prevent leakage into the surrounding environment and removed from site. • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least. • Where a registered disposal facility is not available close to the PAOI, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits. • Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days.	
12	Introduction of alien species, especially plants	Construction	Medium to high -	• It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the	Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				spread of exotic or alien species or the illegal collection of plants. • An Alien Invasive Plant (AIP) Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in AIP composition. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.	
13	Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Operation	Medium to high -	• Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources. • A dust management plan must be compiled and implemented. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce	Medium to high -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. • All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • Discussions are required on sensitive environmental receptors within the PAOI in line with the Environmental Authorisation and within the EMPr. • Only existing access routes and walking paths may be made use of. All new roads must be authorised.	
14	Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.).	Operation	Medium to high -	• All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • Discussions are required on sensitive environmental receptors within the PAOI in line with the Environmental Authorisation and within the EMPr. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc. • Contractors and employees must all undergo the induction and must be made aware of any sensitive areas to be avoided. • Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible.	Medium to low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				• Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and controlled according to the waste management plan. • The Mine should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least. • Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days.	
15	Environmental pollution due to water/ mine drainage runoff.	Operation	Medium to high -	• A stormwater management plan must be compiled and implemented. • Clean and dirty stormwater channels should be developed and maintained.	Medium to low -
16	Continuous stripping of topsoil for opencast mining, leading to ongoing land degradation, including erosion	Operation	Medium to high -	• A stormwater management plan must be compiled and implemented. • Clean and dirty stormwater channels should be developed and maintained.	Medium to high -
17	Continued encroachment by alien and invasive plant species	Operation	High -	• It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants. • An Alien Invasive Plant (AIP) Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in AIP composition. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.	Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
18	Increased risk of soil erosion and instability due to removal of infrastructure.	Decommissioning	Medium to high -	• Stormwater and dust management plan implemented; • Rehabilitation plan to be approved by authorities and implemented.	Medium to low -
19	Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Decommissioning	Medium to low -	• Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources. • A dust management plan must be implemented. • Areas that are denuded during decommissioning need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. • All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • Discussions are required on sensitive environmental receptors within the PAOI in line with the Environmental Authorisation and within the EMPr.	Medium to low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				• Only existing access routes and walking paths may be made use of.	
20	Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	Medium to high -	• A habitat rehabilitation plan must be implemented, and areas of bare ground must be revegetated with species indigenous to the region. • Alien Invasive Plan to be implemented.	Medium to low -
21	Indirect loss, disturbance and degradation of wetlands.	Construction	Medium to low -	In light of the expected impacts from proposed activities the following mitigation measures have been proposed to lower the intensity of the impacts on the ecological integrity of the wetlands. • The focus of mitigation measures should be to reduce the significance of potential environmental impacts associated with the proposed development and thereby to: ○ Prevent the unnecessary destruction and fragmentation of the vegetation community of the wetland areas; and ○ Limit the construction area to the defined project areas and only impact those areas where it is unavoidable to do so otherwise. • Road construction specific mitigation measures. The following road construction specific mitigation measures are provided: ○ The road should incorporate stormwater management that aims to divert water into the downstream of adjacent watercourse in a manner that does not lead to erosion and sedimentation; and	Low -
22	Increased bare surfaces, runoff and potential for erosion.	Construction	Medium to low -		Medium to low -
23	Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation.	Construction	Medium to low -		Medium to low -
24	Increased sediment loads to downstream reaches.	Construction	Medium to low -		Medium to low -
25	Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste.	Construction	Medium to low -		Medium to low -
26	Alteration of hydrological regime.	Construction	Medium to low -		Low -
27	Increased water inputs (clean) to downstream wetlands	Operation	Medium to high -		Medium to low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
28	Degradation of wetland vegetation and proliferation of alien and invasive species.	Decommissioning	Medium to high -	○ Contamination of the watercourses with unset cement or bitumen should be negated as it is detrimental to aquatic biota. Mixing of materials should not take place within any of the delineated watercourses and spillage of unset materials into watercourse areas must immediately be remedied in an appropriate manner. ***Impact specific mitigation measures*** • Dewatering ○ Dewatering an opencast mine can significantly impact nearby wetlands and water resources. Implementing effective mitigation measures is crucial to minimize these impacts. The following dewatering specific mitigation measures are provided: ○ Dewatering must only take place into the PCD's to prevent erosion, water quality impairments and changes to natural flows; and ○ Treat dewatered water to remove contaminants before discharge, using methods such as filtration, sedimentation, and chemical treatment. • Direct and indirect loss of wetlands. Any activities within proximity to wetland systems have the potential to degrade these systems directly or indirectly either by improper conduct, negligence, or stochastic / uncontrolled / accidental events. The following measures have therefore been suggested	Medium to low -
29	Disruption of wetland soil profile, hydrological regime and increased sediment loads.	Decommissioning	Medium to low -		Medium to low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				to alleviate the potential for these impacts to occur on the delineated systems. ○ Restrict unauthorised and unnecessary activities within the wetlands and their respective buffers. No laydown areas or storage of equipment and material should be allowed within the wetlands and only activities necessary for construction of the relevant infrastructure (within watercourses) must be permitted. Authorised activities within the watercourse must be overseen by an ECO; ○ Minimise the disturbance footprint of the development or the proposed infrastructure areas and avoid land clearing outside of these areas to prevent indirect impact to the wetlands; ○ Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area; and ○ Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the making them aware of the overall site plan which should indicate sensitive areas, waste disposal areas and any other relevant project specifics. • Altering overland flow characteristics. During the construction and operational phase, alterations to the topography of the land will alter the surface	

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				flow patterns and in turn affect the hydrological dynamics of the wetland systems. Similarly, increased hardened surfaces, will drastically increase the overland flow in the local area of the infrastructure which will subsequently increase the water input to the wetlands. ○ Design and implement an effective stormwater management plan; ○ Re-vegetate denuded areas as soon as possible to increase surface roughness and promote infiltration; and ○ Regularly clear drains to prevent uncalled for accumulation of surface water and the establishment of concentrated flow paths out of the accumulation areas. • Erosion and sedimentation of catchment and downstream watercourses. The alteration of surface topography and hydrology for the project infrastructure will inevitably be accompanied by an increase in erosion and sedimentation as rainwater erodes and washes exposed soils (active working and exposed areas) into the downslope watercourse. ○ Loose soils are particularly prone to loss due to wind or water. It is therefore preferable that construction takes place during the dry season, where possible, to reduce the erosion potential of the exposed surfaces; ○ Practice good soil management across the construction footprint;	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				○ Implement a suitable stormwater management plan for the construction and operation phases; ○ Signs of erosion must be addressed immediately to prevent further erosion of the area to prevent head cut erosion from forming; ○ Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching; and ○ The rehabilitation of watercourse banks must take place following construction. Key areas where erosion has occurred should be rehabilitated through bank reprofiling to gentler gradients and the revegetation of the marginal and riparian areas. • Spread of alien invasive vegetation. Alien invasive vegetation is particularly opportunistic and has the potential to spread rapidly, especially in disturbed settings. These plants outcompete the natural vegetation and in turn alter the abiotic and biotic components of freshwater ecosystems. The control of such species is considered imperative in consideration of the proposed development and in maintaining the ecological integrity and functioning of such systems. ○ Implementation of an alien invasive management plan should be considered.	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				• Impaired water quality and pollution. impaired water quality can be detrimental to freshwater ecosystems and can be a result of several factors or activities, most commonly related to the use of harmful or hazardous substances such as fuels, oils, pesticides and herbicides. This impact has the potential to adversely affect the biotic component of the freshwater resources and will ultimately result in a degraded ecosystem with reduced functionality. ○ All chemicals and toxicants to be used for the construction must be stored outside the watercourse areas and their respective buffers, preferably on flat terrain and in a bunded area; ○ All machinery and equipment should be inspected regularly for faults and possible leaks, these should be out of watercourses and in a designated area that is flat and bunded; ○ Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems; ○ The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly; and ○ The stormwater management plan must aim to release only clean water in the environment.	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
30	Soil compaction, Soil erosion, Land degradation - Associated Infrastructure.	Construction	Medium to high -	***Hydropedology:*** • Subsurface drainage on associated infrastructure like the buildings or offices should be included in the water management plan for stormwater which can minimise overland flow from paved surfaces. This can also allow the roof water from the associated infrastructure like parking lots or offices to percolate and re-infiltrate. Pipe leakages need to be fixed and ensure measures are in place to prevent future leakages. Measures like contacting the responsible authorities immediately for sewage or faecal sludge pipelines associated with sanitation systems and having response guidelines. • The following measures can promote infiltration and percolation flows: ○ Minimise soil compaction and keep the soil covered with mulching residue (plant or gravel) and vegetative cover; ○ Infiltration basin or trench only where necessary can minimise surface overflows or runoffs and allow water that runs off from roofs to settle and re-infiltrate; ○ Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; ○ Application of good quality water downstream of watercourse where possible to ensure sufficient catchment water regime recharges especially on the opencast activities; and	Medium to low -
31	Soil compaction, Soil erosion, Land degradation - Associated Infrastructure.	Operation	Medium to low -		Medium to low -
32	Soil compaction, Soil erosion, Land degradation - Associated Infrastructure.	Decommissioning	Medium to low -		Medium to low -
33	Soil compaction, Soil erosion, Land degradation - Associated Infrastructure.	Rehab and Closure	Low -		Low -
34	Decrease in subsurface lateral flow and return flow - Associated Infrastructure.	Construction	Medium to high -		Medium to low -
35	Decrease in subsurface lateral flow and return flow - Associated Infrastructure.	Operation	Medium to low -		Medium to low -
36	Decrease in subsurface lateral flow and return flow - Associated Infrastructure.	Decommissioning	Medium to low -		Medium to low -
37	Decrease in subsurface lateral flow and return flow - Associated Infrastructure.	Rehab and Closure	Low -		Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
38	Soil compaction, Soil erosion, Land degradation - Opencast Mining Activities.	Construction	Medium to high -	○ Adhering to the recommended footprint buffers and wetland buffers or wetland rehabilitation measures if applicable.	Medium to low -
39	Soil compaction, Soil erosion, Land degradation - Opencast Mining Activities.	Operation	Medium to high -		Medium to low -
40	Soil compaction, Soil erosion, Land degradation - Opencast Mining Activities.	Decommissioning	Medium to low -		Medium to low -
41	Soil compaction, Soil erosion, Land degradation - Opencast Mining Activities.	Rehab and Closure	Low -		Low -
42	Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.	Construction	High -		Medium to high -
43	Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.	Operation	Medium to high -		Medium to low -
44	Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.	Decommissioning	Medium to low -		Medium to low -
45	Decrease in subsurface lateral flow and return flow - Opencast Mining Activities.	Rehab and Closure	Low -		Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
46	Remediation of contaminated water sources in the unlikely event of post closure contamination.	Rehab and Closure	Medium to high -	• Effective implementation of water remediation during mine closure should be ensured. This will require a combination of advanced technologies, site-specific planning, and long-term sustainability strategies. The following strategies could be investigated during the EIA phase and the most effective to be included in the Rehabilitation and Closure Plan: ○ Bioremediation: Utilize naturally occurring microorganisms to break down pollutants like heavy metals and hydrocarbons into less toxic forms. This method is cost-effective and environmentally friendly. ○ Membrane Filtration: Removes fine particulates and dissolved contaminants. ○ Advanced Oxidation Processes (AOPs): Use chemical reactions to degrade complex pollutants. ○ Passive Treatment Systems: Constructed wetlands and limestone drains can treat mine water with minimal maintenance. These are ideal for long-term, low-cost remediation post-closure. ○ pH Adjustment and Metal Precipitation: Tailor chemical treatments to neutralize acidity and remove metals like cadmium, nickel, and zinc based on site-specific water chemistry. ○ Stream Diversion and Hydrological Control: Redirect clean water away from contaminated zones to reduce treatment	Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				volumes and prevent further contamination. ○ Robust Regulatory Frameworks: Adhering to clear water quality standards and closure guidelines ensures accountability and encourages investment in innovative solutions. • Long-term monitoring will be required and to be included in the rehabilitation and closure plan.	
47	Altering the beds, banks, course or characteristics of a watercourse.	Construction	Medium to high -	• Refer to mitigation measures for the wetlands.	Medium to low -
48	Damage caused to infrastructure as a result of flood event.	Operation	Medium to high -	• Identify flood-prone areas using historical data, hydrological models, and topographic surveys. • Assess vulnerability of infrastructure (roads, bridges, buildings, utilities) to flooding. • Elevate critical infrastructure above known flood levels. • Use flood-resistant materials in construction (e.g., reinforced concrete, waterproof coatings). • Install proper drainage systems to divert floodwaters away from infrastructure. • Construct floodwalls, and embankments to protect key assets, where necessary, note that prior approval might be required. • Restore wetlands and natural floodplains to absorb excess water and reduce flood intensity. • Regularly inspect and maintain drainage systems, culverts, and embankments. • Install sensors and monitoring systems to detect rising water levels and structural stress.	Medium to low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				• Develop and implement flood response plans for infrastructure operators and local authorities. • Ensure backup systems (e.g., generators, alternate routes) are in place for critical services. • Promote green infrastructure (e.g., permeable pavements, green roofs) to reduce runoff.	
49	Dewatering impacts on ground water table	Operation	Medium to high -	• Aquifer testing of bore-holes to determine sustainable yields for pumping. This will prevent over abstraction. • Monitoring of abstraction volumes. • Implement scavenger boreholes to minimise contaminated plume migration. • Implement a detailed groundwater monitoring program. • Monitoring boreholes need to be drilled immediately downstream of the opencasts and Tailings Storage Facility to monitor if the current impacts on groundwater quality are worsening. The geophysical survey results should be used to site and to drill the monitoring boreholes in pairs (shallow and deep) to monitor flow and qualities in the shallow and deep aquifer. • Monitoring of these boreholes should commence as soon as possible after drilling. • The mine planning should consider concurrent rehabilitation of mine workings and waste management facilities, to maximise the areas of clean runoff that could seep to the groundwater. • Groundwater quantity and quality data should be collected on a regular, ongoing basis during mining operations. These data will be used to recalibrate and update the groundwater model, to prepare	Medium to high -
50	Impacts on groundwater quality during mining	Operation	Medium to high -		Medium to high -
51	Impacts on groundwater quality during mining	Decommissioning	Medium to low -		Medium to low -
52	Impacts on groundwater quality during mining	Rehab and Closure	Medium to low -		Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				monitoring and audit reports, to report to the regulatory authorities. • Should the above be insufficient to mitigate polluted groundwater, an interception by scavenger bore-holes will have to be considered.	
53	Potential destruction of Late Iron Age Archaeological sites	Construction	High -	• All mitigation measures that is currently in the approved EMPr and the approved EMPr for new activities to be developed during the EIA phase should be implemented. • The mitigation hierarchy should be followed as far as possible, starting with avoiding the areas where archaeological finds were discovered and may still be discovered. • Comments from the South African Heritage Resources Agency (SAHRA) should be obtained during the commenting period and all their recommendations and requirements to be implemented. • More detailed mitigation measures will be developed by the specialist during the EIA phase.	Low -
54	Potential destruction of historical homesteads with potential infant burial	Construction	High -		Low -
55	Potential destruction of graveyards	Construction	High -		Low -
56	Potential destruction of historical Infrastructure	Construction	Medium to high -		Low -
57	Loss of Palaeontological Resources.	Construction	Low -	• In the unlikely event that, Palaeontological Heritage is uncovered during surface clearing and excavations, the ECO/site manager must report the find to the South African Heritage Resources Agency (SAHRA) (Contact details: Heritage Western Cape, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. 3rd floor Protea Assurance Building, 142 Longmarket St, Cape Town City Centre, Cape Town, 8000; Private Bag X9067, Cape Town, 8000 Tel: 021 483 9598. Fax: +27 (0) 21 483 9845. Web: www.hwc.org.za) so that	Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				mitigation (recording and collection) can be carried out. • Before any fossil material can be collected from the development site, the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012). • These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the Rustenburg Chrome Mine Project near Rustenburg in the North-West Province.	
58	Large volumes of demolition waste requiring appropriate disposal.	Decommissioning	Medium to high -	• Waste Characterization should be done and an inventory be recorded and kept on file at the mine. The following steps should be followed: ○ Identify waste types: Separate hazardous (e.g., contaminated soil, chemicals) from non-hazardous (e.g., concrete, scrap metal). ○ Quantify volumes: Accurate estimates help plan disposal logistics and costs. • Waste should be separated at source as far as possible: ○ On-site sorting: Establish zones for metals, concrete, wood, plastics, and hazardous materials. ○ Avoid cross-contamination: Prevent mixing of clean and contaminated materials to reduce disposal complexity.	Medium to low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance

				• The following waste reuse and recycling measures should be considered for inclusion in the EMPr:
				  ○ Concrete and rubble: Can be crushed and reused for road base or site rehabilitation.
				  ○ Scrap metal: Recycled through licensed facilities.
				  ○ Timber and plastics: Recovered for reuse or energy generation where feasible.
				
				• Hazardous Waste Handling
				  ○ Specialized disposal: Materials like asbestos, hydrocarbon residues, and chemical containers must be handled by certified contractors.
				  ○ Secure containment: Use lined, sealed containers to prevent leaks during transport.
				• Licensed Disposal Facilities
				  ○ Compliance with regulations: Ensure all waste is sent to approved landfills or treatment plants.
				  ○ Documentation: Maintain records of waste types, volumes, and disposal routes for audit and legal purposes.
				• Community and Environmental Safeguards:
				  ○ Dust and noise control: Use water sprays, noise barriers, and schedule work to minimize disruption.
				  ○ Stakeholder engagement: Inform local communities about waste management plans and progress.
				• Monitoring and Reporting:	

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				○ Environmental audits: Regular checks to ensure no illegal dumping or contamination. ○ Closure certification: Final verification that waste has been safely and legally managed.	
59	Risk of accidents related to mining activities and transport of hazardous materials.	Operation	Medium to high -	• Risk Assessment and Planning ○ Map high-risk zones and develop transport routes that avoid densely populated or environmentally sensitive areas. ○ Implement Hazard Identification and Risk Assessment (HIRA) for all mining and transport activities. • Engineering and Design Controls ○ Use modern, well-maintained equipment with built-in safety features (e.g., collision avoidance systems, spill containment). ○ Design secure storage and containment systems for hazardous materials to prevent leaks and spills. ○ Ensure proper ventilation and structural integrity in underground mining operations. • Operational Safety Measures ○ Train personnel in safe handling, transport, and emergency procedures for hazardous materials. ○ Develop Material Safety Data Sheets (MSDS) for all hazardous materials and display at the site of storage.	Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				○ Implement strict protocols for loading, unloading, and transporting hazardous substances. • Regulatory Compliance ○ Adhere to national and international safety standards, such as those from OSHA and MSHA . ○ Regular audits and inspections to ensure compliance with safety regulations. • Emergency Preparedness and Response ○ Regularly update emergency response plans, including evacuation procedures and spill containment strategies. ○ Coordinate with local emergency services and communities for rapid response capabilities. ○ Conduct drills and simulations to ensure readiness for various accident scenarios. • Community Engagement and Communication ○ Inform and involve local communities about potential risks and safety measures. ○ Establish grievance mechanisms and communication channels for reporting concerns or incidents.	
60	Job creation and economic benefits for surrounding communities.	Construction	High +	• Ensure a fair number of secondary economic opportunities are given to local contractors. A percentage of goods as determined by mine and the relevant stakeholders can also be procured locally • Services and goods must be procured locally as far as reasonably possible. Aspects of this positive impact will occur by default when the construction	High +

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				force lives locally and they utilise local services and support local shops.	
61	Continuation of jobs at the mine if Life of Mine is extended and economic benefits for the surrounding communities.	Operation	High +	• Approve the project proposal and listed activities, provided that all negative impacts can be mitigated to acceptable levels.	Very high +
62	Potential skills development and training programs for employees.	Operation	High +	• Implement approved Social and Labour Plan of the Mine, which is updated to include the expansion activities.	High +
63	Reduced availability of arable land for farming due to mining expansion into southern areas.	Operation	High -	• Addressing these conflicts requires inclusive land-use planning, stakeholder engagement, and the development of alternative livelihood programs to support affected communities.	Medium to high -
64	Competition for water resources between the mine and surrounding farmers.	Operation	Medium to high -	• Addressing these conflicts requires inclusive land-use planning, stakeholder engagement, and the development of alternative water resources to support affected communities and farmers.	Low -
65	Illegal occupation of abandoned mine infrastructure.	Decommissioning	Medium to high -		Low -
66	Retrenchments leading to social and economic hardship in local communities.	Decommissioning	High -	Include measures in the SLP to ensure the transition period when the mine is approaching closure, plan (including financially) for alternative land uses and employment opportunities well in advance of closure of the mine.	Low -
67	Potential conversion of rehabilitated land for agriculture, conservation, or community use.	Rehab and Closure	Low to medium +	Include measures in the SLP to ensure the transition period when the mine is approaching closure, plan (including financially) for alternative land uses and employment opportunities well in advance of closure of the mine.	High +

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
68	Opportunities for eco-tourism or renewable energy projects.	Rehab and Closure	Low to medium +	Include measures in the SLP to ensure the transition period when the mine is approaching closure, plan (including financially) for alternative land uses and employment opportunities well in advance of closure of the mine.	High +
69	Subsidence issues from abandoned underground mining operations.	Decommissioning	Medium to high -	Effective monitoring and rehabilitation of abandoned workings are essential to mitigate these risks and protect both environmental integrity and community well-being. • In order to mitigate these impacts, rehabilitation strategies should include detailed subsidence risk assessments, backfilling of underground voids with inert material, and surface regrading to restore land stability. • Long-term monitoring using ground movement sensors and satellite imagery can help detect early signs of subsidence. • Additionally, revegetation and erosion control measures should be implemented to stabilize affected areas and promote ecological recovery. • Community engagement and transparent reporting are essential to ensure public safety and build trust during the rehabilitation process.	Low -
70	Risk of tailings dam failure causing serious environmental and socio-economic damage.	Operation	Medium to low -	• All measures in the approved EMPr, conditions of the Environmental Authorisation and updated Water Use License should be implemented; • The applicant must apply for a water use license amendment; • Designs should be drafted by registered and suitably qualified engineers and submitted and approved by relevant authorities;	Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				• The relevant standards and legislation related to the management and design of the TSFs should be adhered to at all times; and • The emergency response and management plan must be available at all times and staff and visitors should receive training and or awareness of this with relevant signs erected where required.	
71	Heavy metal leaching from waste rock dump affecting soil and water quality.	Operation	Medium to high -	• All measures in the approved EMPr, conditions of the Environmental Authorisation and updated Water Use License should be implemented; • The applicant must apply for a water use license amendment; • Designs for the new WRD should be drafted by registered and suitably qualified engineers and submitted and approved by relevant authorities; • The relevant standards and legislation related to the management and design of the WRDs should be adhered to at all times; and • The water monitoring plan must be implemented and recommendations from specialists implemented.	Low -
72	TSF footprint expansion resulting in permanent alteration of surface land use.	Operation	High -	• Careful land use planning and post-mining rehabilitation strategies to be implemented.	Low -
73	TSF basement liner or capping failure resulting in contamination of the surface and/or groundwater resources.	Rehab and Closure	Medium to high -	• All measures in the approved EMPr, conditions of the Environmental Authorisation and updated Water Use License should be implemented; • The applicant must apply for a water use license amendment;	Low -

#	Impact	Phase	Pre-mitigation Environmental Significance	Mitigation Measures	Final Significance
				• Designs for the capping should be drafted by registered and suitably qualified engineers and submitted and approved by relevant authorities; • The relevant standards and legislation related to the management and design of the TSFs should be adhered to at all times; and • The water and other environmental monitoring plans must be implemented and recommendations from specialists implemented.	

10 SENSITIVITY MAPPING

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (basemaps and shapefiles) into a single consolidated layer making use of Geographic Information System (GIS) software and analysis tools. Environmental sensitivity mapping is a rapid and objective method applied to identify areas which may be particularly sensitive to development based on environmental, cultural and social sensitivity weightings – which is determined by specialists input within each respective field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of low, medium and highly sensitive areas within the study area, towards selecting the preferred location, design and layout, and process or technology alternatives for the proposed activities and infrastructure.

This sensitivity mapping approach allows for the proposed activities to be undertaken whilst protecting identified sensitive environmental areas / features. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of Environmental Assessment processes. Table 37 below provides a breakdown of the sensitivity rating and weightings applied to determine the sensitivity score of each aspect. Figure 64 presents the preliminary combined sensitivity map for the project. These areas and sensitivities will be further refined in the EIA phase once further detailed assessments are completed. This map will be updated for the EIA phase of the project once detailed specialist studies are completed.

Table 37: Sensitivity rating and weighting

Sensitivity Rating	Description	Weighting
Least concern	The inherent feature status and sensitivity is already degraded or contain no inherent sensitivities. The proposed development will not affect the current status and/or may result in a positive impact. These features would be the preferred alternative for mining or infrastructure placement.	-1
Low/Poor	The proposed development will not have a significant effect on the inherent feature status and sensitivity.	0
Medium	The proposed development will moderately negatively influence the current status of the feature.	1
High	The proposed development will have a significantly negative influence on the current status of the feature.	2
Very High	The proposed development will have a very high significant negative influence on the current status of the feature.	3

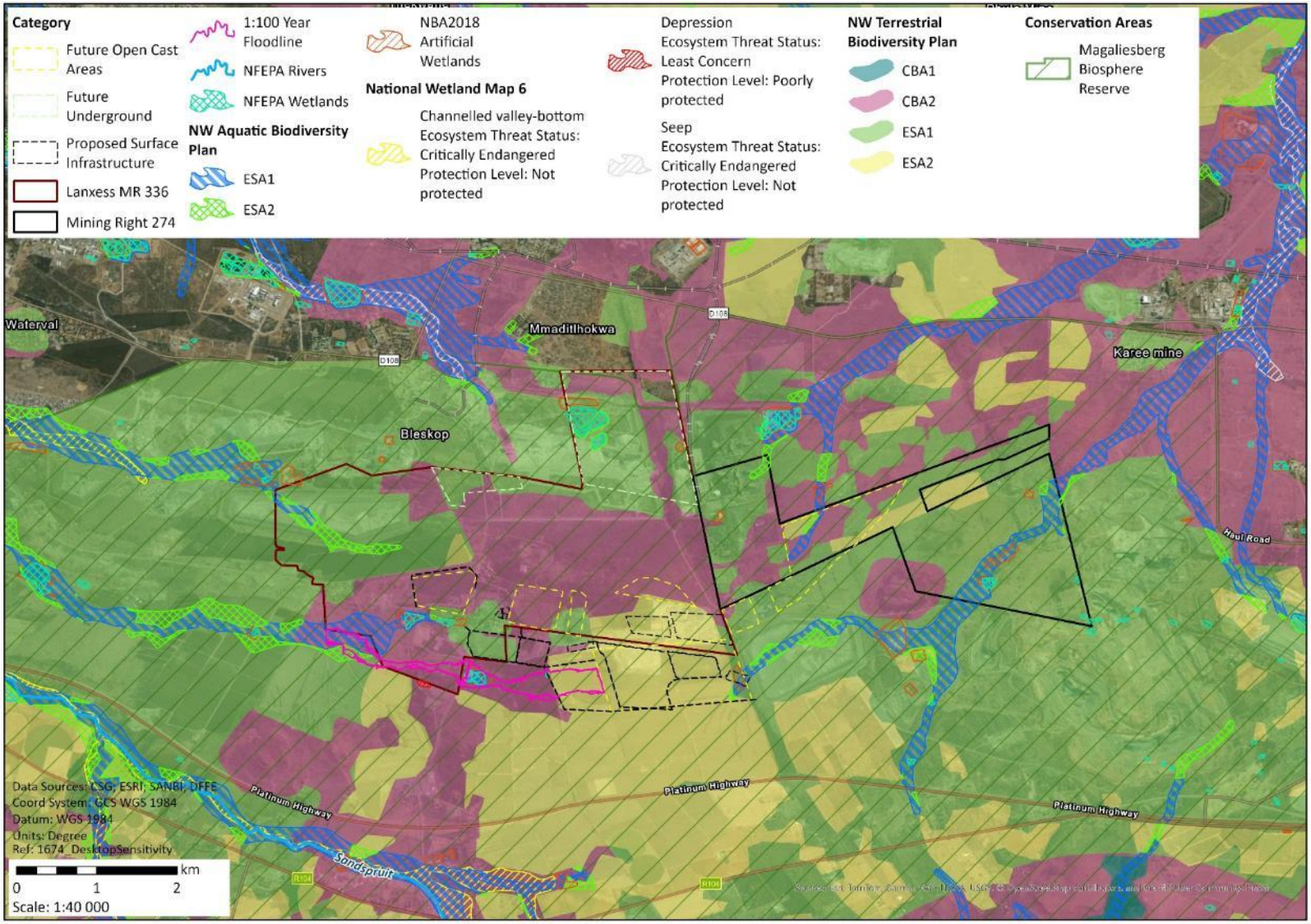

Figure 64: Combined scoping sensitivity map.

11 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

The section below outlines the proposed plan of study which will be conducted for the various environmental aspects during the EIA Phase. It is also important to note that the plan of study will also be guided by comment obtained from I&AP's and other stakeholders during the PPP.

11.1 DESCRIPTION OF ALTERNATIVES TO BE CONSIDERED IN EIA PHASE

11.1.1 NO-GO OPTION

The "No Go" alternative assumes the proposed mining project does not proceed, maintaining the status quo. It serves as the baseline for evaluating all other alternatives. While this avoids further environmental degradation and protecting biodiversity, water resources, and ecosystems, it also means losing benefits like employment, economic activity, and community support. Once current resources are depleted and sites are rehabilitated, mining operations would cease, potentially destabilising local economies reliant on mining.

11.1.2 ROUTING AND DESIGN ALTERNATIVES

Site layout decisions for haul roads, the TSF, and stockpiles are based on operational practicality and spatial constraints. Environmentally sensitive areas will be considered during the EIA and design phases to minimise negative impacts, with layout options explored to find the most optimal configuration.

11.1.3 PROCESS ALTERNATIVES

These involve exploring alternative technologies and methods to achieve project goals more sustainably. Options include improved tailings deposition techniques, renewable energy integration, and adjustments to mining sequencing and scheduling to enhance environmental performance.

11.1.4 INPUT ALTERNATIVES

Despite reliance on fixed geological resources, input alternatives can improve efficiency and reduce environmental impact. These may include:

- **Renewable Energy**: Solar and hybrid systems to reduce fossil fuel use;
- **Water Efficiency**: Recycling, rainwater harvesting, and treated wastewater use;
- **Reagent Substitution**: Eco-friendly chemicals in mineral processing; and
- **Sustainable Materials**: Locally sourced or recycled materials for infrastructure.

These will be assessed for feasibility, cost, and environmental/social benefits during the EIA.

11.1.5 SITE LAYOUT ALTERNATIVES

RCM's proposed expansion largely falls within its existing or soon-to-be-acquired mining rights areas. Initial studies suggest the current layout avoids most sensitive zones, including flood lines. However, further specialist assessments during the EIA phase may prompt layout adjustments to avoid high-sensitivity areas.

11.2 DESCRIPTION OF THE ASPECTS TO BE ASSESSED AS PART OF THE EIA PROCESS

The following aspects will be assessed further during the EIA phase investigation to be undertaken:

- Air Quality;
- Geology and soils;
- Agricultural Potential and Land Capability;

- The EAP noted cultivation activities directly to the south of the study area, and these crops will need to be identified and will be included in the studies and assessments as sensitive receptors and the impact will be assessed in the EIA;
- Visual impacts;
- Noise;
- Hydrology;
- Groundwater;
- Terrestrial Biodiversity;
- Aquatic Biodiversity;
- Hydropedology;
- Cultural and Heritage;
- A more detailed assessment of the amount and frequency of blasting, as well as sensitive nearby buildings, will be provided and assessed during the EIA phase, once more detailed activity descriptions is available, and will be included in the EIA Report.
- Socio-economic aspects, including the length of the construction phase, how many jobs will be created etc.
- Environmental and Social Health, security and safety aspects related to proposed activities.
- Sensitive areas and sensitivities (composite sensitivity map) will be further refined in the EIA phase once further detailed assessments are completed. This map will be updated for the EIA phase of the project once detailed specialist studies are completed.

11.3 ASPECTS TO BE ASSESSED BY SPECIALISTS

Table 38 below details the various aspects of the project to be addressed in the EIA phase through detailed specialist studies.

Table 38: Details of specialist input during the EIA phase.

Aspect	Component	Scope of Work / Terms of Reference

Agricultural Potential	Land Capability	Agricultural Agro-Ecosystem Specialist Assessment: (According to the Protocol published in terms of the EIA Regulations, 2014):
		• 2.1. The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professionals (SACNASP).
		• 2.2. The assessment must be undertaken on the preferred site and within the proposed development footprint.
		• 2.3. The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within the past 5 years, and must identify:
		  ○ 2.3.1. the extent of the impact of the proposed development on the agricultural resources; and
		  ○ 2.3.2. whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.
		• 2.4. The status quo of the site must be described, including the following aspects which must be considered as a minimum in the baseline description of the agro ecosystem:
		  ○ 2.4.1. the soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope;
		  ○ 2.4.2. where applicable, the vegetation composition, available water sources as well as agro-climatic information;
		  ○ 2.4.3. the current productivity of the land based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units;
		  ○ 2.4.4. the current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure; and
		  ○ 2.4.5. existing impacts on the site, located on a map (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc.).
		• 2.5. Assessment of impacts, including the following aspects which must be considered as a minimum in the predicted impact of the proposed development on the agro ecosystem:
		  ○ 2.5.1. change in productivity for all agricultural activities based on the figures of the past 5 years, expressed as an annual figure and broken down into production units;
		  ○ 2.5.2. change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure; and

Aspect	Component	Scope of Work / Terms of Reference
		○ 2.5.3. any alternative development footprints within the preferred site which would be of "medium" or "low" sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification. • 2.6. The findings of the Agricultural Agro-Ecosystem Specialist Assessment must be written up in an Agricultural Agro-Ecosystem Specialist Report. • 2.7. This report must contain the findings of the agro-ecosystem specialist assessment and the following information, as a minimum: ○ 2.7.1. details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vitae; ○ 2.7.2. a signed statement of independence by the specialist; ○ 2.7.3. the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; ○ 2.7.4. a description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant; ○ 2.7.5. a map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool; ○ 2.7.6. an indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development; ○ 2.7.7. an indication of possible long term benefits that will be generated by the project in relation to the benefits of the agricultural activities on the affected land; ○ 2.7.8. additional environmental impacts expected from the proposed development based on the current status quo of the land including erosion, alien vegetation, waste, etc.; ○ 2.7.9. information on the current agricultural activities being undertaken on adjacent land parcels; ○ 2.7.10. an identification of any areas to be avoided, including any buffers; ○ 2.7.11. a motivation must be provided if there were development footprints identified as per paragraph 2.5.3 above that were identified as having a "medium" or "low" agriculture sensitivity and that were not considered appropriate; ○ 2.7.12. confirmation from the soil scientist or agricultural specialist that all reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities; ○ 2.7.13. a substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a

Aspect	Component	Scope of Work / Terms of Reference
		recommendation on the approval or not of the proposed development; 2.7.14. any conditions to which this statement is subjected; ○ 2.7.15. where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr); and ○ 2.7.16. a description of the assumptions made and any uncertainties or gaps in knowledge or data. • 2.8. The findings of the Agricultural Agro-Ecosystem Specialist Assessment must be incorporated into the Basic Assessment Report or Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which are to be contained in the EMPr. • 2.9. A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.
Terrestrial Biodiversity	Fauna and Flora	• The surveys will include the following: ○ A survey for Red and Orange Data plant species; ○ Vegetation units will be identified, classified and delineated; and ○ Habitat types will be classified and delineated. • The floristic survey should be conducted during the growing season (the rainy season when most plants are in flower or seeding), over the project areas. These will give an indication of the actual species present on site and will be discussed in context of plant communities (should the area support distinct communities) within the ecosystem of the area. • Protected, endemic, exotic, alien invasive and culturally significant species will also be discussed as separate issues and related back to relevant legal requirements. Furthermore, the identification of red data and protected species as listed according to the IUCN List, NEMBA and other Provincial and National legislation will be completed. • Depending on the vegetation and terrain, the timed meander sampling could be used during vegetation assessments, however, should dominant vegetation types require other methods be used, then these shall be motivated. • The surveys will include the following: ○ The identification of these features and delineation thereof; and ○ The location of any unique or protected habitat features. • All sensitive areas, as described by the provincial and national legislation, will be identified. The locality and extent, as well as species composition of sensitive areas such as the wetlands or pans, streams, rivers and rocky outcrops will be conducted to identify and map all such sensitive areas present. Sensitive areas will be identified and delineated.

Aspect	Component	Scope of Work / Terms of Reference
		• An additional survey for potential SCC is to be undertaken in summer season to determine if additional sites are present. Based on the findings from this survey mitigation measures will be proposed to address this concern. This will include members from The Biodiversity Company and the Endangered Wildlife Trust. • A terrestrial ecology assessment report will be written. This report will be compiled according to the necessary requirements and standards. • The study area location will be assessed against the Mining and Biodiversity Guidelines (2013) spatial dataset to determine which categories it falls within. • The extent to which the Threatened or Protected Species Regulations, 2007 in terms of NEMBA apply will be determined as a result of the EIA phase terrestrial biodiversity specialist assessment.
Aquatic Biodiversity	Wetlands	The areas will be traversed on foot to identify local freshwater resources. The following will be achieved to supplement the approach: • A desktop assessment of all available datasets; • GIS processing to preliminary identify water accumulation areas; and • The delineation of water resources in accordance with the DWAF (2005) guidelines, whereby the outer edges will be identified. • A functional and integrity assessment of the water resources. The "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries" (Macfarlane, *et al*., 2014) will be used to determine the appropriate buffer zone for the proposed activity. The risk assessment will be completed in accordance with the requirements of the DWS General Authorisation (GA) in terms of Section 39 of the NWA for water uses as defined in Section 21(c) or Section 21(i) (GN 509 of 2016). • An aquatics and wetlands assessment report will be written. This report will be compiled according to the necessary requirements and standards.
Noise	Noise Impact Assessment	The noise impact assessment should include the following: • Compilation of project source term; • Attenuation modelling of all potential noise sources due to project operations; • Evaluation of potential noise impacts on human receptors due to project activities; • Determination of environmental noise risk according to the EIMS stipulated Impact Assessment methodology; and

Aspect	Component	Scope of Work / Terms of Reference
		• More accurate impact and noise levels that may be expected as a result of the construction activities, will be quantified by the noise specialist during the EIA phase and will be included in the EIA Report; • More accurate impact and noise levels that may be expected as a result of the operational activities, will be quantified by the noise specialist during the EIA phase once more detailed activity and equipment descriptions is available, and will be included in the EIA Report; • Identification and recommendation of suitable mitigation measures and monitoring requirements; • Additional mitigation measures specific to the expansion activities to be added during the EIA phase, once all information is available and specialist studies are completed. The assessment and report must also comply and be prepared in accordance with the published Protocol for Specialist Assessment and Minimum Report Content Requirements for Noise Impacts.

Air Quality	Dust, particulate matter and gaseous emissions	The air quality impact assessment should include the following:
		• An impact assessment, including:
		  ○ The establishment of a source inventory for current and proposed activities;
		  ○ Atmospheric dispersion simulations to determine potential air quality impacts as a result of the project activities;
		  ○ Screening of simulated results against relevant environmental standards;
		  ○ A qualitative cumulative air quality assessment; and
		  ○ Significance rating of the expected impacts according to the EIMS methodology.
		  ○ Identification and recommendation of suitable mitigation measures and monitoring requirements.
		  ○ Preparation of comprehensive air quality impact assessment report in the prescribed specialist report format.

Heritage	Archaeology and Cultural Heritage	• The HIA will adhere to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended; • The HIA should include a site visit to identify heritage resources within the study area, including archaeological resources which should be rated with significance and will require further mitigation work before the project can continue. • During the impact assessment phase, the heritage data collected during the fieldwork must be evaluated according to the heritage significance methodology and utilising the impact assessment methodology to determine the potential impact of the proposed layout alternatives on the heritage resources. • Mitigation and management measures will then also be developed in consideration of the impacts during the HIA report process. • These recommendations will then be incorporated into the Environmental Management Plan (EMP) for approval by the competent authority.

Aspect	Component	Scope of Work / Terms of Reference
		• EIA phase impact study and all specialist studies will provide clearer guidance on the exact impact on the identified sites and whether the impact can be avoided. • More detailed mitigation measures will be developed by the specialist during the EIA phase.

Palaeontology	Palaeontology	The Palaeontological Impact Assessment will:
		• Adhere to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
		• Adhere to all applicable best practice recommendations, appropriate legislation and authority requirements;
		• Submit a comprehensive overview of all appropriate legislation, guidelines;
		• Describe of the proposed project and provide information regarding the developer and consultant who commissioned the study;
		• Describe location of the proposed development and provide geological and topographical maps;
		• Provide palaeontological and geological history of the affected area;
		• Identify sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
		• Evaluate the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
		  ○ Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
		  ○ Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity.
		  ○ Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.
		• Fair assessment of alternatives (infrastructure alternatives should be provided);
		• Recommend mitigation measures to minimise the impact of the proposed development; and
		• Detail the implications of specialist findings for the proposed development (such as permits, licenses etc).

Hydrology	Floodline area and stormwater and climate prediction and impacts	• Determination of the floodline by an ECSA registered engineer; • Adhere to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended; • Adhere to all applicable best practice recommendations, appropriate legislation and authority requirements; • Submit a comprehensive overview of all appropriate legislation, guidelines;

Aspect	Component	Scope of Work / Terms of Reference

		• Describe of the proposed project and provide information regarding the developer and consultant who commissioned the study;
		• Describe location of the proposed development and provide hydrological and topographical maps;
		• Identify sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
		• Evaluate the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
		  ○ Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
		  ○ Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity.
		  ○ Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.
		• Fair assessment of alternatives (infrastructure alternatives should be provided);
		• Recommend mitigation measures to minimise the impact of the proposed development; and
		• Detail the implications of specialist findings for the proposed development (such as permits, licenses etc).

Geohydrology	Groundwater quality and quantity	The Geohydrological Study may include *inter alia*:
		• Conduct a hydrocensus in a 1-2km radius surrounding the new proposed open cast areas:
		  ○ Record the latest groundwater levels in private user boreholes and on-site boreholes;
		  ○ Record groundwater uses;
		  ○ Record detailed borehole data such as depths, location relative to study area, abstraction volumes and application;
		  ○ Identifying and locating seepage zones, springs, wetlands, streams and rivers; and
		  ○ GIS mapping of hydrocensus results.
		• Sensitive environmental receptor analysis to:
		  ○ Identify potential sensitive receptors in the vicinity of the new proposed open cast;
		  ○ GIS mapping and spatial analysis of sensitive receptors; and
		  ○ Water sampling of existing boreholes and surface water bodies to:
		  ▪ Determine the macro and micro inorganic chemistry; and
		  ▪ Determine hydraulic connections based on hydrochemistry.
		• Conduct ground-based geophysical surveys on the boundary the new proposed open cast pit to:

Aspect	Component	Scope of Work / Terms of Reference
		○ Identify suitable drill targets for boreholes which could be utilised as both monitoring and dewatering boreholes; ○ The Resistivity method will be utilised to site the monitoring and dewatering boreholes; and ○ Based on the survey data, results will be analysed, and most suitable drill targets will be summarised in the detailed report. • Drilling of 6 boreholes identified during the geophysical survey data analysis. ○ Boreholes will be drilled 6.5" (165 mm) up to 60m ; ○ Steel casing will be installed through the weathered zone with perforated steel casing installed along the water strikes; and ○ The boreholes will be finished off with headworks. • Aquifer testing of newly drilled boreholes ○ Aquifer testing will be conducted to determine the hydrogeological characteristics of the groundwater system; ○ Aquifer tests will consist of: Step Test (ST), 24 hr Constant Rate Test (CRT) and Recovery Test (RT); and ○ The aquifer testing data will be analysed and sustainable yields will be calculated for the newly drilled boreholes using the FC method. • Data collation and reporting ○ Compile and analyse all hydrocensus data and provide a detailed insight into the current baseline conditions of the specific area which will be included/worked into the existing report; ○ Update numerical model with the new areas and pits; ○ Detailed GIS mapping and updates of previous maps; ○ Compilation of geophysical data and siting of drill targets based on the geophysical survey results; ○ Compilation and analysis of aquifer testing data to determine sustainable yields. • Impact Assessment and mitigation and monitoring requirements. • The Specialist Assessment must comply with Appendix 6 of the EIA Regulations, 2014.
Hydropedology		• The approach of this assessment is based on the protocols compiled by van Tol et al., (2021) and issued by the Department of Water and Sanitation (DWS). According to these protocols, the following two steps are required for this level of hydropedology assessment: ○ Identification of dominant hillslopes; and ○ Conceptualise hillslope hydrological responses. • For impact assessments associated with activities that pose significant threats on the interflow volumes of a landscape or activities that are expected to drastically change the dynamics of a landscape (i.e.,

Aspect	Component	Scope of Work / Terms of Reference
		opencast mining), four steps are required. For those activities that only include minor impacts (i.e., installation of a pipeline or infrastructure), only the first two steps are required. Therefore, considering the intensity of some of the proposed activities, only the first two steps will be relevant to this assessment. • The Specialist Assessment must comply with Appendix 6 of the EIA Regulations, 2014.

Engineering Designs and Financial	MineLock Environmental Engineers	• A closure plan and closure cost estimate in support of the application will be undertaken. This report will address the closure measures that will be implemented and provides the cost of environmental rehabilitation at closure. The closure costing will be calculated according to the escalated DMRE rates since the NEMA Financial Provision regulations have not yet come into effect.
		• Effective implementation of water remediation during mine closure should be ensured. This will require a combination of advanced technologies, site-specific planning, and long-term sustainability strategies. The following strategies could be investigated during the EIA phase and the most effective to be included in the Rehabilitation and Closure Plan:
		  ○ Bioremediation: Utilize naturally occurring microorganisms to break down pollutants like heavy metals and hydrocarbons into less toxic forms. This method is cost-effective and environmentally friendly.
		  ○ Membrane Filtration: Removes fine particulates and dissolved contaminants.
		  ○ Advanced Oxidation Processes (AOPs): Use chemical reactions to degrade complex pollutants.
		  ○ Passive Treatment Systems: Constructed wetlands and limestone drains can treat mine water with minimal maintenance. These are ideal for long-term, low-cost remediation post-closure.
		  ○ pH Adjustment and Metal Precipitation: Tailor chemical treatments to neutralize acidity and remove metals like cadmium, nickel, and zinc based on site-specific water chemistry.
		  ○ Stream Diversion and Hydrological Control: Redirect clean water away from contaminated zones to reduce treatment volumes and prevent further contamination.
		  ○ Robust Regulatory Frameworks: Adhering to clear water quality standards and closure guidelines ensures accountability and encourages investment in innovative solutions.
		• A geotechnical assessment is also important to be conducted during the EIA phase in order to inform the designs and identify mitigation measures for impacts such as potential subsidence and pollution of the environment.
		• The Specialist Assessment must comply with Appendix 6 of the EIA Regulations, 2014 and all other relevant legislation.

11.4 PROPOSED METHOD OF ASSESSING ENVIRONMENTAL ASPECTS

The same method of assessing impact significance as was used during the Scoping phase will be applied during the EIA phase. This methodology is described in detail in **Section 9.1** of this report.

11.5 PROPOSED METHOD FOR ASSESSING DURATION AND SIGNIFICANCE

The significance of environmental impacts will be rated before and after the implementation of mitigation measures. These mitigation measures may be existing measures or additional measures that may arise from the impact assessment and specialist input. The impact rating system considers the confidence level that can be placed on the successful implementation of the mitigation. The proposed method for the assessment of environmental issues is set out in the **Section 9.1**. This assessment methodology enables the assessment of environmental issues including: the severity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

The specialist studies will recommend practicable mitigation measures or management actions that effectively minimise or eliminate negative impacts, enhance beneficial impacts, and assist project design. If appropriate, the studies will differentiate between essential mitigation measures, which must be implemented and optional mitigation measures, which are recommended.

11.6 STAGES AT WHICH COMPETENT AUTHORITIES WILL BE CONSULTED

Competent authorities have been and will be consulted during the initial notification period, the scoping phase as well as during the EIA phase.

11.7 PROPOSED METHOD OF EIA PHASE PUBLIC PARTICIPATION

The proposed public participation process to be followed for the EIA phase is provided below.

- The commenting periods that will be provided to the I&AP's (and the competent authorities) will be 30 days as per the relevant legislative requirements.
- The dates of the review and commenting period for the draft EIA/EMPr will be determined at a later date and communicated to all registered I&AP's through faxes, emails, SMS's and/or registered letters.
- The location at which the hard copy of the EIA report will be made available is at the same public places in the study area that the Scoping Report was made available (refer to Section 6.1) sent electronically to stakeholders who request a copy, and placed on the EIMS website: www.eims.co.za/public-participation/.
- The public participation will be undertaken in compliance with NEMA GNR 982 (Chapter 6).
- A public meeting will be held during the review period for the EIA report. Focus group meetings will also be held with key stakeholders as and where necessary.
- All comments and issues raised during the comment periods will be incorporated into the final EIA Report.

11.8 DESCRIPTION OF TASKS THAT WILL BE UNDERTAKEN DURING THE EIA PROCESS

The plan of study detailed in the above sections and is summarised below. The following tasks will be undertaken as part of the EIA phase of the project:

- EIA-phase specialist studies.
- Public consultation:

- Notification of the availability of the EIA Report for review and comment to all registered I&AP's;
- Public and focus group meetings, where required.

- Authority consultation:
  - Consultation with DMPR and DWS and the commenting authorities; and
  - Authority consultation (including meetings where necessary) to provide authorities with project related information and obtain their feedback.
- Document compilation:
  - The EIA and EMPr will be compiled in line with the requirements of Appendix 3 and 4 of the NEMA EIA Regulations.
  - The EIA and EMPr will be made available for public comment for a period of 30 days.
  - The EIA and EMPr will be finalised and submitted to DMPR for adjudication and decision making.

11.9 MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IMPACTS

All comments received from I&APs during the Scoping Report review will be taken into consideration and where applicable inform the high-level mitigation measures. Detailed mitigation measures will be further developed as part of the EIA phase. The potential impacts will further be assessed in terms of the mitigation potential, taking into consideration the following:

- Reversibility of impact:
  - Reversible;
  - Partially reversible.; and
  - Irreversible.
- Irreplaceable loss of resources:
  - Replaceable;
  - Partially replaceable; and
  - Irreplaceable.
- Potential of impacts to be mitigated:
  - High;
  - Medium; and
  - Low.

More detailed assessment findings for each identified impact taking the above into consideration will be provided in the EIA Report and associated EMPr.

12 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations relating to this scoping phase assessment should be noted:

- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project;
- This study is not based on any engineering designs as these designs are still being completed.

- In accordance with the Protection of Personal Information Act (Act 4 of 2013), personal information (emails, contact numbers, address) are blanked out and/or excluded during the Public Participation and only provided to the competent authority officials;
- Personal information of I&APs made available to the competent authority will only be used by the authorities to confirm or obtain information regarding this specific project; and
- The information presented in this report was the most accurate and relevant at the time of compilation of the report.
- Any assumptions and limitations by specialists will be included in the EIA report.

13 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I **Monica Niehof** herewith undertake that the information provided in the foregoing report is correct to the best of my knowledge, and that the comments and inputs from stakeholders and Interested and Affected Parties has been correctly recorded in the report where applicable.

……

Signature of the EAP

Date: 11/03/2026

14 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I **Monica Niehof** herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with Interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

……

Signature of the EAP

Date: 11/03/2026

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