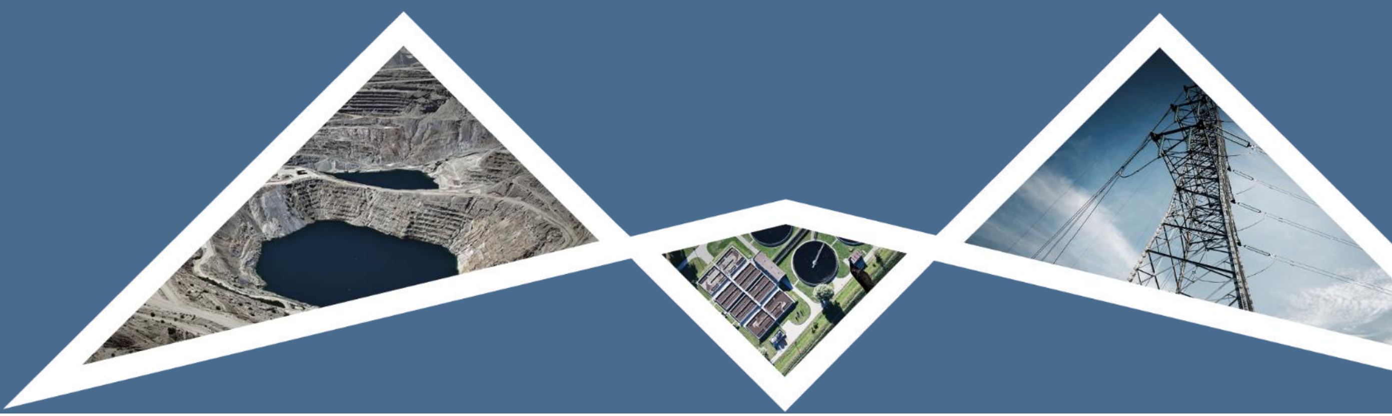
EIMS | ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

T 011 789 7170 E info@eims.co.za W www.eims.co.za

ENVIRONMENTAL ASSESSMENT REPORT

CLOVER ALLOYS RIETFONTEIN PLANT SECTION 24G COMPLIANCE NOTICE: 18/2024ER



DOCUMENT DETAILS

EIMS REFERENCE:	1673
DOCUMENT TITLE:	CLOVER ALLOYS RIETFONTEIN PLANT S24G ENVIRONMENTAL ASSESSMENT REPORT

	NAME	SIGNATURE	DATE
COMPILED:	Andre van Rooyen		2026/02/16
CHECKED:	Monica Niehof		2026/02/27
AUTHORIZED:	Liam Whitlow		2026/03/03

REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2025/12/08	ORIGINAL DOCUMENT	Environmental Assessment Report for public review

Contents

List of Figures

List of Tables

Appendices

Acronyms and Abbreviations

Acronym / Abbreviation	Full Meaning
ALR	Action Leakage Rate
AQMS	Air Quality Monitoring Station
AQSR	Air Quality Sensitive Receptor
ASAPA	Association of Southern African Professional Archaeologists
ASTM	American Standard Testing Methodology
BESS	Battery Energy Storage System
BI	Biodiversity Importance
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
CR	Critically Endangered
CV	Curriculum Vitae
dBA	A-weighted decibels
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DN	Diameter Nominal
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
ECA	Environment Conservation Act
EIA	Environmental Impact Assessment
EIMS	Environmental Impact Management Services (Pty) Ltd

Acronym / Abbreviation	Full Meaning
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GLC	Ground-Level Concentration
GN	Government Notice
GVA	Gross Value Added
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEM	Integrated Environmental Management
IFC	International Finance Corporation
IMOL	Inverse Monin-Obukhov Length
l/ha/day	Litres per hectare per day
LA90	A-weighted Sound Level exceeded for 90% of the time
LAeq(T)	Equivalent Continuous Sound Level over Time T
LAFmax	Maximum A-weighted Fast Sound Level
LAFmin	Minimum A-weighted Fast Sound Level
LAIeq(T)	A-weighted Instantaneous Equivalent Continuous Sound Level
LC	Least Concern
LIA	Late Iron Age
MAE	Mean Annual Evaporation
MDD	Maximum Dry Density
Mm S-pan	Rate of evaporation, measured in millimeters (mm)
MOD AASHTO	Modified American Association of State Highway and Transportation Officials
MPRDA	Mineral and Petroleum Resources Development Act

Acronym / Abbreviation	Full Meaning
NAAQS	National Ambient Air Quality Standards
NBA	National Biodiversity Assessment
NCW	No Conservation Worth
ND	Nominal Diameter
NDCR	National Dust Control Regulations
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMAQA	National Environmental Management: Air Quality Act
NEMBA	National Environmental Management: Biodiversity Act
NEMWA	National Environmental Management: Waste Act
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act
NPAES	National Protected Area Expansion Strategy
NT	Near Threatened
NWA	National Water Act
PCD	Pollution Control Dam
PPP	Public Participation Process
Pty	Proprietary (Company designation)
SACAD	South Africa Conservation Areas Database
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern

Acronym / Abbreviation	Full Meaning
SDR	Standard Dimension Ratio
SEI	Socio-Economic Impact
SPLUMA	Spatial Planning and Land Use Management Act
SSVR	Site Sensitivity Verification Report
SWSA	Strategic Water Source Area
TSF	Tailings Storage Facility
TSP	Total Suspended Particulates
Unit	Description
VU	Vulnerable
WMA	Water Management Area
WRF	Weather Research and Forecasting (model)
WUL	Water Use License
www	World Wide Web

EXECUTIVE SUMMARY

This Environmental Assessment Report (EAR) has been prepared to support a Section 24G application in terms of the National Environmental Management Act (NEMA, Act No. 107 of 1998) for the Clover Alloys SA (Pty) Ltd (Clover Alloys) Rietfontein Plant, located in the North West Province. The application seeks retrospective environmental authorisation for existing infrastructure and approval for the proposed expansion of the stockpile areas and a pipeline, following a compliance notice issued by the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) in October 2024.

1 INTRODUCTION AND OVERVIEW

Environmental Impact Management Services (Pty) Ltd (EIMS) was appointed as the Environmental Assessment Practitioner (EAP) to assist Clover Alloys SA (Pty) Ltd (Pty) Ltd (hereafter referred to as the Applicant), with undertaking the required authorisation processes, including the statutory public participation, and to compile and submit the required documentation in support of an application for:

- Retrospective Environmental Authorisation (EA) in accordance with the National Environmental Management Act - Act 107 of 1998 (NEMA) Section 24G for - Listed activities detailed in section 4 of this report.

In addition, the Applicant is also applying for:

- A Water Use Licence (WUL) amendment in accordance with the National Water Act – NWA (Act 36 of 1998) - Listed activity/ies:
    - Section 21 (a)
    - Section 21 (c) and (i); and
    - Section 21 (g).

The Applicant operates a chrome processing facility in the North West Province and is undertaking steps to ensure compliance with environmental legislation following the development of infrastructure without prior environmental authorisation.

The existing infrastructure at the Rietfontein plant includes two stockpile areas, a chrome wash plant, drying pads, weighbridges, a sump, as well as site offices and staff accommodation. These facilities support the processing, storage, and operational activities associated with chrome beneficiation.

In an effort to regularise its operations and address past non-compliance, the applicant is submitting an application in terms of Section 24G of the National Environmental Management Act, 1998 (Act No. 107 of 1998). This application seeks to obtain retrospective environmental authorisation for existing infrastructure and approval for planned developments.

The proposed infrastructure includes:

- The expansion of one of the existing stockpile areas;
- The construction of dirty water channels and culverts to manage contaminated surface runoff;
- The installation of a clean water channel to divert uncontaminated stormwater away from operational areas;
- A Pollution Control Dam (PCD) with a design capacity of 8 000 m³, which will receive all dirty water collected on site; and
- A proposed pipeline approximately 2.5 km in length, to be constructed between the Rietfontein plant and the main mine, facilitating the transfer of materials or water as part of integrated operations.

This Section 24G application is being submitted in response to a compliance notice issued by the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) in October 2024, under reference number 18/2024ER. The applicant wishes to rectify unauthorised activities and obtain the necessary environmental approvals for both current and future infrastructure components.

Through this application, the applicant seeks to achieve full environmental compliance, strengthen site water management practices, and continue operating the Rietfontein plant in a sustainable and responsible manner as part of its broader chrome mining operations.

The project is located on Portion 23 and Portion 24 of the farm Rietfontein 338 JQ, within the Rustenburg Local Municipality, North West Province. The site is approximately 15km southeast of Rustenburg, along the N4. The centre point of the site is 25°44'54.40"S 27°21'52.69"E. Please refer to Figure 1 for the project locality map.

2 PUBLIC PARTICIPATION

The Public Participation Process (PPP) as required by Regulation 41(2) of the EIA Regulations, 2014 as amended and the section 24G fines regulations has commenced. To date the following PPP has been conducted:

Initial call to register:

- Newspaper Advertisement: Placement of advertisement in English and Afrikaans in the Rustenburg Herald Newspaper;
- Placement of site notices: Placement of 4 A1 Correx site notices in English and Afrikaans at locations along, within and surrounding the perimeter of the proposed project study area;
- Notification of landowners, occupiers and other key I&APs: Notification letters, were distributed to pre-identified I&APs through either email, fax, and/or registered mail where contacts were available.

The Environmental Assessment Report (EAR) will be made available to Interested and Affected Parties (I&APs) for comment for a minimum period of 30 days at a date to be confirmed after submission to the competent authority. All comments received during this period will be included in the EAR for submission to the Competent Authority. Contact details was provided to I&APs should they require assistance accessing the information or require copies of the reports. A hard copy of the EAR are made available for public review and comment for a period of 30 days at Rustenburg Public Library and at the Rustenburg Chrome Mine office as required by the NEMA S24G application and an electronic copy on EIMS's website.

All comments and/or queries received during the initial call to register to date have been included in the Public Participation Report (PPR) and will be updated for submission to the competent authority, following the 30-day public review period.

3 ENVIRONMENTAL IMPACT STATEMENT

The findings of the assessment and associated specialist studies conclude that there are no environmental fatal flaws that should prevent the retrospective licensing of the Rietfontein plant, provided that the recommended mitigation and management measures are implemented. Furthermore, it is recommended that the additional infrastructure be approved as for the most part the additional infrastructure serve to enhance the environmental sustainability in the operation of the site. Based on the nature and extent of the project, the local level of disturbance predicted, the findings of the specialist studies, and the understanding of the significance level of potential environmental impacts, it is the opinion of the environmental assessment project team and the EAP that the significance levels of the majority of identified negative impacts can generally be reduced to an acceptable level by implementing the recommended mitigation measures and the project should be authorized.

The following impacts were determined to have a potentially moderate negative final significance after mitigation:

- Impacts on Biodiversity & Habitat Loss; and

- Impacts on land and soil degradation;

The impact that the Rietfontein Plant has already had on the heritage features on site cannot be overlooked. In consultation with the heritage specialist, should the EA be granted, the mitigation recommended should be implemented prior to any further developments at the site.

1 INTRODUCTION

Environmental Impact Management Services (Pty) Ltd (EIMS) was appointed as the Environmental Assessment Practitioner (EAP) to assist Clover Alloys SA (Pty) Ltd (Pty) Ltd (hereafter referred to as the Applicant), with undertaking the required authorisation processes, including the statutory public participation, and to compile and submit the required documentation in support of an application for:

- Retrospective Environmental Authorisation (EA) in accordance with the National Environmental Management Act - Act 107 of 1998 (NEMA) Section 24G for - Listed activities detailed in section 4 of this report.

In addition, the Applicant is also applying for:

- A Water Use Licence (WUL) amendment in accordance with the National Water Act – NWA (Act 36 of 1998) - Listed activity/ies:
    - Section 21 (a)
    - Section 21 (c) and (i); and
    - Section 21 (g).

In an effort to regularise its operations and address past non-compliance, the applicant is submitting an application in terms of Section 24G of the National Environmental Management Act, 1998 (Act No. 107 of 1998). This application seeks to obtain retrospective environmental authorisation for existing infrastructure and approval for planned developments.

This Section 24G application is being submitted in response to a compliance notice issued by the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) in October 2024, under reference number 18/2024ER. The applicant wishes to rectify unauthorised activities and obtain the necessary environmental approvals for both current and future infrastructure components.

Through this application, the applicant seeks to achieve full environmental compliance, strengthen site water management practices, and continue operating the Rietfontein plant in a sustainable and responsible manner as part of its broader chrome mining operations.

The project is located on Portion 23 and Portion 24 of the farm Rietfontein 338 JQ, within the Rustenburg Local Municipality, North West Province. The site is approximately 15km southeast of Rustenburg, along the N4. The centre point of the site is 25°44'54.40"S 27°21'52.69"E. Please refer to Figure 1 for the project locality map.

The Public Participation Process (PPP) as required by Regulation 41(2) of the EIA Regulations, 2014 as amended and the NEMA Section 24G Fine regulations has commenced. To date the following PPP has been conducted:

Initial call to register:

- Newspaper Advertisement: Placement of advertisement in English and Afrikaans in the Rustenburg Herald Newspaper;
- Placement of site notices: Placement of 4 A1 Correx site notices in English and Afrikaans at locations along, and surrounding the perimeter of the project study area;
- Notification of landowners, occupiers and other key I&APs: Notification letters, were distributed to pre-identified I&APs through either email, fax, and/or registered mail where contacts were available.

The Environmental Assessment Report (EAR) will be made available to Interested and Affected Parties (I&APs) for comment for a minimum period of 30 days at a date to be confirmed after submission to the competent authority. All comments received during this period will be included in the EAR for submission to the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT).

1.1 DETAILS OF THE EAP

EIMS has been appointed by MineLock Environmental Engineers as the independent Environmental Assessment Practitioner (EAP) to prepare and submit the Section 24G application and undertake a Public Participation Process (PPP) for the retrospective licensing of the Rietfontein Plant. The contact details of the EIMS consultant and EAP who compiled this Report are as follows:

Table 1: EAP Details

Name of Practitioner	Ms Monica Niehof (EAP)	Mr Andre van Rooyen (Candidate EAP/compiler)
Tel No.:	+27 11 789 7170	+27 11 789 7170
Fax No.:	+27 86 571 9047	+27 86 571 9047
E-mail:	monica@eims.co.za	andre@eims.co.za

1.2 EXPERTISE OF THE CANDIDATE-EAP

In terms of Regulation 13 of the EIA Regulations, 2014, as amended, an independent EAP, must be appointed by the applicant to manage the application. These regulations are relevant to the Section 24G process as an EAP is required to conduct an Environmental Impact Assessment to assess the extent, duration, magnitude and cumulative impacts of the illegal commencement. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 30 years' experience in conducting EIA's. Please refer to the EIMS website (www.eims.co.za) for further details of expertise and experience.

The experience of the EAP is as follows:

Andre van Rooyen is a current Environmental Assessment Practitioner with 2 years' working experience. He is a registered candidate natural scientist with the South African Council for Natural Scientific Professions (SACNASP) (Reg. #164675). He is also a Registered Candidate Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA Reg. #2023/6845). Andre has background in Environmental Sciences having academic qualifications which focused on these disciplines as well as relevant work experience. Andre has experience in various environmental assessment projects ranging from environmental screening, auditing, and compliance evaluation among others. In addition, Andre has undertaken Water Use Authorisations applications through both the general authorisation and water use authorisation processes, including the compiling of related documentation such as the Integrated waste and water management plan.

1.3 EXPERTISE OF THE EAP:

Ms. Monica Niehof is a senior Environmental Assessment Practitioner (EAP) with over seven (13) years' working experience.

Environmental assessment projects ranging from Environmental Screening, Basic Assessments, Section 102 Amendments and Scoping & Environmental Impact Assessments processes for Environmental Authorisations, Atmospheric Emission Licenses and Waste Management Licenses applications. In addition, Monica has undertaken Water Use Authorisations applications through both the General Authorisation and Water Use Authorisation processes. Monica is also an Environmental Auditor who has experience in various Environmental Authorisations, Environmental Management Programmes, Waste Management License, Atmospheric Emission License and Water Use Authorisations as well as Legal & Environmental Compliance Audits.

The Curriculum Vitae of the EAP and the candidate EAP responsible for the compilation of this Report is included in Appendix A.

2 DESCRIPTION OF THE PROJECT AREA

Table 2 indicates the details of the project area for the proposed project including details on the project location as well as the distance from the proposed project area to the nearest towns.

Table 2: Locality details

Project Area	Portion 23 and 24 of the farm Rietfontein 338 JQ
Application Area (ha)	12
Cadastral description	Farm Name: Portion 23 of Farm Rietfontein 338 JQ 21-Digit SG Code: T0JQ00000000033800023 Farm Name: Portion 24 of Farm Rietfontein 338 JQ 21-Digit SG Code: T0JQ00000000033800024
Magisterial District	Rustenburg
District Municipality	Bojanala District Municipality
Local Municipalities	Rustenburg Local Municipality
Nearest town	Kroondal
Centre point	-25.748175°S, 27.365785°E

The locality of the proposed project is shown in Figure 1**.**

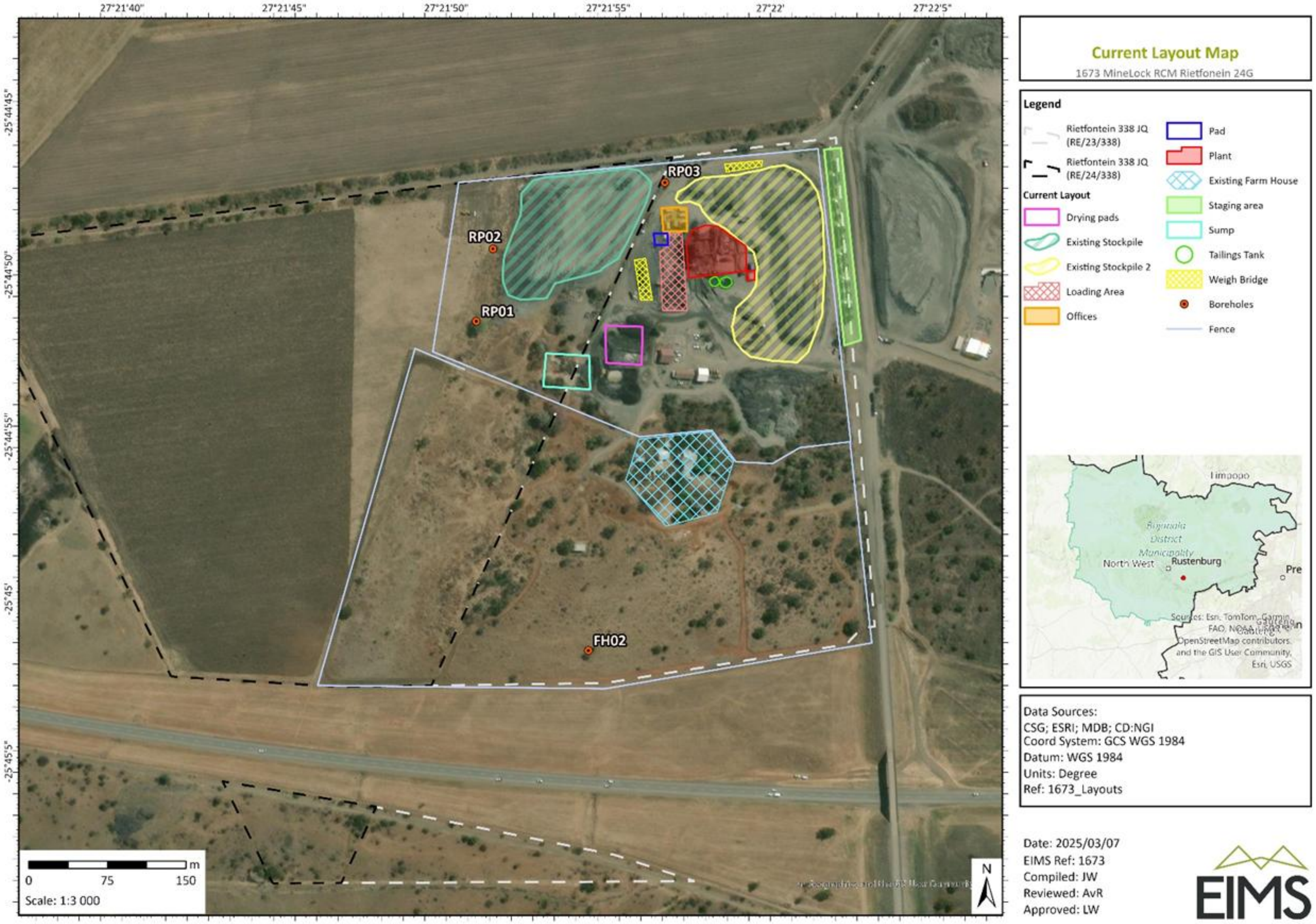


Figure 1: Locality and current layout of Rietfontein Plant.

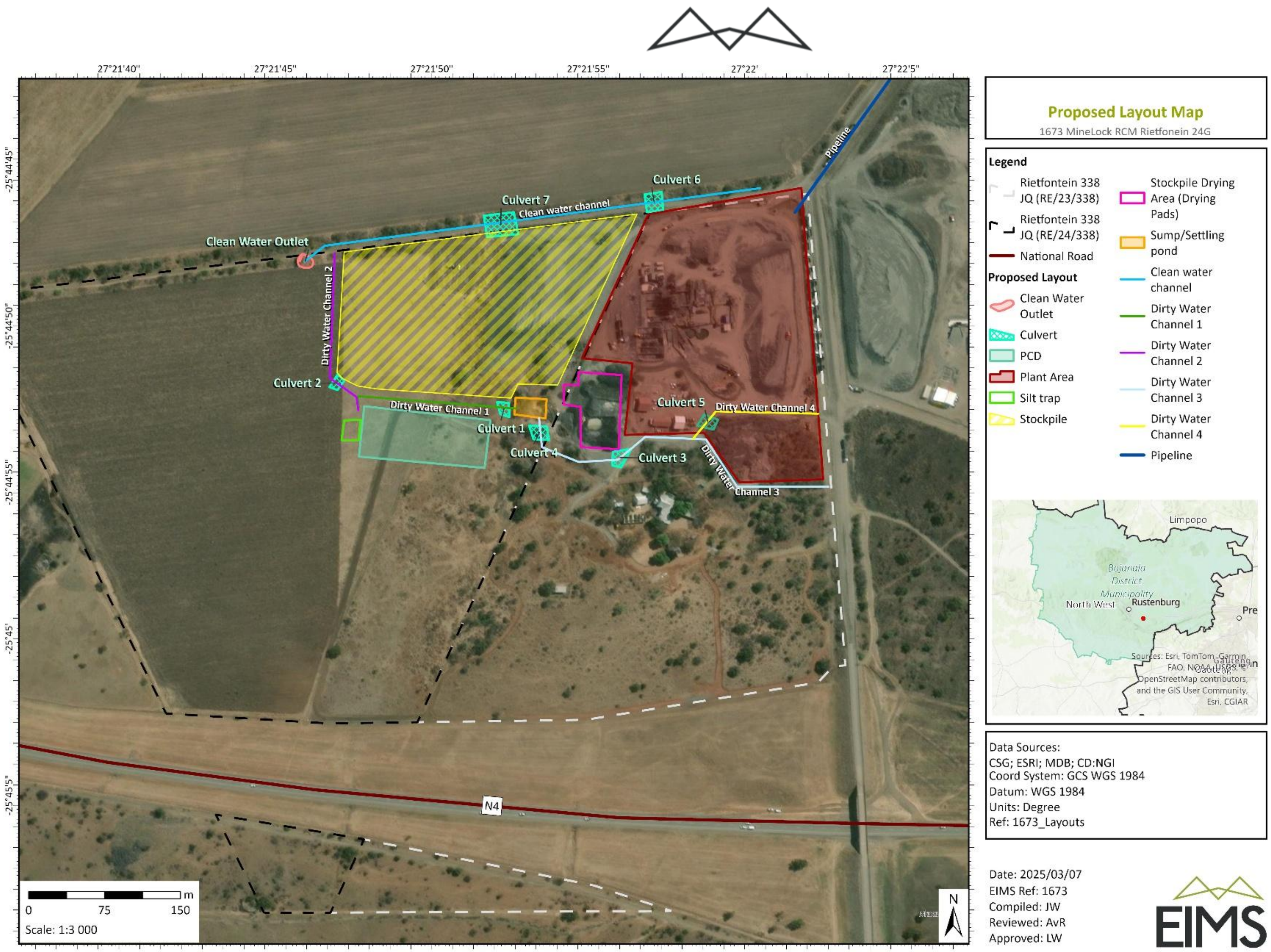


Figure 2: Proposed site layout for new infrastructure.

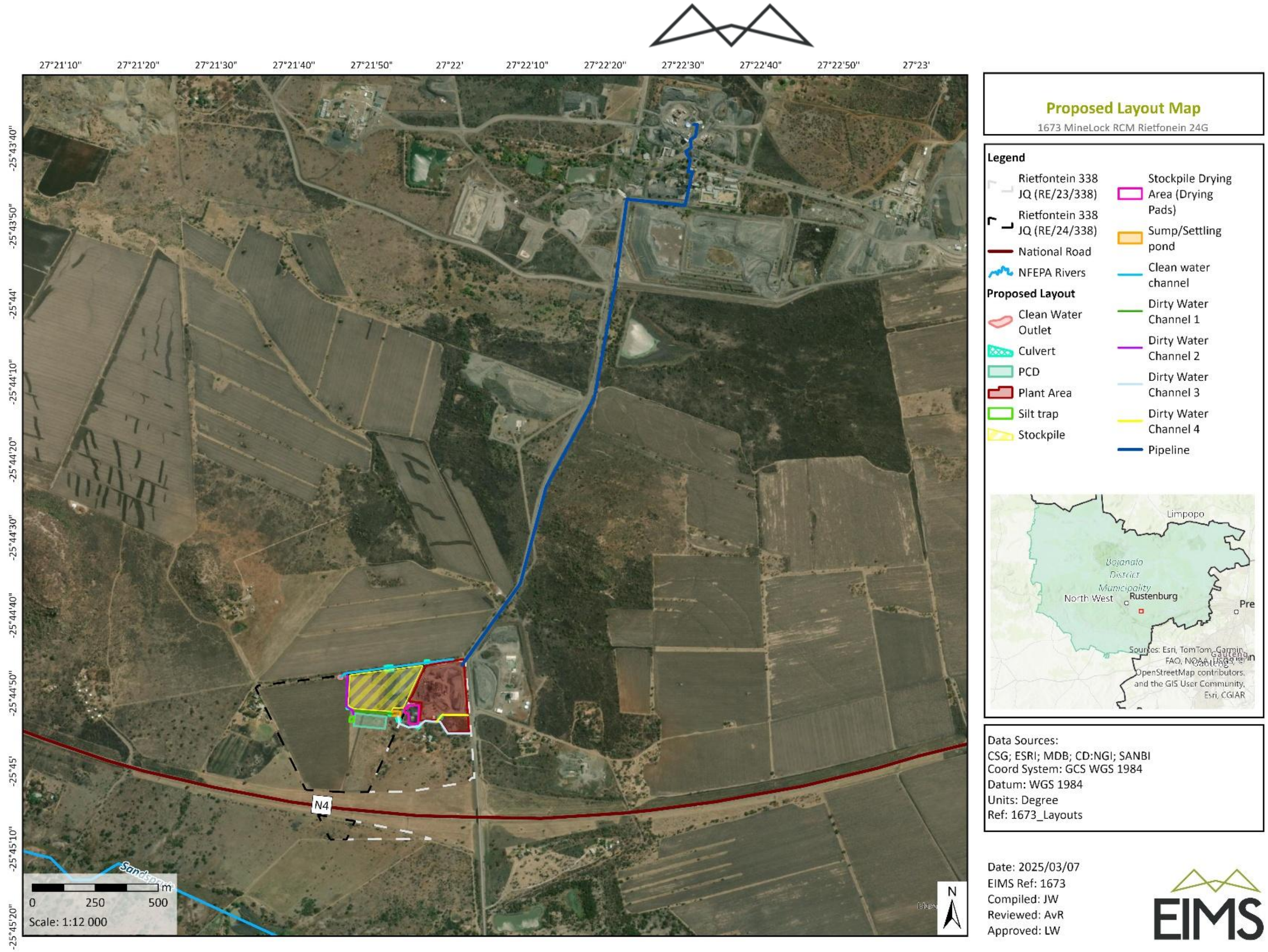


Figure 3: Proposed Pipeline Route and Layout.

3 DESCRIPTION AND SCOPE OF THE PROPOSED ACTIVITY

The sections below provide a detailed description of the Rietfontein Plant Section 24G project. The aim of the project description is to indicate the current and proposed activities to take place and to facilitate an understanding of the preliminary impacts identified and assessed in this Environmental Assessment Report. The final engineering report is also attached in Appendix G.

3.1 PROJECT DESCRIPTION

The Applicant operates a chrome processing facility in the North West Province and is undertaking steps to ensure compliance with environmental legislation following the development of infrastructure without prior environmental authorisation.

The existing infrastructure at the Rietfontein plant includes two stockpile areas, a chrome wash plant, drying pads, weighbridges, a sump, as well as site offices and staff accommodation. These facilities support the processing, storage, and operational activities associated with chrome beneficiation.

In an effort to regularise its operations and address past non-compliance, the applicant is submitting an application in terms of Section 24G of the National Environmental Management Act, 1998 (Act No. 107 of 1998). This application seeks to obtain retrospective environmental authorisation for existing infrastructure and approval for planned developments.

The proposed infrastructure includes:

- The expansion of one of the existing stockpile areas;
- The construction of dirty water channels and culverts to manage contaminated surface runoff;
- The installation of a clean water channel to divert uncontaminated stormwater away from operational areas;
- A lined Pollution Control Dam (PCD) with a design capacity of 8 000 m³, which will receive all dirty water collected on site; and
- A proposed pipeline approximately 2.5 km in length, consisting of two 144.5mm internal diameter slurry lines and two return water lines with an inner diameter of 136.4mm, to be constructed between the Rietfontein plant and the main mine, facilitating the transfer of materials or water as part of integrated operations.

3.1.1 PROJECT OVERVIEW

The Rietfontein plant was initially established as a temporary crushing and screening plant which later became the Rietfontein mud processing plant. The Rietfontein plant was issued a compliance notice dated October 2024 which necessitated that a Section 24G process be conducted to retrospectively license the facility and its associated operations as well as the addition of infrastructure to ensure that the plant has adequate environmental management infrastructure.

3.1.2 PROJECT TIMELINE

The plant is currently operational and its operation will continue in respect of the established operations. The construction of the proposed new infrastructure will commence once the section 24G process has been concluded and all relevant licensing/permitting of activities are in place.

3.1.3 PROJECT COMPONENTS

This section will discuss the existing and proposed infrastructure for the Rietfontein plant. Since the additional infrastructure will contribute to the project being more environmentally sound, it will be included in this application.

3.1.4 EXISTING INFRASTRUCTURE TO BE RETROSPECTIVELY LICENSED

The currently existing infrastructure at the plant consists of:

- Two stockpile areas located at the eastern and western sides of the site;
- A chrome mud processing plant;
- Two weighbridges;
- Site offices and staff accommodation, including Jojo tanks for water supply;
- A loading area adjacent to the plant area;
- Two tailings containment tanks;
- A stockpile drying pad; and
- A sump for wastewater.

3.1.5 PROPOSED INFRASTRUCTURE TO BE ADDED TO THE APPLICATION

This section provides a brief technical description of the proposed infrastructure at the Rietfontein plant. All information contained in this section was obtained from the MineLock Environmental Engineers Design report.

3.1.5.1 A NEW PCD AND ASSOCIATED INFRASTRUCTURE;

The Pollution Control Dam (PCD) at the Rietfontein Plant is designed to manage dirty water runoff from operational areas, including the plant footprint and stockpile zones. It complies with GN704 of the National Water Act, which requires that the dam must not spill more than once in 50 years. The dam is sized to hold a total volume of 8 000 cubic metres, which includes 5 600 cubic metres for the 50-year design storm and an additional 2 400 cubic metres for operational flexibility. The catchment contributing to the PCD includes both stockpile areas and the plant footprint which will be conveyed using the dirty water channels .

The embankments are constructed using residual norite soils of G7 quality. Upstream excavation slopes are limited to a maximum of 1V:3H for vertical depths up to 4.0 metres, while fill embankments are built with slopes not steeper than 1V:1.5H for heights up to 1.5 metres. Fill is placed in 150 mm layers and compacted to at least 93% of Modified American Association of State Highway and Transportation Officials (AASHTO) Maximum Dry Density (MDD), with moisture content maintained between Optimum Moisture Content (OMC) and OMC +2%. The basin and embankment surfaces are ripped to a depth of at least 100 mm and re-compacted prior to liner installation.

The dam incorporates a Class C composite liner system. The secondary liner consists of a 750 g/m² non-woven geotextile and a 1.5 mm smooth High-Density Polyethylene (HDPE) geomembrane. A cuspated drainage sheet is placed between the liners to facilitate leakage detection. The primary liner is a 2 mm smooth HDPE geomembrane. Anchor trenches are constructed at the crest of the embankment, measuring 0.5 metres deep and 0.5 metres wide, and are backfilled with cement-stabilised soil in 150 mm layers compacted to 93% MOD AASHTO. A 1 metre gap is maintained between the anchor trench and the crest line. The factor of safety against sliding is calculated to be 8.66.

Leakage management includes a detection sump measuring 5 by 5 metres and 0.5 metres deep, with a 100 mm no-fines concrete base and filled with 19 mm washed stone. A DN160 HDPE pipe connects the sump to a monitoring manhole at a maximum gradient of 1:100. If water is detected in the sump, the dam must be emptied and the liner inspected. The estimated action leakage rate (ALR) for the primary drainage system ranges from 2,847 to 4,678 litres per hectare per day, depending on water depth. The secondary liner is expected to leak at a rate of approximately 150 litres per day.

Subsoil drainage is managed through collector and interception drains. The collector drain uses 110 mm perforated HDPE pipe, while the interception drains use 160 mm perforated HDPE pipe. These are encased in 19 mm washed stone and wrapped in 210 g/m² filtration geotextile. The sump manhole is constructed from precast concrete rings (ND 1250 mm), with a 150 mm reinforced concrete base slab and sealed joints.

Stormwater overflow is managed via a concrete-lined emergency spillway designed to handle a 100-year flood peak of 2.6 cubic metres per second. The spillway has a base width of 2 metres and a depth of 1.3 metres, with a minimum freeboard of 800 mm. The outlet structure includes a 300 mm thick reno mattress floor lined with 550 g/m² protection geotextile to prevent erosion.

Additional infrastructure includes perimeter fencing, a double-leaf access gate, life buoys, crawl nets, and safety boxes containing life jackets and emergency equipment. Construction quality assurance is implemented through material specifications, installation procedures, and testing requirements for geomembranes, seams, and drainage components. The HDPE geomembrane, not exposed to UV, is expected to have a service life exceeding 106 years at 35°C, which is significantly longer than the projected life of mine of approximately 30 years.

3.1.5.2 STORMWATER SYSTEM CONSISTING OF CLEAN-AND-DIRTY WATER SEPARATION;

The stormwater management system at the Rietfontein Plant is designed to ensure effective separation of clean and dirty water, in compliance with GN704 of the National Water Act and the National Environmental Management: Waste Act (NEMWA). The system includes a network of dirty water channels, a silt trap, a settling pond, culverts, and a clean water separation berm. These components are integrated to manage runoff from the plant area, stockpiles, haul roads, and infrastructure, directing contaminated flows to the silt trap and ultimately to the PCD.

3.1.5.2.1 DIRTY WATER CHANNELS

Five dirty water channels are proposed to convey runoff from the plant and stockpile areas. The channels are designed to be trapezoidal in shape and lined with a 2 mm HDPE geomembrane over a 750 g/m² non-woven protection geotextile. Anchor trenches measuring 500 mm × 500 mm will be installed along the channel edges and backfilled with cement-stabilised G6 material, compacted to 93% Modified AASHTO Maximum Dry Density (MDD). Channel depths range from 0.4 m to 0.7 m, with flow velocities between 1.3 m/s and 2.65 m/s under 50-year flood conditions. A freeboard of 0.3 m is included to accommodate wave action and surges. All channels are constructed with side slopes of 1V:1.5H and are founded on compacted in situ soils after removal of black turf material.

3.1.5.2.2 SILT TRAP

The silt trap is designed to be located downstream of the dirty water channels and serves to remove suspended solids before water enters the PCD. It has a basin depth of 1.55 m, with a footprint of 12 m × 12 m, providing a total capacity of 400 m³. A 1:8 sloped ramp is included to allow access for mechanical cleaning. The trap is constructed on compacted G5 material, with all black turf soils removed from the foundation area. A 1.2 m high, 3 m wide overflow weir directs water from the silt trap into the PCD.

3.1.5.2.3 CLEAN WATER SEPARATION BERM

A clean water separation berm is proposed along the northern boundary of the site to divert clean runoff away from the dirty water system. The berm will be formed from compacted in situ soils and hydroseeded to establish vegetation cover. It is designed to prevent clean water from entering the contaminated catchment areas, thereby reducing the volume of water requiring treatment.

3.1.5.2.4 CULVERTS

Seven precast rectangular portal culverts will be installed along the dirty water channels to maintain site access. The culverts are designed for Class 1 loading in accordance with SANS 986 and are constructed with base slabs and rubber seals compliant with SANS 677-1986. Culvert dimensions vary, with widths of 0.75 m and heights ranging from 0.45 m to 0.75 m. Each culvert is 10 m in length and includes precast inlet and outlet wingwalls. A minimum cover of 1 m is maintained over all culverts, and road layer works are reconstructed to accommodate abnormal heavy loads.

3.1.5.3 AN EXPANSION OF THE EXISTING STOCKPILE AREA

The product stockpile area at the Rietfontein Plant is being expanded to accommodate increased volumes of sand and product resulting from re-processing activities. The final footprint of the expanded stockpile area is:

- Total area: 31,900 m² (3.19 hectares);

- Topsoil removal: Approximately 4,785 m^3 of topsoil (150 mm depth) stripped and stockpiled for future landscaping;

- Black turf excavation: Approximately 15,950 m^3 of reworked residual norite (black turf) removed to spoil; and

- Compacted subgrade: Approximately 4,785 m^3 of remaining black turf scarified and compacted to ≥93% Modified AASHTO Maximum Dry Density (MDD).This engineered subgrade provides both structural stability and a semi-impermeable base, reducing infiltration and supporting temporary stockpile operations.

3.1.5.4 A PIPELINE FROM RIETFONTEIN PLANT TO THE MAIN RCM MINE

The pipeline system at the Rietfontein Plant includes two slurry pipelines and two return water pipelines, proposed to connect the plant to Rustenburg Chrome Mine (RCM). These pipelines are intended to transport approximately 25% of the processed material as slurry back to RCM's tailings storage facility, while return water is conveyed to support water reuse in the plant operations. The pipelines are routed above ground and intersect with floodlines and wetland buffer zones, requiring specific structural and environmental design considerations.

The pipelines are designed to utilise 180 mm outer diameter HDPE pipes. The slurry pipelines are specified as SDR9 (Standard Dimension Ratio of 9 HDPE pipe) with a mass of 10.17 kg/m, and the return water pipelines as SDR11 with a mass of 8.5 kg/m. The pipelines will be supported on precast concrete sleepers or reinforced concrete stub columns, depending on the location and environmental sensitivity of the crossing.

Within the 500-metre wetland buffer zones, the pipelines are proposed to be elevated on standard F4 1065 mm gauge precast concrete sleepers. These sleepers are placed on compacted G7 material after removal of the reworked residual norite (black turf) soils. The fill is placed in 150 mm layers and compacted to 93% Modified AASHTO Maximum Dry Density (MDD). The bearing capacity of the foundation is limited to 75 kPa. If the black turf material is not removed, the bearing capacity is reduced to 25 kPa, which is not recommended due to potential swell and settlement.

Two installation options are proposed for sleeper placement. Option 1 places all four pipelines on a single sleeper at 3.5 m intervals. Option 2 separates the slurry and return water pipelines onto individual sleepers, with intervals of 6 m for slurry and 8.5 m for return water pipelines. Both options are structurally viable, but Option 1 offers faster installation.

At floodline intersections, the pipelines are proposed to be supported on reinforced concrete stub columns to elevate them above the 1:100-year flood level. A steel plate is bent over the pipes and anchored into the stub columns using HD galvanized bolts.

To manage potential leaks and erosion at stream crossings, berms and paddocks are proposed upstream of the crossings. These structures are intended to contain any spillage and facilitate clean-up. The pipeline sections within the buffer zones are proposed without flanges and are recommended to include continuous HDPE internal liners for wear and corrosion protection.

The pipeline infrastructure is integrated with the stormwater management system to ensure minimal impact on surface water flow. Elevation of the pipelines allows stormwater to pass beneath, maintaining natural drainage patterns and preventing erosion. The design ensures compliance with environmental regulations and supports operational efficiency and water reuse.

4 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which relates to the proposed project.

4.1 NATIONAL LEGISLATION

4.1.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (CSA)

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 EAR and associated impact mitigation actions are conducted to retrospectively fulfil the requirement of the Bill of Rights with respect to the Rietfontein plant.

4.1.2 MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (MPRDA)

The aim of the MPRDA is 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 mining rights in South Africa. The MPRDA also requires adherence with related legislation, chief amongst them is the National Environmental Management Act (Act No. 107 of 1998, NEMA) and the National Water Act (Act No. 36 of 1998, NWA).

Rietfontein plant has no applications with respect to the MPRDA however, considering the interrelatedness of the plant with Rustenburg Chrome Mine, it is important to note that activities are mining related and not direct mining activities.

4.1.3 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

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, EIA's 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 a number of 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.

NEMA sets out the general objectives of Integrated Environmental Management (IEM) in South Africa, including to (section 23(2)), of which the following two are of relevance for this report:

- Identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities. This is to be done with a view to minimising negative impacts, maximising benefits and promoting compliance with the principles of environmental management set out in section 2 (of NEMA).

- Ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them.

4.1.3.1 SECTION 24G

In terms of Section 24G of the National Environmental Management Act, 1998 (Act No. 107 of 1998), a person who has commenced with a listed or specified activity without the required environmental authorisation may apply for retrospective authorisation from the competent authority. This provision serves as a mechanism to rectify non-compliance, subject to the payment of an administrative fine. The Section 24G Fine Regulations (Government Notice No. R. 698 of 2017), promulgated under Section 44(1) of NEMA, outline the procedure and criteria for determining the quantum of such fines. These regulations require the establishment of a fine committee by each competent authority, which considers factors such as the nature and extent of the environmental impact, compliance history, and socio-economic and heritage impacts when recommending the fine amount. The application process must also include public participation and submission of relevant environmental reports to inform the authority’s decision.

Section 24G of NEMA and the Section 24G fine regulations (GN R. 698) makes provision for activities which have commenced without the prior environmental authorisation being obtained and outline the process to be followed. The application in terms of Section 24G does not guarantee that an authorisation will be issued, where the competent authority may require the applicant to rehabilitate the area in which activities were undertaken. An administrative fine is also prescribed which may not exceed R 5 million for first offences and not exceed R 10 million for induvial/entities who have previously been required to submit a Section 24G application.

4.1.3.2 LISTED ACTIVITIES

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 EIA’s in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the process to be followed when applying for EA for any listed activity.

Commencement of the Rietfontein plant did not comply with the required processes as mentioned above before the facility was constructed and started operating, therefore this report will follow the process outline in Section 24G of NEMA and the regulations contained in the Section 24G Fine regulations (GN R 698) which will reference the listed activities as contemplated in GN R. 982.

Table 3: NEMA listed activities to be authorised retrospectively and or for new planned activities

Activity	Activity Description	Applicability
Listing Notice 1 **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 of2014, 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.	The proposed pipeline route would result in the pipeline crossing two wetlands where sleepers/plinths will be placed. Additionally, a portion of the footprint of the plant occurs within the regulated area of a wetland.

Activity	Activity Description	Applicability
Listing Notice 1 **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; (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.	The proposed pipeline route would result in the pipeline crossing two wetlands where sleepers/plinths will be placed. Additionally a portion of the footprint of the plant occurs within the regulated area of a wetland.
Listing Notice 1 **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.	The Rietfontein Plant consists of an area of approximately 15ha of cleared area which was not licensed before commencement of construction.
Listing Notice 1 **Activity 28**	**Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:** (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or	The plant consists of an area of approximately 15ha which was previously used as agricultural land.

Activity	Activity Description	Applicability
	(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	
Listing Notice 1 **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.	The proposed expansion of the western stockpile as well as the addition of the various stormwater infrastructures within the regulated area will trigger this activity.

Activity	Activity Description	Applicability
Listing Notice 3 **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.** h. North West i. World Heritage Sites; core of biosphere reserve; or sites or areas identified in terms of an international convention; **ii. A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;** iii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999); **iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;** v. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or **vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.**	The Rietfontein plant footprint covers an area of approximately 15ha which falls within the boundaries of Critical Biodiversity Area (CBA) 2, Ecological Support Area (ESA) 1, ESA 2 and NPAES areas.
Listing Notice 3 **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	The proposed pipeline route crosses two wetlands where sleepers/plinths will be placed. Additionally a portion of the footprint of the plant occurs within the regulated area of a wetland.

Activity	Activity Description	Applicability
	(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.	

The DFFE have published a number of guidelines and protocols which have been considered in the compilation of this report and include but not limited to:

- Public Participation Guideline in terms of NEMA EIA Regulations (2017).
- Need and desirability Guideline in terms of NEMA (2012).
- Procedures for assessment and minimum criteria for specialist studies.

4.1.3.3 SCREENING TOOL

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. 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 4.

Table 4: Screening Tool environmental sensitivities.

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

In this regard, as 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. Please refer to Table 5 for a summary of the verification process. Please refer to Appendix B for the SSVR.

Table 5: SSVR findings and motivation.

Screening Tool identified specialist	Level of sensitivity	Suggested Sensitivity	Required level of assessment	Motivation
Agriculture	Very High	Very High	Full Assessment	The medium sensitivity for this theme can be confirmed by the EAP as some surrounding properties consist of cultivated land. Based on the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources (GN 320, 2020, as amended), an Agricultural Compliance Statement must be undertaken for the application.
Animal species	Medium	Medium	Full Assessment	A full DFFE protocol compliant specialist Terrestrial Biodiversity Impact Assessment will be undertaken which will include impact on sensitive or protected faunal species in the area.
Aquatic Biodiversity	Very High	Very High	Full Assessment	A full DFFE protocol compliant specialist Aquatic and Wetland Impact Assessment will be undertaken. The very high sensitivity rating is present along the pipeline route.
Archaeological and Cultural Heritage	High	High	Full Assessment	The low sensitivity assigned by the Screening Tool is disputed as during the site inspection, evidence of heritage features were observed, therefore a full assessment was undertaken in accordance with the requirements of Section 38 of the National heritage Resources Act 25 (1999).
Civil Aviation	High	Low	Compliance Statement	The nature of the development as well as the maximum height of the development components will not pose a material risk to commercial air traffic. As such, no specialist aviation studies will be undertaken.
Defense Theme	Low	Low	None	The defence theme was rated as low and therefore no defence related studies will be undertaken.

Screening Tool identified specialist	Level of sensitivity	Suggested Sensitivity	Required level of assessment	Motivation
Palaeontology	Low	Low	Full Assessment	A full DFFE protocol compliant specialist Paleontological Impact Assessment will be undertaken.
Plant Species Theme	Medium	Medium	Full Assessment	A full DFFE protocol compliant specialist Terrestrial Biodiversity Impact Assessment will be undertaken which will include impact on sensitive or protected floral species in the area.
Terrestrial Ecology/ Biodiversity	Very High	Very High	Full Assessment	A full DFFE protocol compliant specialist Terrestrial Biodiversity Impact Assessment will be undertaken.

4.1.4 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT (NEMPAA)

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)".

The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. The database is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003. The site is located within the Magaliesberg Biosphere Reserve 'Transition' zone, and approximately 8.7 km from the Magaliesberg Protected Natural Environment.

The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection. The site overlaps with a Priority Focus Area as per the NPAES dataset (refer to Figure 4 below).

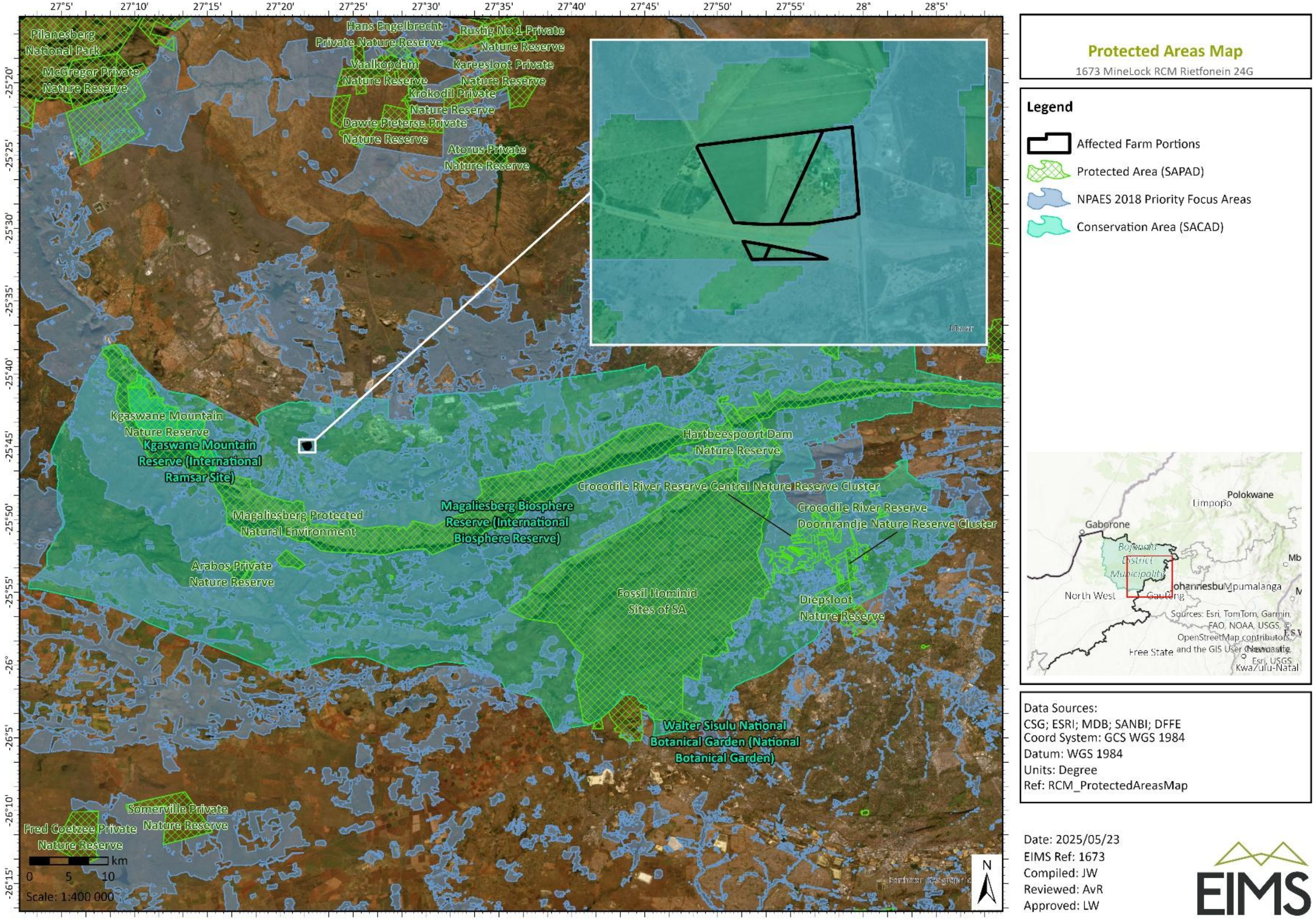


Figure 4: Protected Areas Map.

4.1.5 NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT (NEMAQA)

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
- 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 of November 2013 (Government Gazette No. 37054).

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 (PM10 and PM2.5), sulphur dioxide (SO2), nitrogen dioxide (NO2), ozone (O3), carbon monoxide (CO), lead (Pb) and benzene. The NAAQS were published in the Government Gazette (no. 32816) on 24 December 2009 for PM10 and other pollutants (South Africa, 2009). The PM2.5 NAAQS were published in 2012 (South Africa, 2012).

The NEMAQA also provides for the monitoring and reporting of Green House Gass (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 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.

The Section 24G application for the Rietfontein plant does not trigger any listed activities under NEM:AQA however the plant does fall within the boundaries of the Waterberg-Bojanala Priority Area and as such an air quality assessment was conducted by Airshed Planning Professionals (Appendix D) as part of the environmental assessment process.

4.1.6 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (NEMBA)

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.

The National List of Ecosystems that are Threatened and in Need of Protection (GN 1002 of 2011) are promulgated under the NEMBA and these Regulations provide 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.

Further regulations published under the NEMBA are the threatened or protected Species Regulations (GN R 152 of 2007) which aims to:

(a) 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;

(b) provide for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders;

(c) provide for the regulation of the carrying out of a specific restricted activity, namely hunting;

(d) provide for the prohibition of specific restricted activities involving specific listed threatened or protected species;

(e) provide for the protection of wild populations of listed threatened species; and

(f) provide for the composition and operating procedure of the Scientific Authority.

The Alien and Invasive Species Lists are promulgated under the NEMBA with the aim of protecting 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.

In giving effect to the above, the Alien and Invasive Species Regulations (GNR 1020 of 2020) provide for amongst others, the prevention of the spread or allowing the spread of, any specimen of a listed invasive species.

Alien Invasive Plants (AIPs) have an average density of <5% over the entire Bojanala Platinum District Municipality and are not considered to be an overall issue within the District Municipality. However, the local municipalities such as Rustenburg, Madibeng and Kgetlengrivier Local Municipalities experience greater issues with AIP densities of greater than 5% and exceeding 20%. Invasions of AIPs within these areas are likely associated with grasslands, as well as broken terrain in river systems, valleys and ridges. Invasions by alien plants have significant impacts on the economy due to loss of agricultural productivity and the cost involved for AIP management, as well as harmful impacts on ecosystem services and biodiversity (BPDM EMF: Status Quo report (Final Rev13), 2018).

The site overlaps the endangered Marikana Thornveld (SVcb 6) vegetation type. The Marikana Thornveld is endangered, with a conservation target of 19%. Less than 1% of this vegetation type is statutorily conserved in conservation areas like the Magaliesberg Nature Area. This vegetation type has been significantly transformed (approximately 48%), mainly by urban sprawl and cultivation (Mucina and Rutherford, 2006; TBC, 2025). This habitat loss is the main contributor endangering this vegetation type and further loss and fragmentation should be minimised (RLM SDF Draft, 2023).

The site falls within the Magaliesberg Important Bird Area. Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria (TBC, 2025). The Cape Vulture, an important bird species, is found within the Magaliesberg IBA. IBAs are typically considered when delineating Critical Biodiversity Areas (CBAs), however, additional buffer areas may be necessary around CBAs with respect to developments that are particularly sensitive to birds such as windfarms (RLM SDF Draft, 2023).

4.1.7 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

On 2 June 2014, the NEMWA came into force. The objectives of this Act are:

a) to protect health, well-being and the environment by providing reasonable measures for-

   i. minimising the consumption of natural resources;

   ii. avoiding and minimising the generation of waste;

   iii. reducing, re-using, recycling and recovering waste;

   iv. treating and safely disposing of waste as a last resort;

   v. preventing pollution and ecological degradation;

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

   vii. promoting and ensuring the effective delivery of waste services;

viii. remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and

ix. achieving integrated waste management reporting and planning;

b) to ensure that people are aware of the impact of waste on their health, well-being and the environment;

c) to provide for compliance with the measures set out in paragraph (a); and

d) generally, to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.

Section 16 of the NEMWA states:

1. A holder of waste must, within the holder's power, take all reasonable measures 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 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 unauthorised purposes."

The NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities.

4.1.7.1 WASTE MANAGEMENT ACTIVITIES

GNR 921 provides a list of waste management activities that have, or are likely to have, a detrimental effect on the environment, and consequently require a Waste Management Licence. The Rietfontein plant does not trigger any waste management activities as set out in NEM:WA.

4.1.7.2 WASTE CLASSIFICATION AND MANAGEMENT REGULATIONS

The Waste Classification and Management Regulations (GNR 634) are published under the NEMWA. 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.

4.1.7.3 NEMWA NATIONAL NORMS AND STANDARDS FOR THE ASSESSMENT OF WASTE FOR LANDFILL DISPOSAL, 2013 (GN R. 635)

These Norms and Standards prescribe the requirements for the assessment of waste prior to storage or disposal to landfill. The aim of the waste assessment tests is to characterise the material to be deposited or stored in terms of the above-mentioned waste assessment guidelines set by the DFFE. The waste generated at the proposed project which is not listed under Annexure 1 of the Waste Classification and Management Regulations, must be assessed in accordance to these Norms and Standards to determine the waste type. In terms of Regulation 12(1) of GN R 634 with regards to the classification of waste, the potential level of risk associated with disposal or downstream use of waste must be determined by following the prescribed and appropriate analysis protocol as detailed in these Norms and Standards. The assessment of the waste should:

- Identify the chemical substances present in the waste;

- Sampling and analysis to determine the total concentration (TC) and leachable concentration (LC) of the elements and chemical substances that have been identified within the waste according to section 6 of this regulation;

- Based on the TC and LC limits of the identified elements and chemical substances in the analysed waste exceeding the corresponding TC and LC thresholds respectively, the waste type will be determined (Type 0 Waste to Type 4 Waste); and

- The waste type will then be used determine to which landfill class site the waste must be disposed and / or the suitable containment barrier design for storage.

The project does not trigger any waste related activities, the existing stockpiles on site consist of product stockpiles as clarified by the DFFE IQ presented in Appendix H.

4.1.7.4 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.

No waste requiring a lined barrier will be stored at Rietfontein Plant, at present all tailings from the plant are transported to the main RCM mine. As part of this application a pipeline from the Rietfontein plant to RCM is proposed to transport all tailings to the waste facilities located on the main mine via a pipeline.

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

These Regulations 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 pipeline from the Rietfontein Plant to the RCM mine will transport all process waste from the plant to the main mine where residue stockpiles already exist and form part of a separate EIA. No waste activities will occur at the Rietfontein plant.

4.1.8 THE NATIONAL WATER ACT (NWA)

The purpose of the NWA is to ensure that the nation’s water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

a) meeting the basic human needs of present and future generations;

b) promoting equitable access to water;

c) redressing the results of past racial and gender discrimination;

d) promoting the efficient, sustainable and beneficial use of water in the public interest;

e) facilitating social and economic development;

f) providing for growing demand for water use;

g) protecting aquatic and associated ecosystems and their biological diversity;

h) reducing and preventing pollution and degradation of water resources;

i) meeting international obligations;

j) promoting dam safety;

k) managing floods and droughts,

and for achieving this purpose, to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation.

The 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. 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.

The above water use processes are described in Figure 5.

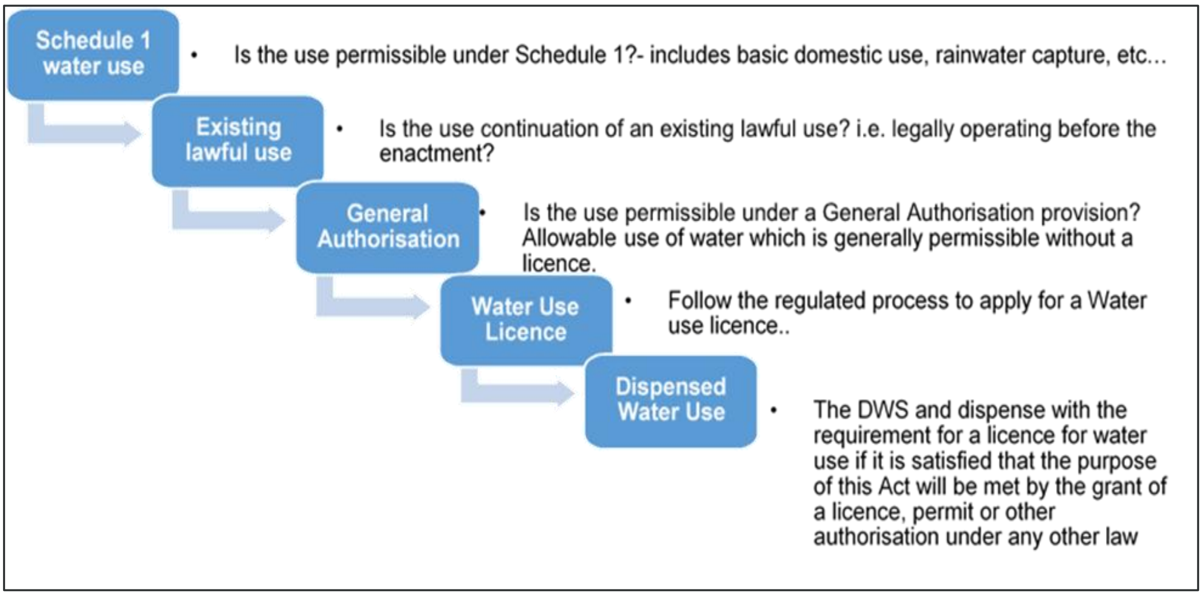


Figure 5: Authorisation processes for new water uses.

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

a) Taking water from a water resource;

b) Storing water;

c) Impeding or diverting the flow of water in a watercourse;

d) Engaging in a stream flow reduction activity contemplated in section 36;

e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);

f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;

g) Disposing of waste in a manner which may detrimentally impact on a water resource;

h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

i) Altering the bed, banks, course or characteristics of a watercourse;

j) 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

k) Using water for recreational purposes.

A watercourse is defined in terms of the Act as follows:

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;

The regulated area of a watercourse for section 21(c) or (i) of the Act water uses, is similarly defined in terms of the Act as follows:

a) 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;

b) 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

c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

Rietfontein plant currently holds a water use license (WUL) in terms of section 21 (a) and section 21 (g) of the act with reference 07/A22H/AG/5292. An amendment of the current WUL at Rietfontein plant will be applied for in order to license the new pipeline as well as the proposed stormwater infrastructure. The water uses applicable to this project are presented in Table 6 below and shall be discussed and agreed upon with the DWS during the WULA process.

Table 6: Likely NWA Section 21 water uses triggered by this project.

Section 21 water use	Description	Applicability
a	Taking water from a water resource.	Multiple abstraction boreholes are present on the site. The water abstracted is used for processing purposes and domestic use.
c & i	Impeding or diverting the flow of water in a watercourse and/or altering the bed,	The majority of the infrastructure occurs within 500m of the regulated area of a wetland and the proposed pipeline route

Section 21 water use	Description	Applicability
	banks, course or characteristics of a watercourse.	will cross at least one wetland to the North of the site.
g	Disposing of waste in a manner which may detrimentally impact on a water resource.	The proposed construction of a new PCD as part of the stormwater management plan upgrades to the site. This includes the associated silt traps as well as the licensing of the stockpile areas.

The required water use license amendment application will run concurrently with this process and in consultation with the DWS, additional water uses may be identified throughout the process.

South Africa is divided into nineteen 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 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 project is situated in the secondary catchment A2 of the Limpopo-Olifants Water Management Area, within the A22H Quaternary Catchment. The total drainage area of the Limpopo-Olifants WMA covers 183 125km2 and borders the neighbouring Zimbabwe and Botswana with the Limpopo River. The Crocodile River is one of the major tributaries of the Limpopo River which eventually discharges into the Indian Ocean through Mozambique (DWS, 2022). The WMA is currently experiencing challenges due to increased urban growth and expansion of key economic sectors such as agriculture and mining. According to the Business Case for the Limpopo-Olifants Catchment Management Agency (2022) it is expected that water demand will have increased by 46% by 2025. The agriculture sector is said to account for 60% of the water use in the Limpopo-Olifants WMA (DWS, 2022).

Strategic Water Source Areas (SWSAs) are areas that supply a disproportionate amount of mean annual runoff to a geographical region of interest. The areas supplying ≥ 50% of South Africa’s water supply (which were represented by areas with a mean annual runoff of ≥ 135 mm/year) represent national Strategic Water Source Areas (SANBI, 2013). These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing. Groundwater and interflow play a key role in sustaining surface water flows during the dry season and account for up to 42% of river baseflow, thereby sustaining aquatic and water-dependent biota. Therefore, the protection and management of these areas are imperative (Le Maitre et al., 2018).

According to the SWSAs of South Africa, Lesotho and Swaziland, the proposed site is overlapping with the Kroondal/Marikana groundwater strategic water source areas (Lotter and Le Maitre, 2021). Ecological infrastructure in this region should be protected as far as possible, and emphasis should be placed on management of land uses and associated activities with high potential for surface water pollution (RLM SDF Draft, 2023).

4.1.9 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.

The NEMA 23(2)(b) gives effect to the NHRA and 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) which apply to Heritage Impact Assessments.

The MPRDA also gives effect to the NHRA as this Act 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 MPRDA requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities.

In accordance with the legislative requirements and EIA rating criteria, the regulations of the South African Heritage Resources Agency (SAHRA) and Association of Southern African Professional Archaeologists (ASAPA) have also been incorporated to ensure that a comprehensive and legally compatible Heritage Report is compiled.

A previous heritage study for the area was discovered during the process conducted by Coetzee, 2008, which had identified some heritage features within the proximity of the plant footprint. A full Heritage Impact Assessment was undertaken by PGS Heritage as part of the Section 24G process. The study found that some heritage resources had been destroyed in the development of the site, these action are subject to section 51(1) of the NHRA which states the following

" (1) Notwithstanding the provisions of any other law, any person who contravenes -

(a) …;

(b) sections 33 (2), 35 (4) or 36 (3) is guilty of an offence and liable to a fine or imprisonment or both such fine and imprisonment as set out in item 2 of the Schedule;

(c) sections 28 (3) or 34 (1) is guilty of an offence and liable to a fine or imprisonment or both such fine and imprisonment as set out in item 3 of the Schedule;

(d) ….;

(e) …;

(f) …"

The full heritage impact assessment is provided in Appendix D and is discussed in section 8.

4.1.10 ENVIRONMENT CONSERVATION ACT (ECA)

The ECA (Act 73 of 1989) 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.

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.

There are a few South African National Standards (SANS) 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. A noise impact assessment was undertaken for this project and the findings were utilised in the impact assessment and associated management measures in the EMPr.

4.1.11 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. Impacts on the soil, biodiversity and water resources have been identified with regards to the proposed Project, and mitigation and management measures recommended.

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

The Spatial Planning and Land Use Management Act (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 (LUS); and municipal planning tribunals.

4.2 PROVINCIAL POLICY AND PLANNING CONTEXT

4.2.1 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 infrastructure is partially located within CBA 2, ESA 1, and ESA 2 area according to the North West Terrestrial Biodiversity plan.

4.2.2 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 has been considered and if the mitigation measures are implemented, the development will be in line with the criteria.

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 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.

Based on the available Spatial Development Framework (SDF) and Integrated Development Plan (IDP) maps, the site appears to fall within an area designated for mining activities. However, due to the limitations of the mapping clarity and the absence of formal confirmation from the relevant authorities, the applicant must ensure that the property is correctly zoned for the proposed use and undertake a zoning application if required.

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.). Table 7 presents the needs and desirability analysis undertaken.

Table 7: Needs and desirability analysis for the proposed project

Ref No.	Question	Response
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.	The site falls within the Marikana Thornveld region which is classified as poorly protected and endangered. The majority of the infrastructure falls within the borders of the existing RCM Rietfontein plant operations. A number of specialist studies have been conducted to inform this application and environmental impact assessment, which include: • Soil, Agriculture and Hydropedology Impact Assessments; • Aquatic and Wetland Impact Assessment; • Terrestrial Biodiversity Impact Assessment; • Heritage Impact Assessment; • Palaeontological Desktop Assessment; and • Air quality. These specialist studies informed this impact assessment. The findings from the terrestrial biodiversity study identified areas of Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems,

Ref No.	Question	Response
		Conservation Targets and the Ecological drivers of the ecosystem for consideration in the proposed development. It was found that the site falls within Critical Biodiversity Area (CBA) 2, Ecological Support Area (ESA) 1, ESA 2 and NPAES areas as well as being in the Magaliesberg Biosphere Transition zone. The entire site falls within the outer edge of the Magaliesberg Biosphere Reserve – known as the "Transition Zone" (refer to Figure 4). Please refer to Section 4.2 for the consideration of the relevant SDFs and EMFs, Section 8.2 for a description of the biological environment and Appendix D for specialist reports.
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?	The project is subject to an application in terms of section 24G of NEMA and as such some of the impacts have already occurred. The impacts that may result from the proposed activities are also assessed and discussed in this report. A Terrestrial Biodiversity Assessment and an Aquatic and Wetland Assessment was undertaken to inform of any negative impacts on biological diversity that have/could be imposed due to the development. The specialist's provided mitigation measures to ensure that disturbance to ecosystems is minimized as much as reasonably possible. The applicant is also applying for additional infrastructure at the plant. The largest component of the infrastructure aims to enhance the stormwater management and create catchments for all dirty water on site. Since the application is being conducted in terms of Section 24G of NEMA, it is stated that initial considerations were not made, the stormwater infrastructure and the inclusion of recommended management measures from the Terrestrial, Wetlands and Soils specialists, provided an impact assessment and mitigation (Appendix D and Section 9). Mitigation measures were recommended in the specialist reports to ensure the impact of the pipeline is minimised which includes avoiding the buffer areas of certain heritage features and ensuring that the pipeline is not subterranean. Refer to Section 9 and Appendix D.

Ref No.	Question	Response
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?	The project is subject to an application in terms of section 24G of NEMA and as such some of the impacts have already occurred. The impacts that may result from the proposed activities are also assessed and discussed in this report. (Refer to Section 9). The site has already impacted upon the biophysical environment, thus necessitating an application in terms of section 24G. In an effort to reduce the impacts and prevent potential future impacts at the site, the proposed construction of comprehensive stormwater management infrastructure and a slurry/return water pipeline for the whole site are proposed. Management measures to mitigate impacts were suggested by the specialists as presented in Section 9.3 and Appendix D. Specialist studies which considered the impacts included: • Soil, Agriculture and Hydropedology Impact Assessments; • Aquatic and Wetland Impact Assessment; • Terrestrial Biodiversity Impact Assessment; • Heritage Impact Assessment; • Palaeontological Desktop Assessment; and • Air quality.
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 measures have been explored to safely treat and/or dispose of unavoidable waste?	The nature of the plant inherently leads to the production of tailings material as the product is processed. Presently, tailings are sent by truck for deposition at the main mine. A proposed measure to rectify the potential of pollution by trucking of tailings is to construct a return water and slurry pipeline for deposition of tailings at the main mine, reducing the risk of potential pollution by spillages. General waste is also produced by the plant which will be disposed of in a safe and responsible manner in line with the requirements of NEM:WA. The sand produced at the plant during the washing process also holds economic value and will be-resold for use in other sectors such as construction.

Ref No.	Question	Response
		The construction of the proposed stormwater infrastructure will ensure that should rainfall events or spillages occur that a clear separation will exist between clean-and-dirty water runoff, preventing the irrevocable contamination of water resources.
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?	The project is subject to an application in terms of section 24G of NEMA and as such some of the impacts have already occurred. The impacts that may result from the proposed activities are also assessed and discussed in this report. (Refer to Section 9). A full heritage assessment was conducted for the existing and proposed infrastructure. Various significant sites were observed during the fieldwork and suitable recommendations were made, the most notable of which was a recommended phase 2 heritage mitigation for the remnants of an iron age settlement within the site footprint. It was determined that the activities on-site contributed to the partial destruction of the heritage feature. For more details on the results of the site work conducted see section 8.3.8 and Appendix D. Similarly, the stormwater infrastructure should avoid certain heritage features observed on site and it was stated that before construction takes place, a phase 2 heritage mitigation should be undertaken on site. The heritage assessment uncovered the remains of an iron age settlement on site which has been impacted by the development, see section 8.3 and Appendix D for details and refer to section 9 for the impacts identified.
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?	The project is subject to an application in terms of section 24G of NEMA and as such some of the impacts have already occurred. The impacts that may result from the proposed activities are also assessed and discussed in this report. Refer to Section 9 and the EMPr contained in Appendix F for the impact assessment and mitigation measures.
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	

Ref No.	Question	Response
	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?	
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 project aims to create a structure where water is re-used in a closed loop system which will lead to a reduced requirement for the abstraction of water. The site currently has existing infrastructure in place which will require minimal additional usage of materials, except where the new stormwater management plan is to be implemented and the new pipeline constructed. The introduction of the stormwater management infrastructure and pipeline will further serve to minimise the already existing impacts on the surrounding landscape. Waste generated is currently removed and disposed of by a licensed operator. No new landfills will be established as a result of the project within the project boundary.
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 project is subject to an application in terms of section 24G of NEMA and as such some of the impacts have already occurred. The impacts that may result from the proposed activities are also assessed and discussed in this report. The proposed project will utilize existing infrastructure. Most of the proposed additional infrastructure is to be constructed on land that is already developed and disturbed in order to minimise the unnecessary use of further natural resources. This will in turn ensure the long-term survival of the business by increasing sustainability practices of the plant.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The project is subject to an application in terms of section 24G of NEMA and as such some of the impacts have already occurred. The impacts that may result from the proposed activities are also assessed and discussed in this report. The site currently has existing infrastructure in place which will require minimal additional usage of materials, except where the new stormwater management plan is to be implemented and the new pipeline constructed. The successful implementation of the stormwater infrastructure and PCD should reduce the need for abstraction of groundwater and promote the re-use of process water as far as possible. The primary water supply to the plant is sourced from Rand water, abstraction is a tertiary water

Ref No.	Question	Response
		source which is used for domestic use and to some degree for the operational activities.
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)?	Refer to Section 11 for a detailed description of the gaps, uncertainties and assumptions for each specialist study. The level of risk associated with the limits of current knowledge is considered low based on the impact assessment outcomes (refer Section 9 and Section 11).
1.8.2	What is the level of risk associated with the limits of current knowledge?	
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?	This project is subject to an application in terms of Section 24G of NEMA. The nature of such an application inherently means that development had already proceeded, to this end measures were taken to assess the current environmental status and to establish the way forward. A risk-averse and cautious approach with regards to the proposed additional infrastructure was applied to the development by undertaking specialist studies (Appendix D), which included management recommendations, a detailed impact assessment and a development/updating of the EMPr (Appendix F).
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 project is subject to an application in terms of section 24G of NEMA and as such impacts have already occurred. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this report.
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.)?	The project is subject to an application in terms of section 24G of NEMA and as such impacts have already occurred. The proposed addition of the stormwater infrastructure serve to ensure that the operations at the plant are environmentally sustainable.

Ref No.	Question	Response
		Refer to Section 8 for the Environmental Attributes and description of the Baseline Environment where the baseline ecological and socio-economic context of the area is discussed, as well as the identified impacts, their assessment and recommended mitigation measures 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 project is subject to an application in terms of section 24G of NEMA and as such impacts have already occurred. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of 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?	The project is subject to an application in terms of section 24G of NEMA and as such impacts have already occurred. Considering that the infrastructure is already in place on the site, little to no alternatives can be considered and the priority of the development is to ensure ongoing improvement and pollution prevention on site. Refer to Section 6 for details of the alternatives 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?	The project is subject to an application in terms of section 24G of NEMA and as such impacts have already occurred. Refer to the identified cumulative impacts, their assessment and recommended mitigation measures in 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	Details of the socio-economic context of the area in terms of the Bojanala Platinum District Municipality IDP and Rustenburg Local Municipality IDP are detailed in Section 8.3.
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.),	The project area is located a fair distance from any human habitation and is in line with the SDF for the area as the conceptual framework presented in the SDF outlines

Ref No.	Question	Response
		the use of the area as being a development corridor surrounded by mining activities to the north and agricultural focus to the south.
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	Refer to Section 8 for the Environmental Attributes and Baseline Environment.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	The proposed project will promote and support the sustainable economic growth of business within the municipality (refer to Section 8).
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?	The proposed development will ensure the continued processing of product which will in turn increase productivity of the main mine, thereby ensuring the long-term survival of the business and continued employment for the existing workforce. Some additional job opportunities may be created during the process of upgrading the stormwater management system, however, these will be limited.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The proposed development will ensure the long-term survival of the business which will in turn complement the local socio-economic initiatives of the area.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	Refer to the Public Participation Process undertaken for this project (Section 0) as well as the identified impacts, their assessment and recommended mitigation measures in Section 9 of this report.
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?	The proposed development will ensure the continued processing of product which will in turn increase productivity of the main mine, thereby ensuring the long-term survival of the business.
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.	The plant is currently fully staffed and as such, some additional opportunities will be created during the upgrade process, however, these will be limited. Should the project not be authorised, it is likely that several job losses will occur.
2.5.2	Reduce the need for transport of people and goods.	

Ref No.	Question	Response
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 current operations of the plant accommodate staff at on-site housing, requiring minimal transportation of people. The proposed pipeline be approved for construction, this will result in a reduced need for the transportation of tailings material by truck to the main mine, thus resulting in less need for transportation by truck.
2.5.4	Compliment other uses in the area,	The project consists of pre-existing infrastructure for the purpose of a chrome processing plant. The retrospective authorisation as well as the proposed new infrastructure will not result in a change of the land use. The plant is also in close proximity to other mining and processing land uses.
2.5.5	Be in line with the planning for the area.	The project is in line with the SDF for the area. The project area is located a fair distance from any human habitation and is in line with the SDF for the area as the conceptual framework presented in the SDF outlines the use of the area as being a development corridor surrounded by mining activities to the north and agricultural focus to the south.
2.5.6	For urban related development, make use of underutilised land available with the urban edge.	The proposed project area is outside an urban area.
2.5.7	Optimise the use of existing resources and infrastructure,	The project is subject to an application for environmental authorisation in terms of section 24G of NEMA, as a result, the bulk of the project consists of pre-existing infrastructure with the new infrastructure being proposed consisting of the implementation of a stormwater management plan and a pipeline. As a result of the aforementioned, the project will only require the use of resources for the construction of the new supportive infrastructure.
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),	The project is subject to an application for environmental authorisation in terms of section 24G of NEMA. The plant is situated in a predominantly mining area and consists of mostly existing infrastructure that is currently in use for chrome washing related activities whilst constructing additional supportive infrastructure on the property.

Ref No.	Question	Response
2.5.9	Discourage "urban sprawl" and contribute to compaction / densification.	The project is subject to an application for environmental authorisation in terms of section 24G of NEMA. The plant is situated in a predominantly mining area and consists of mostly existing infrastructure that is currently in use for chrome washing related activities whilst constructing additional supportive infrastructure on the property. The Rietfontein Plant is currently fully staffed and accommodation is available for staff on-site. This will mean that no new housing would be required as the current existing facilities already cater for the workforce at the plant.
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,	No new settlements or structures for housing will be constructed or required for the project as there is no need at the present. The project is subject to an application for environmental authorisation in terms of section 24G of NEMA. The plant is situated in a predominantly mining area and consists of mostly existing infrastructure that is currently in use for chrome washing related activities whilst constructing additional supportive infrastructure on the property. The Rietfontein Plant is currently fully staffed and accommodation is available for staff on-site. This will mean that no new housing would be required as the current existing facilities already cater for the workforce at the plant.
2.5.11	Encourage environmentally sustainable land development practices and processes	The project in terms of the retrospective authorisation will consist of primarily pre-existing infrastructure. The authorisation and subsequent implementation of the stormwater management plan will result in the site fulfilling a more environmentally sustainable process, this would be further improved with the authorisation and implementation of the proposed slurry and return water pipeline.
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.),	The project is subject to an application for environmental authorisation in terms of section 24G of NEMA. The proposed project is already operating with infrastructure already in place on site. The plant is located approximately 1.6km south of the main mine which provides the feedstock for the plant operations.
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).	The retrospective authorisation will ensure the continued operation of the plant thus ensuring that the business will be capable of long term economic sustainability. The

Ref No.	Question	Response
		approval of additional infrastructure will ensure that the plant is capable of performing its' operations in a more environmentally sustainable manner and also increasing the efficiency of the plant, thereby stimulating increased activity and reduce the risk related to waste generated by the plant, which will no longer be trucked to RCM for disposal but rather flow via pipeline. The location of the plant is also placed in an area dominated by mining activities which focus on platinum group metals. The location of the plant ensures that a consistent supply of feedstock will be available for the plant.
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	A suitably qualified Archaeologist and Palaeontologist undertook a Heritage Impact Assessment and a Palaeontological Desktop Assessment respectively. The results of which can be found in Appendix D. The palaeontological impact assessment found that the impacts (both retrospective and potential) were minimal as the area is typified by very low potential for paleontological resources. The heritage impact assessment found various heritage features, the most significant of which consists of the remnants of a late iron age settlement which has been partially destroyed as a result of the development. The specialist has recommended that steps be taken to conserve what is left of this site which will result in a reduction of the sensitivity of the site to low. Other sites had also been identified during the fieldwork and appropriate mitigation measures have been proposed.
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?	It is not anticipated that the project will have an impact on the existing settlements in the area.
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 11 for details regarding the assumptions and limitations.

Ref No.	Question	Response
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?	Refer to Section 11 for a detailed description of the gaps, uncertainties and assumptions for each specialist study. The level of risk associated with the limits of current knowledge is considered low based on the impact assessment outcomes (refer Section 9 and Section 11).
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?	This project is subject to an application in terms of Section 24G of NEMA. The nature of such an application inherently means that development had already proceeded, to this end measures were taken to assess the current environmental status and to establish the way forward. A risk-averse and cautious approach with regards to the proposed additional infrastructure was applied to the development by undertaking specialist studies which included detailed impact assessments, management recommendations, and a development/updating of the EMPr (Appendix F).
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 identified impacts, their assessment and recommended mitigation measures 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 application is being undertaken in terms of Section 24G of NEMA for retrospective environmental authorisation. The current operations at the plant do not discriminate against any individuals as the site is located outside of urban areas.

Ref No.	Question	Response
	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?	Additionally, the use of natural resources at the plant is limited and the abstraction of groundwater is used to supplement the supply from Rand Water.
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?	The potential impacts have been identified assessed as part of this Environmental Impact Report and mitigation measures have been recommended to prevent negative impacts in this regard. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this report.
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?	The application for the plant is being conducted in terms of section 24G of NEMA for rectification of commencement without prior environmental authorisation. This step ensures that the plant complies with the enviro-legal requirements for developments. In addition, the proposed stormwater infrastructure aims to improve the surrounding environment by ensuring the pollution control mechanisms are in place. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this report during all remaining phases of the project's life cycle.
2.13	What measures were taken to:	
2.13.1	Ensure the participation of all interested and affected parties.	Refer to Section 0 for details regarding the public participation process undertaken for this project. The public participation process will continue as planned for the duration of the Environmental Assessment Report review period. Interested & Affected Parties have been notified via: • Notification Letters via Emails, Faxes and/or Registered Mail where details were available. • SMS notifications. • Publication of a Newspaper Advertisement.
2.13.2	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	
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,	

Ref No.	Question	Response
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,	• Publication of a Gazette Notice (North West Provincial Gazette).
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 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?	Workers will be educated on a regular basis as to the environmental and safety risks that may occur within their work environment. Furthermore, adequate measures will be undertaken to ensure that the appropriate personal protective equipment is issued to workers based on the areas that they work in and the requirements of their job. Their right to refuse work (if considered dangerous) will be included in the education programme.
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.	The plant currently employs approximately 48 employees. Should the environmental authorisation not be granted, the existing employment will be lost. The proposed additional infrastructure at the plant will create approximately eight new employment opportunities.
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).	The new labour opportunities can be filled by the existing skills in the area since the labour does not require skilled personnel and training, where required, would be provided on site.
2.16.3	The distance from where labourers will have to travel.	On-site accommodation is provided for staff members. Should the need arise for workers to travel, the travel distance to site will be approximately 15-20km.

Ref No.	Question	Response
2.16.4	The location of jobs opportunities versus the location of impacts.	The location of potential job opportunities is in the same location as the impacts as assessed in this report. It is important to note however that minimal new jobs (approximately eight new jobs) will be created by this application as the development will mainly support the existing Rietfontein plant workers.
2.16.5	The opportunity costs in terms of job creation.	The opportunity costs in terms of job creation is considered low.
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 Section 24G process requires governmental departments to communicate regarding any application, Section 24G of NEMA states that the competent authority should based on available information direct the applicant to undertake certain actions as discussed in section 4.1.3. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties. They will continue to be notified and engaged with regarding the project throughout the Section 24G process. Should any conflicts of interest between organs of state be identified, these will be resolved through the appropriate channels. A public participation process provides opportunity for both organs of state and interested and affected parties to comment during a specified period. The public participation process is discussed in Section 0 and Appendix C.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	
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?	Environmental attributes that may be impacted by this project have been identified and where relevant, specialist input has been solicited to ensure that a rigorous impact assessment process is undertaken. Where impacts on the interests of the public have been identified (e.g. job creation, impact on existing land use, etc.), mitigation measures are put forward to enhance positive impacts and/or reduce negative impacts. Refer to the identified impacts, their assessment and recommended mitigation /enhancement measures in Section 9 of this report.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this report. The proposed mitigation measures are realistic and implementable. The proposed stormwater system upgrade itself will function as

Ref No.	Question	Response
		mitigation. Since the application is being undertaken in terms of Section 24G of NEMA, the mitigations aim to ensure a more environmentally sustainable operation moving forward thereby improving the status quo on site.
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?	The project is undertaking a rectification application to remedy prior commencement without an environmental authorisation which will also include the payment of an administrative fine. The plant is also applying for the authorisation of new infrastructure which would consist of the addition of stormwater infrastructure and a PCD to ensure clean-dirty water separation at the plant which will result in more sustainable environmental state on site. In addition to the stormwater infrastructure, a pipeline for the conveyance of process water and tailings is proposed to reduce the need for the trucking of materials for deposition at the approved TSF facilities on the main mine.
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?	The plant consists of pre-existing infrastructure which contextualises the need for retrospective environmental authorisation in terms of section 24G of NEMA. As a result of the infrastructure already being in place, little to no alternatives are applicable in this case. New infrastructure is also being applied for in the same application. The stormwater management infrastructure will serve to create a catchment for dirty water on site, thereby promoting reduced contaminated runoff leaving the site and will also promote the re-use of process water on site. The proposed pipeline aims to reduce the need for trucking of tailings to the Rustenburg Chrome Mine for deposition.
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 identified cumulative impacts, their assessment and recommended mitigation measures in Section 9 of this report.

6 PROJECT ALTERNATIVES

The current application is being undertaken in terms of Section 24G of NEMA. The nature of the application inherently means that the infrastructure has already been constructed which limits the possibility of alternatives. Alternatives for the proposed stormwater management system will be discussed in this section.

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 8 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 Environmental, Fisheries and Forestry) 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 Report. The alternatives discussed further in this report are as follows:

- The No-Go Option; and
- Design alternatives.

Table 8: 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 Clover Alloys Rietfontein Beneficiation plant. Based on project information, there is one proposed activity and no other activity alternative**. Therefore, this alternative is considered <u>not</u> feasible and will not be discussed in this report.**
Location / property alternatives	Location alternatives could be considered for the entire proposal or for a component of a proposal, for example the location of a processing plant within the property boundary. The latter is sometimes considered under site layout alternatives. A distinction should also be drawn between alternative locations that are geographically quite separate, and alternative locations that are in proximity. In the case of the latter, alternative locations in the same geographic area are often referred to as alternative sites. Based on the nature of the project in terms of Section 24G of NEMA, the location of the site is fixed as the main plant has already been constructed. Location alternatives for the pipeline, PCD and stormwater infrastructure is fixed as a result of limited space and location of existing infrastructure. **This alternative is therefore considered to be neither feasible nor reasonable.**
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. **Alternatives for the stormwater system are not possible in this case as the**

ALTERNATIVE	COMMENT
	alternative is not constructing a stormwater system which is considered to not be reasonable.
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 mixed-use developments. Specific to the proposed project, **alternatives regarding the demand are considered <u>not</u> feasible and will not be discussed in this report.**
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. **These alternatives are considered <u>not</u> feasible to the project as there will be no significant impact variation due to scheduling.**
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. **Supply structures to the plant are already in place and therefore this alternative is <u>not</u> considered feasible and will not be discussed in this report.**
Routing alternatives	Consideration of alternative routes generally applies to linear developments such as power lines, transport, and pipeline routes. There is stormwater channels assessed in this report however the layout of existing infrastructure makes routing alternatives would are limited to the catchment area for stormwater on the site. An alternative route for the proposed pipeline could be considered however the current pipeline route is designed to avoid sensitivities in the area. **An alternative pipeline route is therefore determined to <u>not</u> be feasible or reasonable.**
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. The layout of the plant has already been constructure. The stormwater system layout is limited by the available footprint which is limited. **Based on this, site layout alternatives are considered currently <u>not</u> feasible.**
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. However, the proposed stormwater system and PCD cannot be broken down into smaller units. **For this reason, scale alternatives are considered <u>not</u> feasible and will not be discussed further.**
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. Different 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. Design alternatives for the PCD and stormwater channels would entail

ALTERNATIVE	COMMENT
	the construction of an unlined infrastructure. **Therefore, design alternatives are considered feasible and will be discussed in this report**.
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 stormwater infrastructure, **feasible operational alternatives were not identified and are not discussed further.**

As this application relates only to the construction of proposed stormwater infrastructure on site , there are limited feasible and/or reasonable alternatives that can be considered, and which are described and motivated below.

6.1 DESIGN ALTERNATIVES

Design alternatives are the consideration of different designs for technical efficiency, aesthetic purposes or different construction materials in an attempt to optimise local benefits and sustainability. The following design alternatives were considered for the project.

A stormwater management system has limited design alternatives where the major alternatives are a lined and unlined scenario. The conveyance of stormwater to a central sink can also be achieved by either a lined or unlined method. The design of the stormwater management system has been completed.

6.1.1 UNLINED PCD AND STORMWATER CHANNELS

In the context of the Rietfontein chrome processing plant, an unlined PCD and unlined dirty water channels present a substantially elevated pollution risk. The regulated area includes a downslope unchanneled valley-bottom wetland (HGM 1) located within approximately 30–55 m of the plant footprint and intersected by sections of the existing infrastructure. The wetland has been assessed as “At Risk” with a High Ecological Importance and Sensitivity (EIS) and a Present Ecological State of Class D (“Largely Modified”), meaning that although degraded, it still performs important water quality and hydrological functions. An unlined PCD poses a substantial risk of vertical seepage of contaminated stormwater containing suspended solids, cementitious materials, hydrocarbons, and fine sediments typical of batching plant runoff. Such seepage could mobilise pollutants into the subsurface and percolate downslope toward the wetland. Because the wetland already shows altered hydrology, increased erosion susceptibility, alien plant encroachment, and catchment-related nutrient inputs, any additional pollutant load would exacerbate:

- Toxicant loads, compromising the wetland’s toxicant assimilation capacity;
- Nutrient enrichment, increasing eutrophication risks in a sensitive system;
- Sediment deposition, reducing wetland functionality and potentially shifting hydrogeomorphic behaviour; and
- Habitat degradation, further modifying vegetation composition and suppressing indigenous wetland species.

The unlined scenario would therefore increase cumulative degradation, alter the wetland’s natural attenuation capacity, and compromise compliance with the National Water Act Section 21(c) & (i) water-use authorisation requirements.

6.1.2 LINED PCD AND STORMWATER CHANNELS

A lined PCD and lined dirty water channel system significantly reduces the risk of contamination of both surface and subsurface water resources. The proposed design incorporates:

- A Class C composite liner (2 mm primary HDPE + 1.5 mm secondary HDPE + geotextile + drainage layer) A total PCD storage capacity of 8 000 m³ (5 600 m³ for the 1:50-year event + 2 400 m³ operational);

- Fully HDPE-lined dirty water channels conveying runoff to a silt trap and the PCD;

- Clean water diversion berms to ensure separation of uncontaminated flow ;

- Engineered culverts designed to maintain access and withstand heavy equipment loads ;

- A leakage detection system with a monitoring sump ; and

- A spillway capable of safely conveying the 1:100-year event

This lined system directly prevents subsurface seepage of contaminants, bringing the design in line with GN704 and the requirements for water use authorisation. It enables:

- Effective settlement of suspended solids;

- Controlled storage and reuse of contaminated water;

- Minimised hydrocarbon and sediment release;

- Prevention of downstream erosion; and

- Significantly lower residual risk scores (as confirmed in the specialist risk assessment).

Given the proximity to wetland areas, the regional importance of the Kroondal/Marikana Strategic Groundwater Source Area (SWSA), and the unauthorised nature of the original development, the lined system provides the only acceptable and legally compliant solution.

Table: Advantages and disadvantages of the unlined and lined scenarios.

Unlined PCD and Stormwater Channels	
Advantages	**Disadvantages**
Lower upfront construction cost.	High risk of contamination of the adjacent HGM 1 wetland due to uncontrolled seepage of polluted runoff.
Shorter installation time with simplified construction requirements.	Non-compliant with GN704 and NWA Section 21(c) & (i).
	Increased mobilisation of sediment, hydrocarbons, and chrome-bearing residues into surface and subsurface water.
	Likely to accelerate erosion and alter wetland hydrology, worsening the current PES (Class D).
	Increased long-term environmental liability and rehabilitation costs.
	May result in refusal of authorisation or stricter conditions under the Section 24G process.

Lined PCD and Stormwater Channels	
Advantages	**Disadvantages**
Prevents seepage, protecting groundwater, the HGM 1 wetland, and the Strategic Groundwater Source Area.	Higher upfront capital cost.
Fully compliant with GN704 and NWA Section 21(c) & (i).	Requires periodic inspections and maintenance of the liner.
Enables controlled collection, settlement, reuse, and discharge management.	Potential repair costs if the liner is damaged.
Significantly reduces sediment, hydrocarbon, and chrome-laden runoff entering regulated areas.	Slightly longer construction period due to specialised installation.
Reduces long-term liability and supports sustainable, compliant operations.	

Based on the advantages and disadvantages indicated in Table above, it is the **EAPs opinion that lined stormwater system is the more favourable design**. Based on the completed designs, the proposed stormwater system will follow the line stormwater system design.

6.2 NO GO ALTERNATIVE

The No-Go Alternative would imply one of two scenarios; either the Rietfontein Plant continues operating without the construction of the proposed Pollution Control Dam (PCD) and formalised stormwater management system, or operations are halted until such infrastructure is implemented and authorised. The first scenario would result in potential ongoing uncontrolled discharge of contaminated runoff from processing areas, stockpiles, haul roads, and loading zones into the surrounding environment. Such ongoing non-compliance with GN704 requirements of the National Water Act would expose the proponent to escalating regulatory action, legal consequences, and long-term environmental liabilities. The second scenario would mean that, in the absence of the required stormwater controls, operations at the Rietfontein Plant would need to be suspended, resulting in significant disruption to the processing of chrome-bearing material and interruptions to the supply chain supporting nearby mining and industrial activities. This would negatively impact the economic viability of the facility, cause delays in production commitments, and have direct socio-economic consequences for employees, contractors, transporters, and surrounding businesses reliant on the plant's continued functioning. Halting operations would also undermine ongoing financial planning and delay the implementation of the necessary compliance and rehabilitation measures required under the Section 24G rectification process. Subsequently, the No-Go Alternative would have substantial financial, regulatory, and socio-economic implications for the operator and the broader area, while failing to resolve the existing environmental risks. **As such, the No-Go Alternative is considered neither feasible nor reasonable for this project.**

7 STAKEHOLDER ENGAGEMENT

7.1 OBJECTIVES OF THE PUBLIC PARTICIPATION

South Africa, being one of the countries with the most progressive constitutions, enshrined the public's right to be involved in decisions that may affect them in its Constitution. Section 57(1) of the new Constitution that provides: "*The National Assembly may (b) make rules and orders concerning its business, with due regard to representative and participatory democracy, accountability, transparency and public involvement*". This provision, along with several others gave rise to many new trends in South African legislation. In environmental legislation, the idea of public participation (or stakeholder engagement) features strongly and especially the

National Environmental Management Act (Act 107 of 1998, NEMA) and the recent regulations passed under the auspices of this Act makes very strict provisions for public participation in environmental decision-making.

Public participation can be defined as..."*a process leading to a joint effort by stakeholders, technical specialists, the authorities and the proponent who work together to produce better decisions than if they had acted independently*"[1]. From this definition, it can be seen that the input of the public is regarded as very important indeed.

The Public Participation Process (PPP) is designed to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner to assist them to:

During the Environmental Authorisation:

- Verify that their issues have been recorded;
- Comment on the findings of the environmental assessments; and
- Provide relevant local information and knowledge to the environmental assessment.

The PPP is a requirement of several pieces of South African Legislation and aims to ensure that all relevant I&APs are consulted, involved and their opinions are taken into account and a record included in the reports submitted to 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 necessary authorisation required for the project needs to be managed sensitively and according to best practises in order to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Encouragement of 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 and process for the authorisation project;
- Explain the environmental authorisation process;
- Determine and record 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 maximise and/or promote positive environmental impacts associated with the project.

The Public Participation Report (PPR) lists all verbal and written issues raised by I&APs during the call to register period from the 17th of March to date. The PPR is provided in Appendix C.

7.2 LEGAL COMPLIANCE

The PPP must comply with all environmental legislation that requires public participation as part of an application for authorisation or approval; namely, the National Environmental Management Act (NEMA, Act No. 107 of 1998).

Adherence to the requirements of the above-mentioned Act will allow for an Integrated PPP to be conducted, and in so doing, satisfy the requirements for public participation referenced in the Act. The details of the Integrated PPP are provided below.

7.3 IDENTIFICATION OF INTERRESTED AND AFFECTED PARTIES (I&APS)

An initial I&AP database has been compiled from historic projects in the area, and Windeed searches were conducted to obtain the contact details of the surrounding landowners. The I&APs referred to in the PPR include:

- Pre-identified and registered landowners and surrounding landowners;
- Pre-identified and registered key stakeholders;
- Regulatory authorities;
- Specialist interest groups; and
- All I&APs who responded to the initial notifications and requested to be registered.

Efforts to pre-identify key I&APs involved various avenues such as consultation with the proponent and known landowners within the study area, review of related previously conducted studies, and identification of key interest groups and authorities within the vicinity of the study area and municipality Appendix C for the Key Stakeholder/I&AP Database.

7.3.1 LIST OF ORGANS OF STATE IDENTIFIED AND NOTIFIED

The following key I&APs, but not limited to, were notified of the proposed project and invited to participate in the public participation process:

- Agricultural Research Council
- Bojanala Platinum District Municipality
- Eskom Soc Ltd
- National Department of Agriculture Land Reform and Rural Development
- National Department of Co-operative Governance and Traditional Affairs
- National Department of Forestry, Fisheries, and the Environment
- National Department of Human Settlements
- National Department of Mineral Resources and Energy (DMRE)
- National Department of Rural Development and Land Affairs
- National Department of Rural Development and Land Reform
- National Department of Tourism
- National Department of Transport
- National Department of Water and Sanitation
- National Energy Regulator of South Africa (NERSA)
- National House of Traditional Leaders
- National Transmission Company of South Africa
- North West Department of Community Safety and Management
- North West Department of Community Safety and Transport Management

- North West Department of Conservation and Tourism
- North West Department of Cooperative Governance and Traditional Affairs
- North West Department of Economic Development
- North West Department of Environment
- North West Department of Human Settlements
- North West Department of Minerals and Energy
- North West Department of Social Development
- North West Department of Water and Sanitation
- North West Department Public Works and Roads
- North West Development Corporation Soc Ltd
- North West Parks Board
- North West Provincial Heritage Resources Authority
- North West Wetland Forum
- Rustenburg Local Municipality
- South African Civil Aviation Authority (SACAA)
- South African Heritage Resources Agency (SAHRA)
- South African National Biodiversity Institute (SANBI)
- South African National Parks (SANPARKs)
- South African National Roads Agency
- South African National Roads Agency (SANRAL)
- Transnet Soc Ltd
- Ward Councillors

7.3.2 LIST OF KEY I&APS IDENTIFIED AND NOTIFIED

The following key I&APs were identified and notified:

- Pre-identified and registered landowners and surrounding landowners.
- AgriCulture South Africa (AgriSA).
- BirdLife South Africa
- Botanical Society
- Centre for Environmental Rights
- Conservation South Africa (CSA)
- Council of Geoscience
- Earth Life Africa
- Endangered Wildlife Trust
- Federation for a Sustainable Environment (FSE)
- GroundWork SA
- Mining Affected Communities United in Action (MACUA)
- Mining and Environmental Justice Community Network of South Africa (MEJCNSA)
- Natural Justice
- Wildlife and Environment Society of South Africa (WESSA)

7.4 NOTIFICATION OF INTERRESTED AND AFFECTED PARTIES

This section provides details on the notifications that were distributed as part of the consultation process to date.

7.4.1 INITIAL NOTIFICATION OF KEY I&APS

The PPP commenced between the 24th April 2025 to 1st May 2025 with an initial call to register notification. Notification during this initial consultation was given in the manner described below.

7.4.2 EMAILS, REGISTERED MAIL AND FAXES

Notification letters (in English and Afrikaans) were distributed to pre-identified I&APS through either faxes, SMSs, registered mail, and/or emails on the 25th, 26th, 29th April 2025 and the 1st of May 2025.

The notification documents included 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;
- Contact details of the EAP.

Please refer to Appendix C for initial notification and proofs.

7.4.3 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 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 C for proof of the advert and gazette notice placed.

7.4.4 SITE NOTICE PLACEMENT

Four (4) A1 correx board site notices (in English and Afrikaans) were placed at four (4) 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 C for proof of site notice and site notice distribution.

7.4.5 NOTIFICATION OF I&APS OF EAR AVAILABILITY

Notification (in English and Afrikaans) regarding the availability of the Environmental Assessment Report for public review and comment 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.

Contact details will be provided to I&APs should they require assistance accessing the information or require copies of the reports. A hard copy of the Report will be made available for public comment at a date to be confirmed for a period of 30 days.

7.5 SUMMARY OF PUBLIC PARTICIPATION OPPORTUNITIES

The table below provides a summary of the opportunities provided to I&APs for participation in the public participation process to date.

Table 9: Summary of Public Participation Opportunities

Action	Description	Publication/Place	Date
Initial Call to Register	Notification of landowners, occupiers, and other key I&APs.	Affected landowners and key I&APs were notified via email, fax, SMSs and/or post.	29th April 2025 To 1st May 2025
	Placement of site notices.	Four (4) A1 correx board site notices (in English, and Afrikaans) were placed at four (4) locations along the proposed project study area.	24th April 2025
	Newspaper advertisement and Gazette Notice.	Advertisements (in English, and Afrikaans) describing the proposed project and Section 24G process were placed in the Rustenburg Herald Newspaper. The Gazette Notice was placed in the North West Provincial Gazette.	25th April 2025 (Newspaper) 29th April 2025 (Gazette)

7.6 RECORD OF ISSUES RAISED

Comments on the proposed project were solicited from pre-identified and registered I&APs and key stakeholders. To date, the following comments have been received:

- Registration
- South African Heritage Resources Agency request for an application to be made;
- Eskom Request for map files;
- Transnet wayleave application outcome - Transnet Pipelines not affected by the proposed project; and
- Request for project background.

All comments and/or queries received to date are included Appendix C. Please refer to Appendix C for proof of correspondence.

8 ENVIRONMENTAL ATTRIBUTES AND BASELINE ENVIRONMENT

This section of the Environmental Assessment Report provides a description of the environment that may be or has been affected by the project as well as may be affected by the proposed new infrastructure. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the development have been described. This information has been sourced from existing information available for the area and where relevant specialist assessments.

8.1 PHYSICAL ENVIRONMENT

This section will discuss the physical receiving environment based on available information and the specialist assessments conducted was part of the impact assessment.

8.1.1 CLIMATE AND WEATHER

This section will discuss the climate and weather in the regional setting where the site occurs.

8.1.1.1 RAINFALL

The area falls within the middle-veld climatic zone with hot summers and mild winters. Regional Mean Annual Precipitation (MAP) varies between 558 mm and 730 mm. Precipitation occurs primarily during the summer months in the form of high intensity, short duration thunderstorms between November and March with the peak rainfall occurring in January.

Daily rainfall data was obtained from the CCWR (Computing Centre for Water Research, Natal University) database. CCWR gauge 0511672 (Klipfontein) was used. The gauge is located 4km northwest of the mine. The records provided 73 years of recorded and patched daily data that can be representative of the rainfall that occurs on the mine (Minelock, 2022). Table 10 represents the average amount of rainfall per month in Kroondal (Northwest). The numbers are calculated over a 30-year period to provide a reliable average.

Table 10: Average rainfall and evaporation (Minelock, 2022)

Month	Average rainfall (mm)	Average evaporation (mm – S-Pan)
January	117	182
February	91	152
March	80	147
April	46	116
May	16	99
June	8	81
July	4	90
August	5	119
September	16	160
October	52	186
November	82	176

Month	Average rainfall (mm)	Average evaporation (mm – S-Pan)
December	116	192
Mean annual	633*	1 700

8.1.1.2 EVAPORATION

The development is located in Evaporation Zone 3B. The closest Evaporation station A2E008, the Rustenburg station, is located 8km East of the proposed development, and gives a mean annual evaporation (MAE) of 1645mm for the S-Pan value and 2054mm for the A-Pan value. The evaporation measurements cover the years 1957 to 1979.

8.1.1.3 PREDICTED FUTURE CLIMATE

The future climate of the North West province faces challenges such as increased drought periods, increasing temperatures and rainfall variability, as well as an increase in the number of storm and flood events. The agricultural sector, rural livelihoods and natural ecosystems are most vulnerable due to these impacts. The mining sector is of concern due to the predicted increase in drought and rainfall variability due to the sector's heavy reliance on water resources, as well as susceptibility to increased temperatures affecting working conditions (BPDM EMF: Status Quo report (Final Rev13), 2018; RLM SDF Draft, 2023).

In terms of the Rustenburg Local Municipality, and according to the RLM SDF (2023), a number of climatic changes are expected to occur such as: an increase of 0-80mm in rainfall, which is expected to be offset by increased evaporation as a result of higher temperatures; an increase in temperatures of up to 3°C in the northern regions of the RLM, and 2.5°C in the southern regions; an increase in the number of "very hot days" (days exceeding 35°C) by ~35 days in the northern regions and; an increase in the predicted number of fire-danger days. The RLM will face increasing pressures on water resources. It is expected that the population will have increased by 69.94%, regional urban water supply will increase by 0.06%, whereas mean annual evaporation will increase by 11.46% while mean annual run-off will decrease by 15.72%. There is little to no change expected for groundwater recharge in the RLM, with Molote identified as the only settlement to be at moderate risk for groundwater depletion (RLM SDF Draft, 2023).

Table 11 below represents the sectors vulnerable to climate change as per the vulnerability index. For the purposes of the sectors, the economic sector is defined as vulnerability of economic assets and processes to impacts from climate change. Based on aspects such as economy size, diversification, Gross Domestic Product (GDP) change, labour force and inequality (Gini index). A high score indicates a high vulnerability to external shocks to the economy.

The environmental sector is defined as vulnerability of the natural environment and ecological infrastructure to impacts of natural hazards. Based on aspects such as the type of ecological infrastructure available, environmental health and degradation level, water resources and level of environmental governance. A high score indicates a high level of conflict between the natural environment and development pressure.

Socio-economic vulnerability as Vulnerability and coping capacity of communities and households to the impacts of natural hazards. Based on aspects such as household composition, income level, education, access to basic services and security. A high score indicates a high number of vulnerable households.

The physical sector is defined as vulnerability and expected level of loss on the physical fabric and connection of settlements (buildings and infrastructure). Based on aspects such as road infrastructure, housing type, settlement density and accessibility. A high score indicates areas of remoteness or structural vulnerabilities

Table 11: Sectors of the Rustenburg Local Municipality vulnerable to climate change as per the vulnerability index

Sector	Vulnerability Index[a]
Economic	8.49
Socio-economic	2.32
Physical	6.80
Environmental	6.19

(*Data Source:* RLM SDF Draft (2023), p. 51)

8.1.2 GEOLOGY, SOILS, AND LAND CAPABILITY

8.1.2.1 REGIONAL GEOLOGY

The regional geology of the area is given in Figure 7. 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 dips 10 degrees to the north. The chrome layers are interlayered by pyroxenites, norites and anorthosites. The black turf soil overlays the residual weathered bedrock, approximately up to 6m thick in places. The weathered zone ranges in thickness up to 40m.

The regional area is underlain by the Ruighoek pyroxenite, Mathlagame norite, Mathlagame norite anortho-site and Kroondal Norite of the Rustenburg 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 the activities at the plant as well as mining activities surrounding the site. This artificial 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 project area is represented in Figure 6.

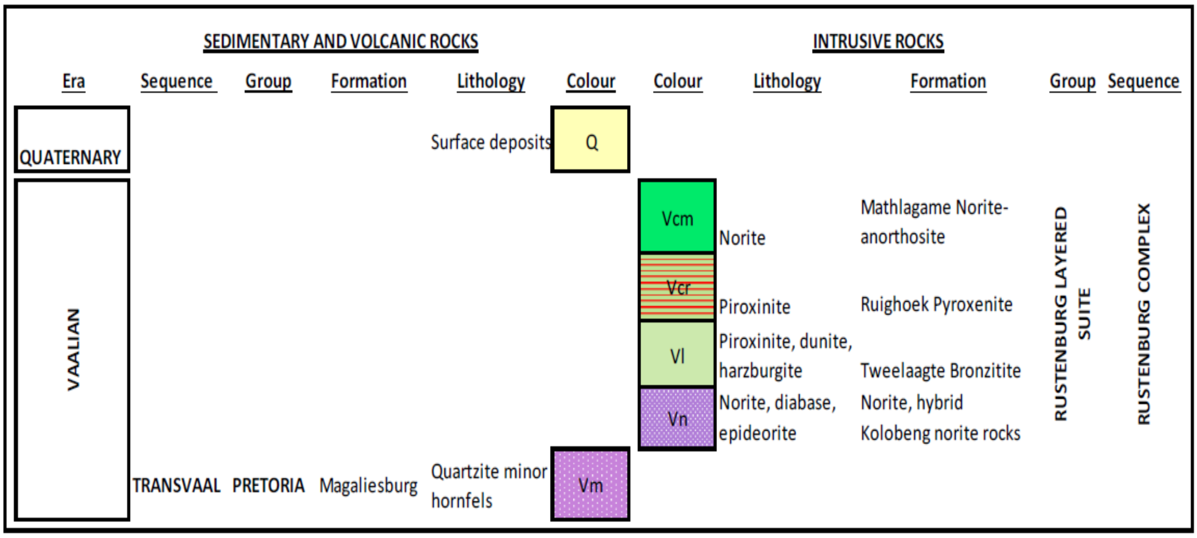


Figure 6: Geology groups present

[a] Vulnerability Index ranges from 1 (low vulnerability) to 10 (high vulnerability)

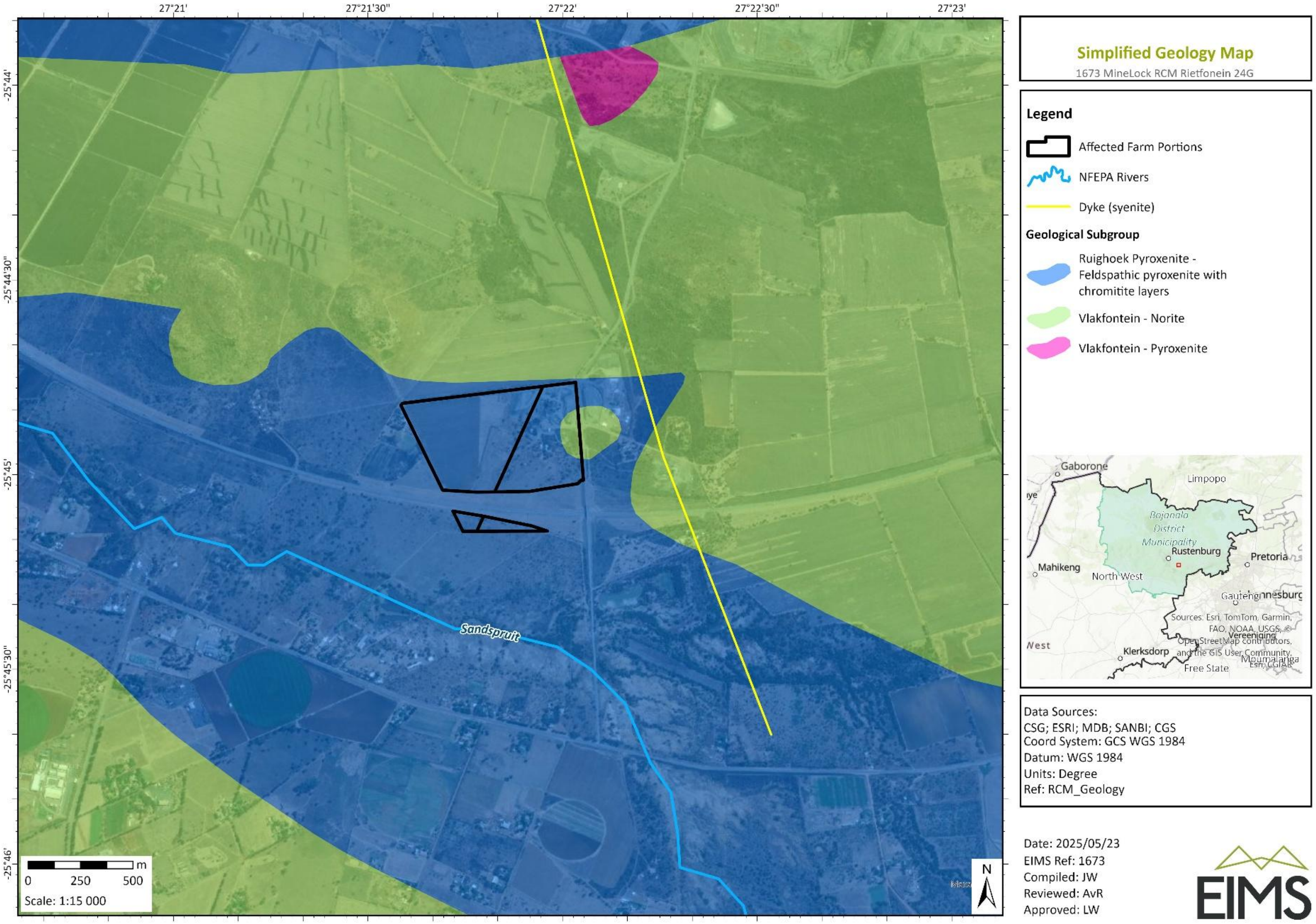


Figure 7: Regional Geology

8.1.3 GROUNDWATER

8.1.3.1 AQUIFERS AND GROUNDWATER OCCURRENCE

The area of interest is located on a fractured and intergranular aquifer, with a successful borehole yield of between 0.5 l/s and 2.0 l/s. According to Barnard (2000), the rocks of the Rustenburg layered suite are characterized by a well-developed igneous layering. The mainly mafic rocks include norite, gabbro, magnetite gabbro anorthosite an pyroxenite. Groundwater occurrence is associated mainly with deeply weathered and fractured mafic rocks. Some of the norite zones weather more easily than other rock types. This characteristic in association with north-south striking dykes that cut through and across the norite, has formed groundwater compartments especially in the area between Rustenburg and Pretoria. The groundwater yield potential is classified as poor as the majority of the boreholes on record produce less than 2l/s. The mafic rocks weather to a clay rich soil that is represented by the well-known black turf. The very low permeability of this soil (in the order of 10-3m/d) is considered to reduce recharge to underlying aquifers. In most cases the hydraulic conductivity of the subsurface would be increased due to mining activities and this would in term mean higher yielding aquifers relating to old and current mine workings.

8.1.3.2 UNSATURATED ZONE – SHALLOW, SAPROLITIC AQUIFER

The main source of recharge into the shallow aquifer is rainfall that infiltrates the aquifer through the unsatu-rated (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 10-2m.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 20m/day with porosities ranging between values of 0.25 to 0.5.

8.1.3.3 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. Ground-water 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.

8.1.4 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 8 below.

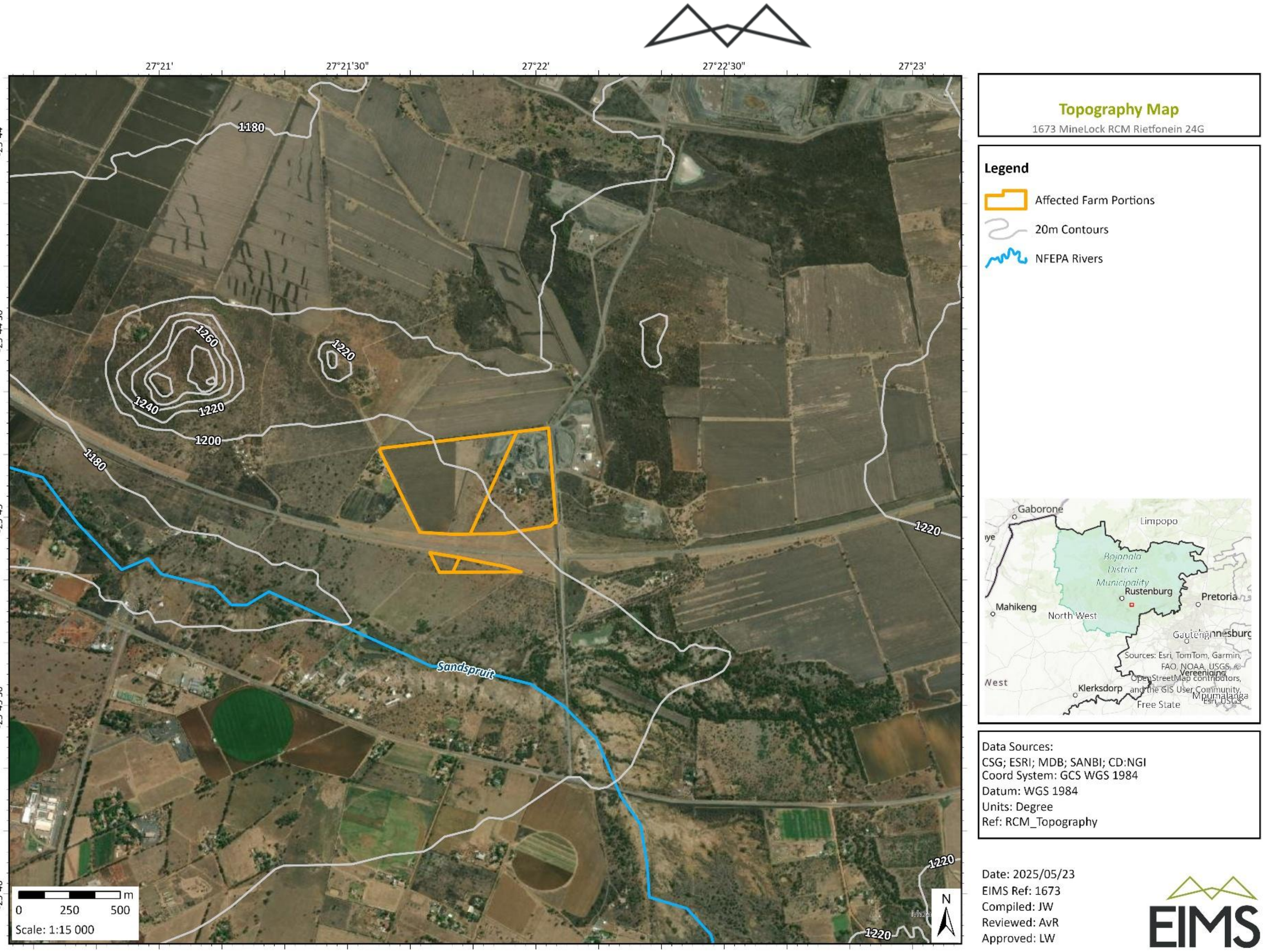


Figure 8: Topography of the area

8.1.5 SURFACE WATER AND DRAINAGE

The project area falls within the Crocodile West and Marico Water Management Area (WMA), quaternary catchment A22H.

The A22H quaternary catchment area is 579 km2 and has a MAR of 14.07 million m3. Runoff emanating from this quaternary catchment drains in a north–easterly direction via the Hex River. Elevations in the A22H quaternary range from 1220 meters above mean sea level (mamsl) at the highest point within the catchment and drop to 1112 mamsl at the outlet of the catchment.

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 project area; this river joins the Elands River which is a tributary to Crocodile River.

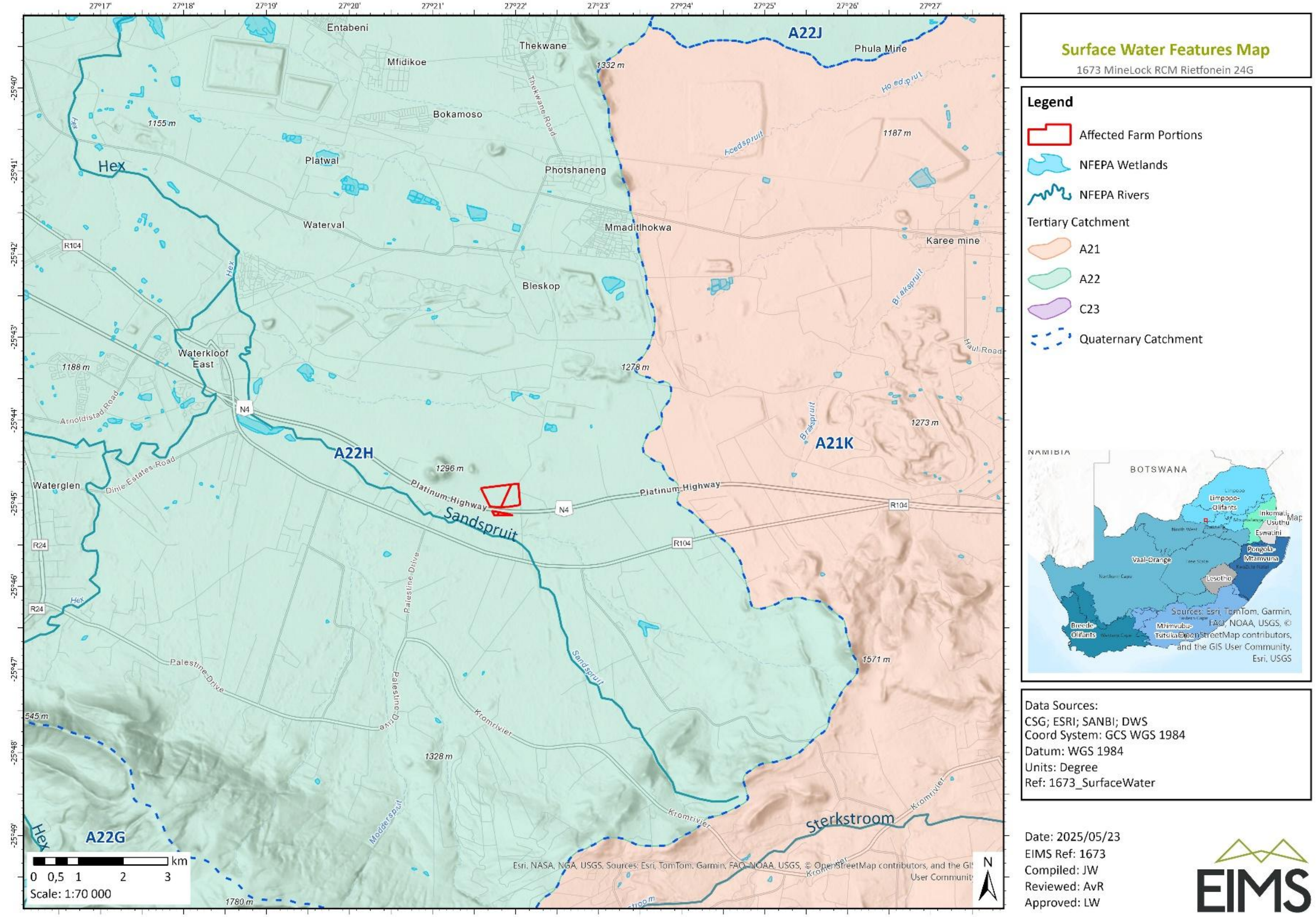


Figure 9: Regional drainage.

8.1.6 AIR QUALITY

This section outlines the characteristics of the receiving environment, including the identification of Air Quality Sensitive Receptors (AQSRs) using available maps and Google Earth imagery. It also examines the area's potential for atmospheric dispersion, taking into account local weather patterns, land use, and terrain. Additionally, it identifies existing emission sources within the study area and analyses all accessible ambient air quality data to establish baseline pollutant concentrations and dustfall levels prior to development.

8.1.6.1 RECEIVING ENVIRONMENT

Air quality sensitive receptors (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, 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 the project area includes a number of households, farmsteads, hospitals/clinics and schools in the immediate vicinity of the plant as shown in Figure 10. The town of Marikana is ~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.

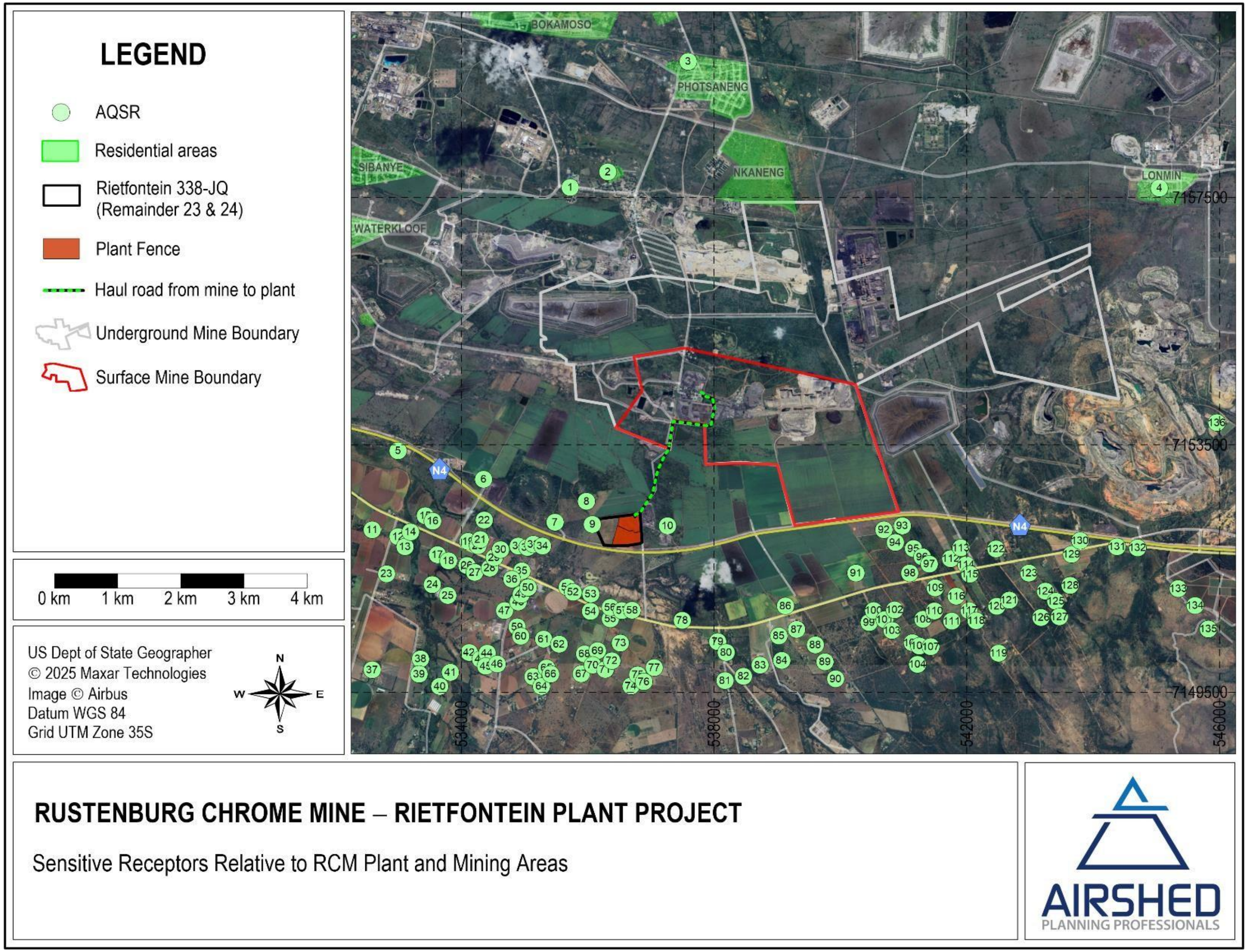


Figure 10: Rietfontein Plant with AQSRs

Table 12: Nearest AQSRs in the vicinity of Rietfontein Plant

Receptor	Description	Coordinates (WGS84 UTM 35J)	
		X	Y
AQSR1	Platinum Private Hospital	535726	7157664
AQSR2	Platinum Mine Primary School	536321	7157913
AQSR3	Photsaneng Primary School	537589	7159701
AQSR4	Lonmin Karee Platinum Clinic	545050	7157652
AQSR5	Individual household	533001	7153406
AQSR6	Individual household	534354	7152945
AQSR7	Individual household	535481	7152247
AQSR8	Individual household	535983	7152586
AQSR9	Individual household	536076	7152217
AQSR10	Individual household	537263	7152191
AQSR11	Individual household	532589	7152127
AQSR12	Individual household	533001	7152016
AQSR13	Individual household	533108	7151854
AQSR14	Individual household	533194	7152095
AQSR15	Individual household	533431	7152354
AQSR16	Individual household	533549	7152270
AQSR17	Individual household	533621	7151725
AQSR18	Individual household	533796	7151625
AQSR19	Individual household	534108	7151940
AQSR20	Individual household	534262	7151868
AQSR21	Individual household	534303	7151971
AQSR22	Individual household	534364	7152282
AQSR23	Individual household	532816	7151417

Receptor	Description	Coordinates (WGS84 UTM 35J)	
		X	Y
AQSR24	Individual household	533544	7151243
AQSR25	Individual household	533788	7151064
AQSR26	Individual household	534089	7151550
AQSR27	Individual household	534215	7151437
AQSR28	Individual household	534449	7151511
AQSR29	Individual household	534519	7151677
AQSR30	Individual household	534621	7151808
AQSR31	Individual household	534903	7151866
AQSR32	Individual household	535044	7151842
AQSR33	Individual household	535140	7151891
AQSR34	Individual household	535285	7151865
AQSR35	Individual household	534956	7151464
AQSR36	Individual household	534799	7151326
AQSR37	Individual household	532588	7149862
AQSR38	Individual household	533356	7150040
AQSR39	Individual household	533332	7149792
AQSR40	Individual household	533660	7149594
AQSR41	Individual household	533828	7149822
AQSR42	Individual household	534123	7150142
AQSR43	Individual household	534307	7150034
AQSR44	Individual household	534408	7150132
AQSR45	Individual household	534388	7149919
AQSR46	Individual household	534567	7149956
AQSR47	Individual household	534683	7150818
AQSR48	Individual household	534902	7150960

Receptor	Description	Coordinates (WGS84 UTM 35J)	
		X	Y
AQSR49	Individual household	534945	7151085
AQSR50	Individual household	535058	7151192
AQSR51	Individual household	535676	7151198
AQSR52	Individual household	535768	7151120
AQSR53	Individual household	536048	7151089
AQSR54	Individual household	536046	7150806
AQSR55	Individual household	536360	7150689
AQSR56	Individual household	536357	7150871
AQSR57	Individual household	536542	7150821
AQSR58	Individual household	536705	7150825
AQSR59	Individual household	534883	7150555
AQSR60	Individual household	534941	7150405
AQSR61	Individual household	535306	7150359
AQSR62	Individual household	535547	7150275
AQSR63	Individual household	535136	7149750
AQSR64	Individual household	535271	7149597
AQSR65	Individual household	535351	7149895
AQSR66	Individual household	535413	7149795
AQSR67	Individual household	535901	7149798
AQSR68	Individual household	535950	7150121
AQSR69	Individual household	536158	7150170
AQSR70	Individual household	536080	7149938
AQSR71	Individual household	536277	7149868
AQSR72	Individual household	536381	7150010
AQSR73	Individual household	536519	7150297

Receptor	Description	Coordinates (WGS84 UTM 35J)	
		X	Y
AQSR74	Individual household	536685	7149601
AQSR75	Individual household	536794	7149783
AQSR76	Individual household	536888	7149668
AQSR77	Individual household	537054	7149896
AQSR78	Individual household	537497	7150662
AQSR79	Individual household	538058	7150319
AQSR80	Individual household	538192	7150142
AQSR81	Individual household	538175	7149688
AQSR82	Individual household	538467	7149761
AQSR83	Individual household	538731	7149937
AQSR84	Individual household	539072	7150014
AQSR85	Individual household	539025	7150413
AQSR86	Individual household	539131	7150894
AQSR87	Individual household	539308	7150515
AQSR88	Individual household	539602	7150266
AQSR89	Individual household	539756	7149992
AQSR90	Individual household	539924	7149715
AQSR91	Individual household	540248	7151427
AQSR92	Individual household	540688	7152128
AQSR93	Individual household	540978	7152193
AQSR94	Individual household	540867	7151920
AQSR95	Individual household	541154	7151821
AQSR96	Individual household	541294	7151687
AQSR97	Individual household	541408	7151575
AQSR98	Individual household	541100	7151427

Receptor	Description	Coordinates (WGS84 UTM 35J)	
		X	Y
AQSR99	Individual household	540454	7150628
AQSR100	Individual household	540525	7150822
AQSR101	Individual household	540701	7150675
AQSR102	Individual household	540859	7150834
AQSR103	Individual household	540816	7150498
AQSR104	Individual household	541222	7149951
AQSR105	Individual household	541136	7150299
AQSR106	Individual household	541252	7150251
AQSR107	Individual household	541430	7150235
AQSR108	Individual household	541305	7150680
AQSR109	Individual household	541500	7151189
AQSR110	Individual household	541487	7150816
AQSR111	Individual household	541762	7150649
AQSR112	Individual household	541746	7151662
AQSR113	Individual household	541907	7151834
AQSR114	Individual household	541988	7151561
AQSR115	Individual household	542047	7151409
AQSR116	Individual household	541835	7151053
AQSR117	Individual household	542036	7150820
AQSR118	Individual household	542148	7150659
AQSR119	Individual household	542504	7150131
AQSR120	Individual household	542475	7150892
AQSR121	Individual household	542670	7150990
AQSR122	Individual household	542461	7151817
AQSR123	Individual household	542981	7151428

Receptor	Description	Coordinates (WGS84 UTM 35J)	
		X	Y
AQSR124	Individual household	543242	7151133
AQSR125	Individual household	543409	7150973
AQSR126	Individual household	543174	7150711
AQSR127	Individual household	543465	7150719
AQSR128	Individual household	543634	7151228
AQSR129	Individual household	543659	7151731
AQSR130	Individual household	543790	7151951
AQSR131	Individual household	544378	7151854
AQSR132	Individual household	544701	7151837
AQSR133	Individual household	545348	7151175
AQSR134	Individual household	545613	7150903
AQSR135	Individual household	545824	7150525
AQSR136	Individual household	545958	7153857

8.1.6.2 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 subsequently discussed.

There is no weather station on-site, and use was made of simulated WRF data for the period 01 January 2022 – 31 December 2024.

8.1.6.3 SURFACE WIND FIELD

The wind field influences both how far pollutants travel downwind and how quickly they disperse. Mechanical turbulence, which aids in dispersion, depends on wind speed and the roughness of the terrain. Wind roses are used to illustrate the wind field in the study area. These diagrams have 16 spokes indicating the directions from which the wind blew during a specific timeframe. Different wind speed ranges are shown using various colours—for instance, yellow represents wind speeds between 4 and 5 m/s. Dotted circles indicate how often each wind speed and direction occurred. Calm conditions refer to times when wind speeds were below 1 m/s, either due to actual still air or because the wind was too weak to be detected by the instruments.

Figure 11 displays both the overall wind field and its daily variations. On average, winds predominantly come from the north through east to south, with calm conditions occurring 2.52% of the time. During the day, winds mostly blow from the north, ranging from northwest to northeast, with calm periods making up 1.75%. At night, the wind direction shifts to the south and south-southeast, with occasional winds from the southwest to northwest. Calm conditions are more frequent at night, occurring 3.30% of the time.

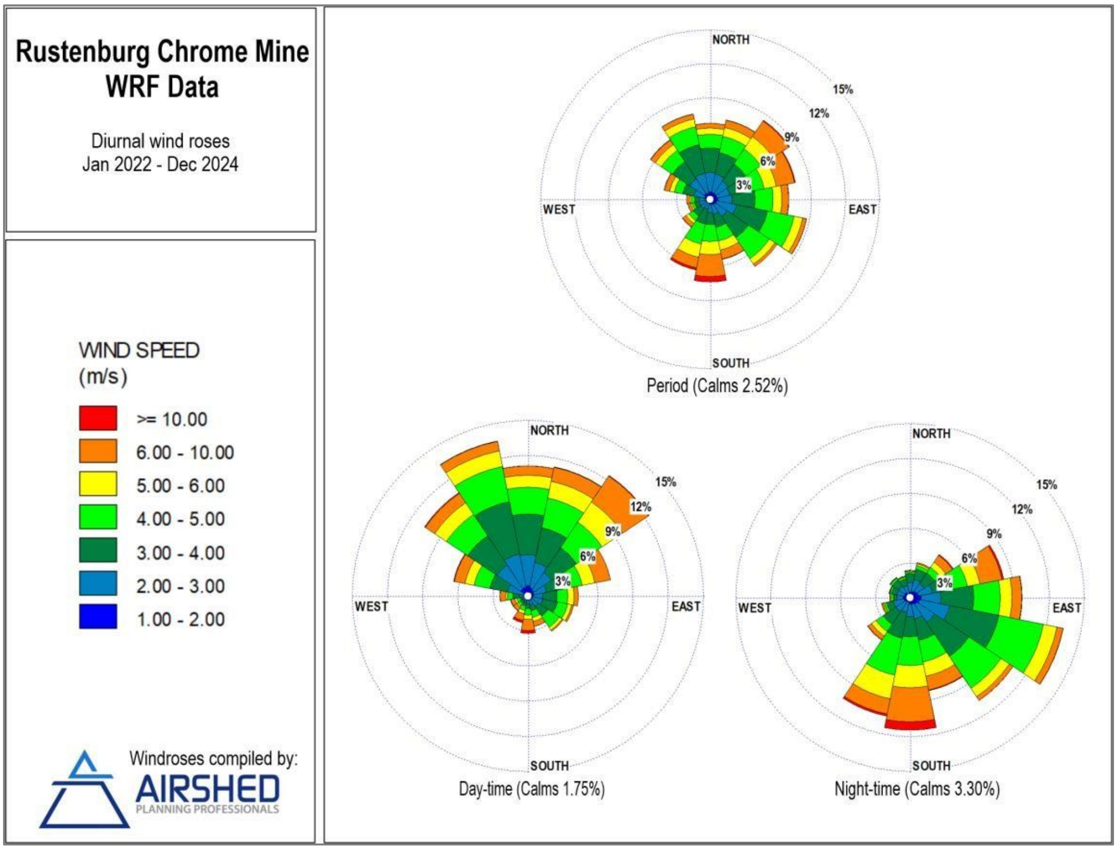


Figure 11: Period, day- and night-time wind roses (WRF data; 2022 to 2024)

A distinct seasonal variation in the wind field is visible from Figure 12. 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.

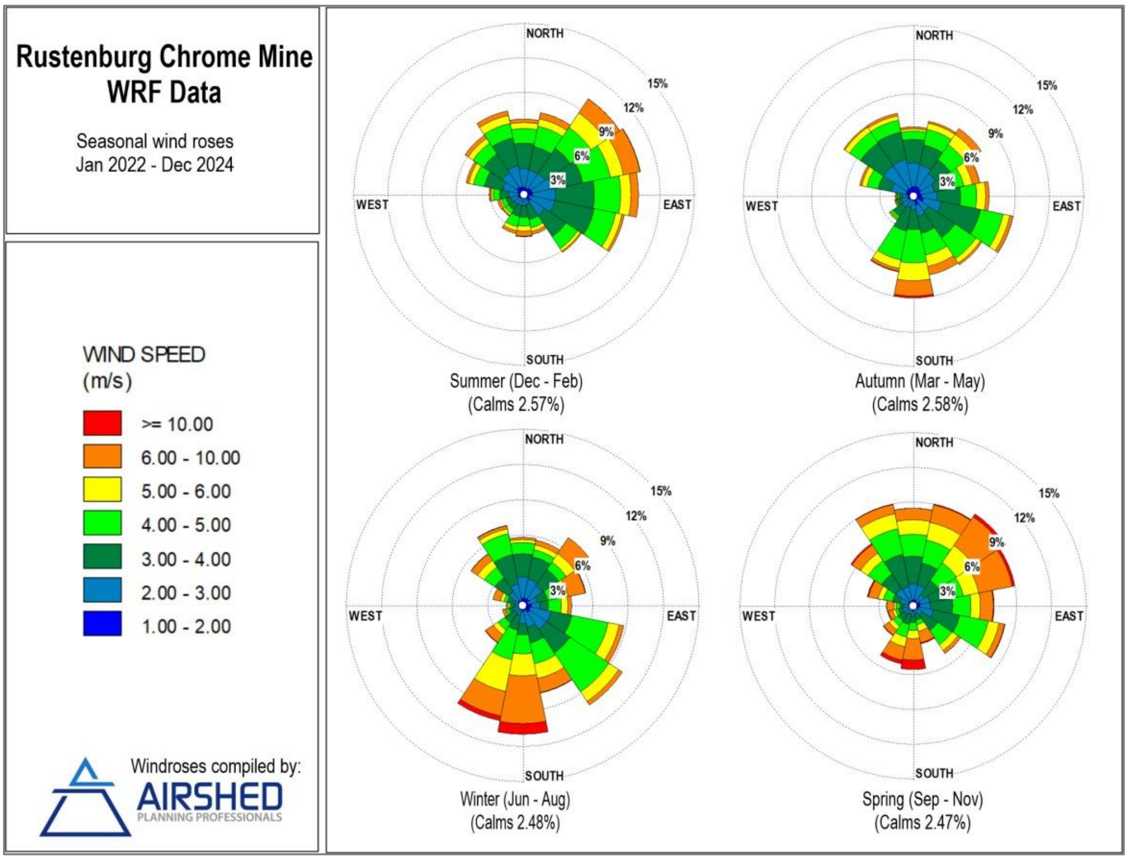


Figure 12: Seasonal wind roses (WRF data; 2022 to 2024).

According to the Beaufort wind force scale, wind speeds between 6 and 8 m/s are classified as a moderate breeze, while speeds between 14 and 17 m/s are considered near gale force. Analysis of three years of WRF data shows wind speeds in the study area ranged from 0.3 m/s to 15.2 m/s, with an average of 4 m/s. Wind erosion from open, exposed surfaces with loose fine material is likely when wind speeds exceed 8 m/s (Liebenberg-Enslin, 2014). The US EPA (2006) suggests that erosion from stockpiles can occur at wind speeds above 5.4 m/s. Over the study period, wind speeds exceeded 8 m/s approximately 4% of the time, and exceeded 5.4 m/s around 18% of the time.

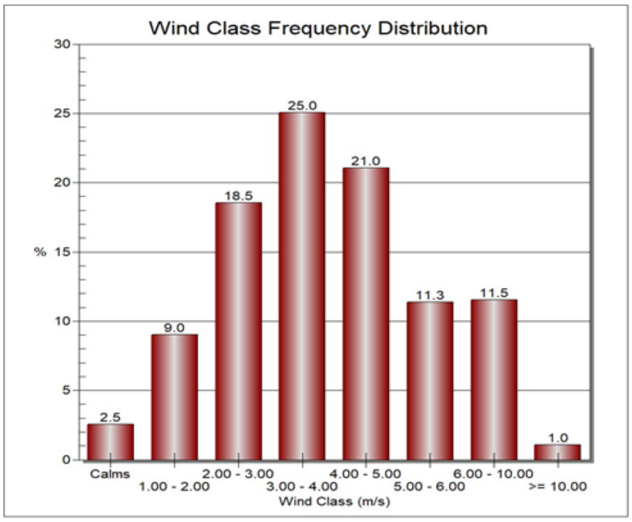


Figure 13: Wind speed categories (WRF data; 2022 to 2024).

8.1.6.4 ATMOSPHERIC STABILITY AND MIXING DEPTH

Atmospheric stability refers to how resistant or supportive the atmosphere is to vertical turbulent motion. In stable conditions, vertical movement is suppressed, while in unstable conditions—typically on sunny days—it is enhanced. As cloud cover or wind speed increases, the atmosphere tends toward neutral stability, where vertical movement is neither promoted nor inhibited.

Modern air dispersion models differ from traditional ones by treating atmospheric stability as a continuous spectrum rather than dividing it into fixed categories. These models describe the atmospheric boundary layer using two key parameters: the boundary layer height and the Obukhov length (also known as the Monin-Obukhov length). Understanding stability through the inverse Monin-Obukhov length and mixing height helps explain how vertical air movement affects pollutant dispersion. A summary of these concepts is provided below.

1. Inverse Monin-Obukhov Length (IMOL):

- The Monin-Obukhov length is a measure of atmospheric stability that indicates the balance between buoyancy-driven vertical motions and mechanical (wind shear) effects near the Earth's surface.
- When the Monin-Obukhov length is positive, it suggests stable atmospheric conditions. In stable conditions, air parcels tend to resist vertical motion, leading to limited vertical mixing.
- Conversely, a negative Monin-Obukhov length indicates unstable conditions. In unstable conditions, buoyancy forces dominate, leading to enhanced vertical mixing and dispersion of pollutants.

2. Mixing Height:

- Mixing height refers to the vertical extent of the atmospheric layer where pollutants are effectively dispersed and mixed by turbulent motions.
- In stable atmospheric conditions, the mixing height tends to be shallow because vertical mixing is restricted. This can lead to the accumulation of pollutants near the surface, resulting in poor air quality.
- In unstable conditions, the mixing height increases as buoyant forces drive stronger vertical mixing. This allows pollutants to disperse more effectively throughout a deeper layer of the atmosphere, potentially improving air quality.

3. Combining these concepts:

- When the IMOL is positive (stable atmosphere), the mixing height tends to be low, leading to poor dispersion of pollutants and potentially degraded air quality near the surface.
- Conversely, when the IMOL is negative (unstable atmosphere), the mixing height increases, promoting better dispersion of pollutants and potentially improving air quality.

In summary, the inverse Monin-Obukhov length (IMOL) and mixing height offer complementary insights into atmospheric stability and its influence on air quality. Positive IMOL values indicate stable atmospheric conditions with limited vertical mixing, while negative values reflect unstable conditions that promote vertical turbulence and pollutant dispersion. The mixing height determines how high pollutants can disperse vertically—lower heights are typical in stable conditions, and higher ones in unstable conditions.

Atmospheric stability is often categorized into six classes, as outlined in Table 13. At the study site, the most frequently observed classes were Class C (Unstable) and Class F (Very Stable). For elevated emissions, such as those from a plant stack, the highest ground-level concentrations (GLCs) typically occur during unstable daytime conditions. In contrast, for low-level sources like vehicle movement and material handling, peak GLCs are more likely under stable, low-wind nighttime conditions. Windblown dust is most likely during high wind events, which are generally associated with neutral atmospheric stability.

Table 13: Atmospheric stability classes

Designation	Stability Class	Atmospheric Condition
A	Very unstable	calm wind, clear skies, hot daytime conditions
B	Moderately unstable	clear skies, daytime conditions
C	Unstable	moderate wind, slightly overcast daytime conditions
D	Neutral	high winds or cloudy days and nights
E	Stable	moderate wind, slightly overcast night-time conditions
F	Very Stable	very limited vertical mixing and turbulence

The highest ground-level concentrations (GLC) for ground level releases, like fugitive dust, which are typical of the Rietfontein Plant operations, will happen during stable nighttime conditions. The atmospheric stability for the site is provided in Figure 14.

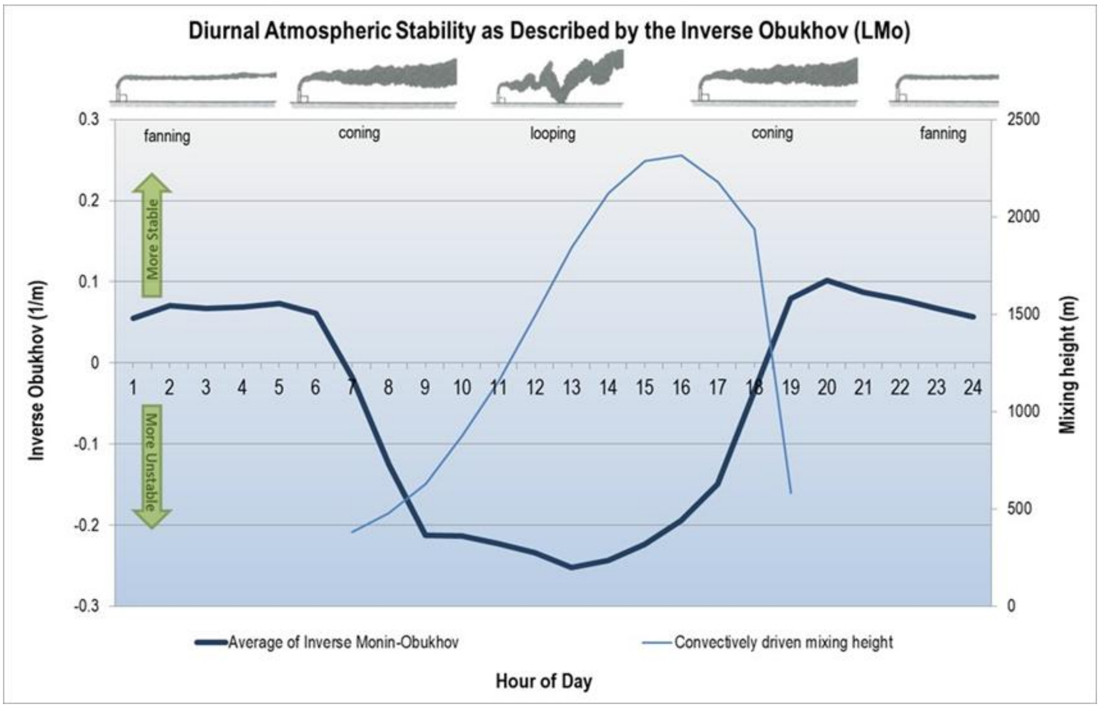


Figure 14: The diurnal atmospheric stability for the site as estimated with AERMET.

8.1.6.5 EXISTING SOURCES OF EMISSIONS NEAR THE PROJECT SITE

The region is characterized by a mix of mining and processing operations, agricultural activities, and residential land uses. These contribute to baseline air pollutant levels through sources such as vehicle emissions, domestic fuel burning, biomass combustion, and various forms of fugitive dust. Additionally, long-range transport of fine particulates—originating from distant tall stacks and large-scale biomass burning in countries north of South Africa—has been shown to influence background particulate concentrations within South Africa's borders (Andreae et al., 1996; Garstang, Tyson, Swap & Edwards, 1996; Piketh, Annegarn & Kneen, 1996).

8.1.6.5.1 MINING AND INDUSTRIAL OPERATIONS

Fugitive emissions from both opencast and underground mining operations primarily arise from activities such as land clearing (scraping, dozing, excavating), materials handling (tipping, loading/unloading, conveyor transfers), vehicle movement on haul roads, wind erosion from exposed surfaces, and drilling and blasting. These processes mainly release particulate matter and dust, with smaller quantities of nitrogen oxides (NO_x), carbon monoxide (CO), sulphur dioxide (SO_2), methane (CH_4), and carbon dioxide (CO_2) emitted during blasting.

Tharisa Chrome and Platinum Mine is situated approximately 5 km east of the Rietfontein Plant boundary, with a dormant mine directly adjacent to the east. Samancor Western Chrome Mine lies about 8 km further east. Additional mining operations in the broader region include Bleskop Mines, Kroondal Mine, and Rustenburg Platinum Mine. Major smelting facilities such as Anglo Platinum's Waterval Smelter and Impala Platinum are located near Rustenburg, roughly 20 km to the west-northwest. Rhovan Vanadium (north of Brits) and Vanchem (to the east) also operate alongside associated mining activities. These smelters and mines contribute to dust emissions through tailings storage facilities, unpaved roads, and various materials handling operations.

8.1.6.5.2 AGRICULTURAL OPERATIONS

Agriculture is one of the land uses in the area surrounding the site, and it contributes to particulate pollution primarily through windblown dust, biomass burning, and dust generated by vehicles traveling on unpaved roads. The amount of windblown dust depends on factors such as wind speed, the extent of exposed soil, and the moisture and silt content of those surfaces.

Between Brits and Rustenburg, in addition to mining and industrial operations, there are several citrus farms and other agricultural activities. These include crop and mixed farming practices involving land tilling, fertiliser and pesticide application, and harvesting. These operations often involve the use of tractors and other vehicles on exposed, unpaved surfaces, which contributes to dust emissions. Tilling activities also generate fugitive dust through scraping, grading, and soil disturbance. In addition to particulate matter (PM), gaseous emissions such as nitrogen oxides (NO, NO_2), ammonia (NH_3), sulphur dioxide (SO_2), and volatile organic compounds (VOCs) are released during the application of fertilisers and manures (EPA, 1999).

8.1.6.5.3 UNPAVED ROADS

Dust emissions caused by vehicles traveling on both paved and unpaved roads are a potentially significant source of fugitive particulate matter in the vicinity of the Rietfontein Plant site. Unpaved roads include those used for industrial, mining, agricultural, and community access purposes. The level of particulate emissions from these roads depends on factors such as traffic volume and the amount of silt present on the road surfaces. To accurately estimate emissions from this source, it is necessary to understand the extent, type, and duration of road usage, as well as the moisture and silt content of the soils involved.

8.1.6.5.4 VEHICLE TAILPIPE EMISSIONS

Vehicle emissions contribute to air pollution through both primary and secondary pollutants. Primary pollutants are released directly into the atmosphere and include carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons (HCs), sulphur dioxide (SO_2), nitrogen oxides (NO_x), diesel particulate matter (DPM), and lead (Pb). Secondary pollutants form through chemical reactions in the atmosphere—such as hydrolysis, oxidation, and photochemical processes—and include nitrogen dioxide (NO_2), ozone, sulfuric acid, sulphates, nitric acid, and nitrate aerosols. Hydrocarbons emitted by vehicles include compounds like benzene, 1,2-butadiene, aldehydes, and polycyclic aromatic hydrocarbons (PAHs). Benzene, an aromatic hydrocarbon found in petrol, is primarily emitted through exhaust (85–90%), with the remainder from evaporative losses.

Vehicle tailpipe emissions are localized and generally do not affect distant areas. However, both light and heavy-duty private and industrial vehicles traveling along the N4 and surrounding unpaved roads are notable contributors to these emissions.

8.1.6.5.5 HOUSEHOLD FUEL BURNING

Domestic households can be significant contributors to poor air quality in residential areas, particularly through the combustion of wood and coal. Wood burning releases respirable particulate matter, carbon monoxide (CO), and sulphur dioxide (SO_2), along with trace amounts of polycyclic aromatic hydrocarbons (PAHs) such as benzo(a)pyrene and formaldehyde. These particulate emissions typically consist of roughly 50% elemental carbon and 50% condensed hydrocarbons.

In informal settlements within the region, coal and wood are commonly used as energy sources. Coal combustion produces substantial amounts of both gaseous and particulate pollutants, including SO_2, total and respirable particulates (which may contain heavy metals and inorganic ash), CO, PAHs, nitrogen dioxide (NO_2), and other toxic compounds like benzo(a)pyrene. Wood burning similarly emits respirable particulates, NO_2, CO, PAHs, benzo(a)pyrene, and formaldehyde, with particulate emissions again comprising approximately equal parts elemental carbon and condensed hydrocarbons.

8.1.6.5.6 CROP BURNING AND WILDFIRES

Crop-residue burning and general wildfires (commonly referred to as veld fires) are significant sources of combustion-related emissions in agricultural areas. Emissions from sugar cane burning tend to be higher than those from savanna wildfires due to the greater availability of combustible material in sugar cane fields. On average, savanna areas contain approximately 4.5 tonnes of dry, burnable matter per hectare.

Quantifying background particulate concentrations—an important aspect of this study—is challenging due to the numerous sources present in the region. A substantial portion of particulate emissions originates from fugitive sources, such as dust entrained by vehicles on roadways, wind-blown dust from stockpiles and exposed areas, and dust generated during materials handling. These diffuse sources are more difficult to quantify than emissions from defined point sources. Dust fallout typically affects areas within close proximity to the source (up to 3 km), whereas PM_{10} can remain airborne for several days and travel long distances, impacting areas far from the original source.

8.1.6.6 LOCAL AIR QUALITY

Ambient particulate concentrations in the region are influenced by a combination of local and long-range sources. Locally, contributors include wind erosion from exposed surfaces, fugitive dust from agricultural and mining activities, vehicle movement on roadways, and veld burning. Regionally, fine particulates can be transported over long distances from remote tall stack emissions and large-scale biomass burning in countries north of South Africa. These sources have been shown to significantly affect background fine particulate levels over the interior of South Africa (Andreae, 1996; Garstang, 1996; Piketh et al., 1996).

Particulate matter is the primary pollutant of concern in the assessment of mining operations. It can reduce visibility, pose health risks, and act as a nuisance due to its potential to soil surfaces. A dustfall monitoring network consisting of 10 units is in place at RCM; however, no dustfall units were identified at the Rietfontein Plant. According to the 2022 EIA and EMPr by Digby Wells, dustfall data from 2021 showed no exceedances of the National Dust Control Regulations (NDCR) limits. No recent dustfall data was available for inclusion in the current study.

To characterise local ambient air quality, data from the Rustenburg Local Municipality’s Marikana Air Quality Monitoring Station (AQMS), located approximately 6.9 km east-northeast of the Rietfontein Plant, was used. Table 14 summarises PM measurements. Data availability at the station was below the SANAS-required 90%, ranging between 71% and 76% for the period 1 January 2021 to 31 December 2023. The 99th percentile PM_{10} concentrations (311.5, 209.6, and 233.3 µg/m³) exceeded the National Ambient Air Quality Standard (NAAQS) limit of 75 µg/m³ in 2021, 2022, and 2023 respectively, with 158, 139, and 151 daily exceedances recorded. Similarly, the 99th percentile $PM_{2.5}$ concentrations (70.6, 60.4, and 74.3 µg/m³) were above the NAAQS limit of 40 µg/m³, with 59, 28, and 50 daily exceedances in the respective years. Annual average concentrations for both PM_{10} and $PM_{2.5}$ also exceeded their respective NAAQS thresholds (40 and 20 µg/m³) across all three years.

Table 14: 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
		$PM_{2.5}$ (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 National Ambient Air Quality Standards (NAAQS) define acceptable air quality levels based on specific indicators, measurement averaging times, concentration thresholds, and compliance criteria. For particulate matter (PM_{10} and $PM_{2.5}$), the standards are based on percentile values calculated over a three-year period. Data from the Marikana Air Quality Monitoring Station (AQMS) clearly indicate that ambient air quality in the region does not meet the regulatory requirements for these pollutants. According to the NAAQS, the daily 99th percentile concentration for both PM fractions should not be exceeded more than four times per year. It is important to note that the monitoring station is located approximately 6.9 km east-northeast of the Rietfontein Plant, and the elevated concentrations observed cannot be directly attributed to specific sources. Figure 15 and Figure 16 present the average daily PM_{10} and $PM_{2.5}$ concentrations over the three-year monitoring period, compared against the NAAQS limits.

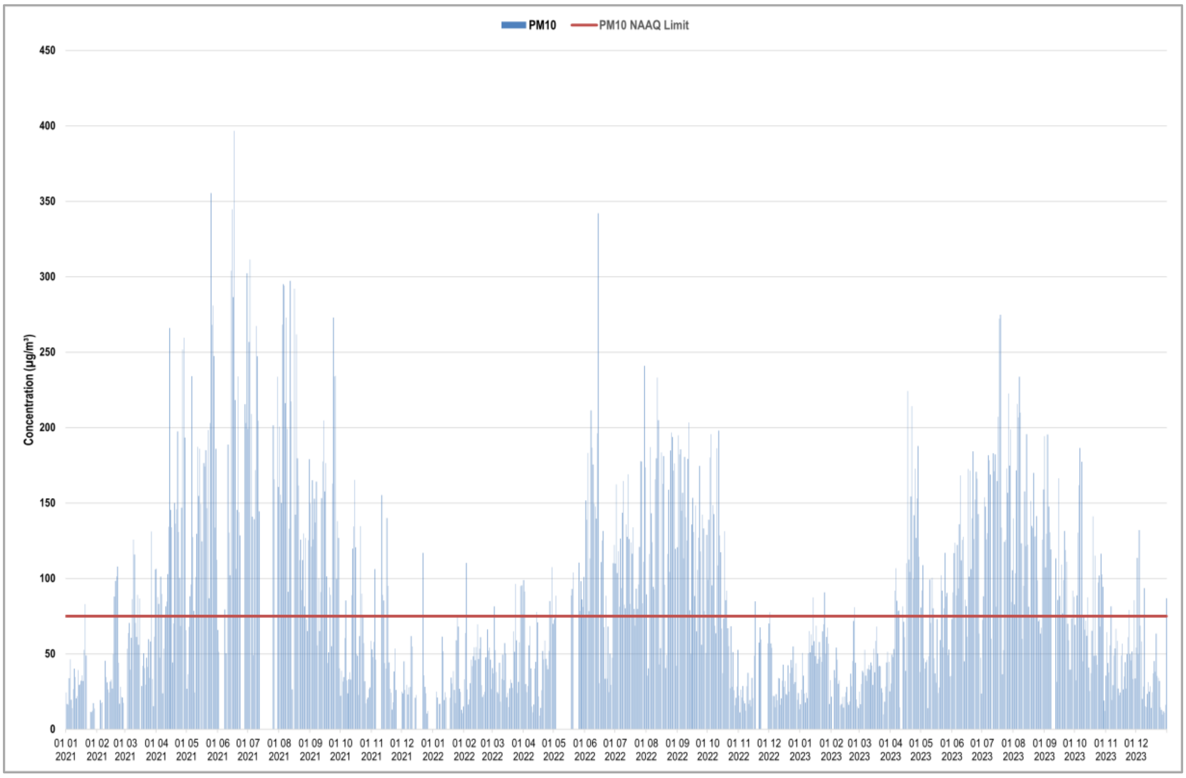


Figure 15: PM10 timeseries plot for measured ambient data from Marikana AQMS (Jan 2021 – Dec 2023)

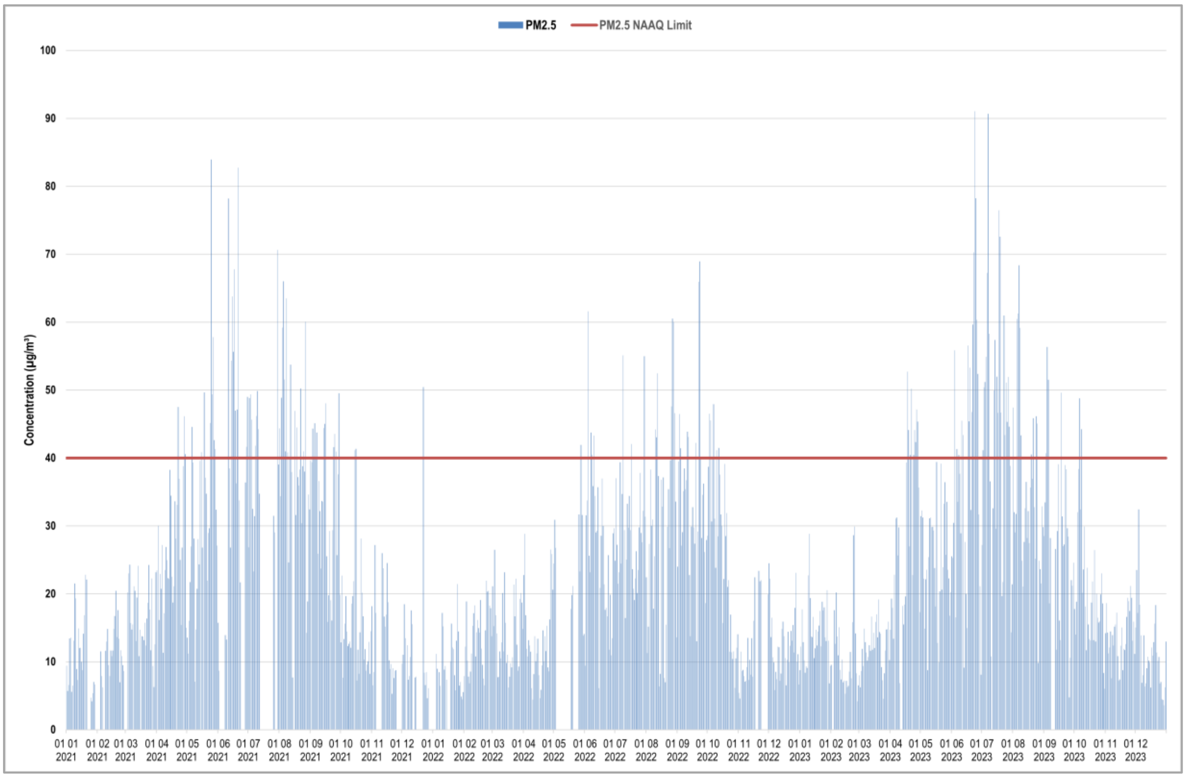


Figure 16: PM2.5 timeseries plot for measured ambient data from Marikana AQMS (Jan 2021 – Dec 2023)

Polar plots are useful tools for assessing both the directional influence of pollutant sources and how concentrations vary with wind speed. Using pollution roses and time series plots generated in R software (Carslaw & Ropkins, 2012; Carslaw, 2013), potential contributors to elevated emissions can be interpreted. These plots reveal that higher concentrations of PM_{10} and $PM_{2.5}$ are predominantly associated with winds from the northwest, although elevated levels are also observed from central and northeastern directions. A symmetrical pattern around the centre of the plot suggests a more evenly distributed source contribution, while off-centre peaks indicate nearby sources.

Elevated ground-level concentrations from tall emission sources are typically more pronounced during stable atmospheric conditions with stronger winds, as plume buoyancy is less effective during daytime convective conditions. In contrast, low-level emissions tend to result in higher concentrations under moderate to weak wind conditions. However, certain low-level mining activities—such as materials handling and wind erosion—are wind speed-dependent and can produce significantly higher impacts during strong winds.

At the Marikana AQMS, elevated PM_{10} and $PM_{2.5}$ levels are observed from the southwest under low to moderate wind speeds (3–5 m/s), likely due to residential activities and wind erosion from mine dumps located to the south, southeast, and east of the station. Under very high wind speeds (>10 m/s), elevated concentrations are recorded from the northwest and northeast, likely linked to household and biomass burning, as well as mining operations in those sectors (Figure 17Figure 17).

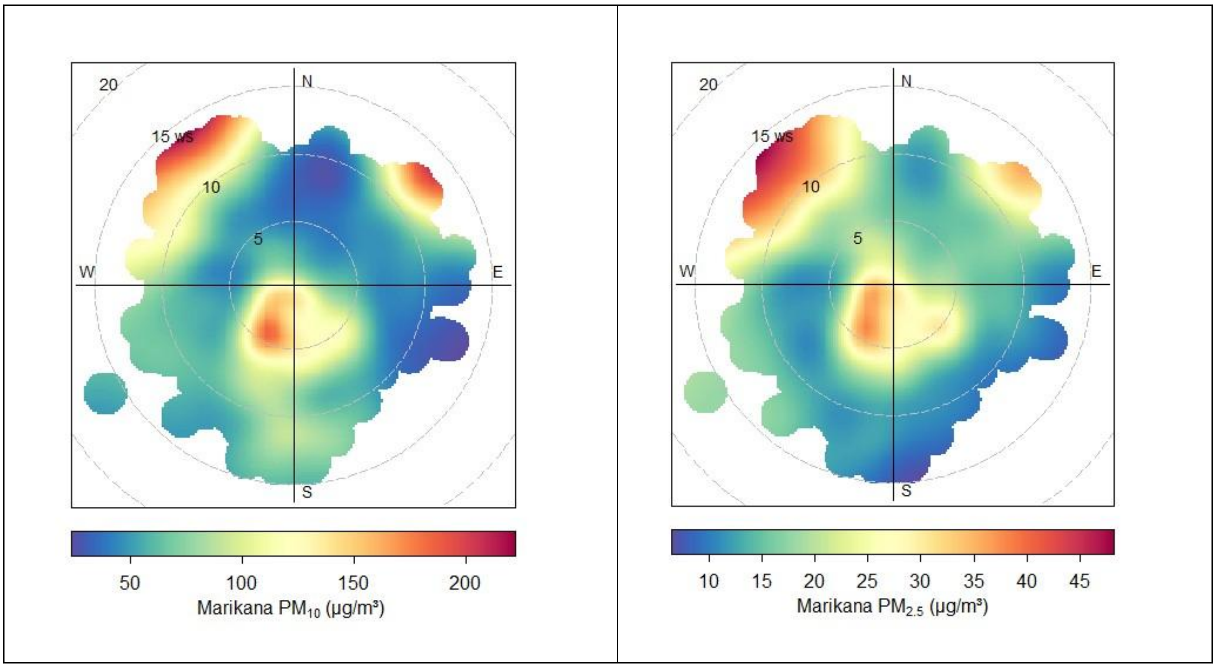


Figure 17: Polar plot of hourly median PM10 and PM2.5 concentrations observations at Marikana AQMS (Jan 2021 – Dec 2023).

Baseline air quality in the study area was assessed using data from the Marikana Air Quality Monitoring Station (AQMS), located approximately 7.9 km east-northeast of the Rietfontein Plant boundary. Key findings include:

- Particulate Matter (PM_{10} and $PM_{2.5}$): Annual average and 99th percentile concentrations for both PM fractions exceeded the National Ambient Air Quality Standards (NAAQS) during the 2021–2023 monitoring period. The number of daily exceedances far surpassed the allowable limit, indicating poor baseline air quality.

- Dustfall: Historical dustfall data from 2021 showed compliance with the National Dust Control Regulations (NDCR); however, no recent data specific to the Rietfontein Plant was available.

- Meteorology: Simulated meteorological data (WRF model) for 2022–2024 indicated dominant wind patterns from the north to southeast, with seasonal variation. Wind speeds exceeding dust entrainment thresholds occurred up to 18% of the time.

- Sensitive Receptors: Numerous AQSRs—including households, schools, and healthcare facilities—are located within a 5 km radius of the plant. The closest settlements are Nkaneng (~2.6 km) and Photsaneng (~4 km).

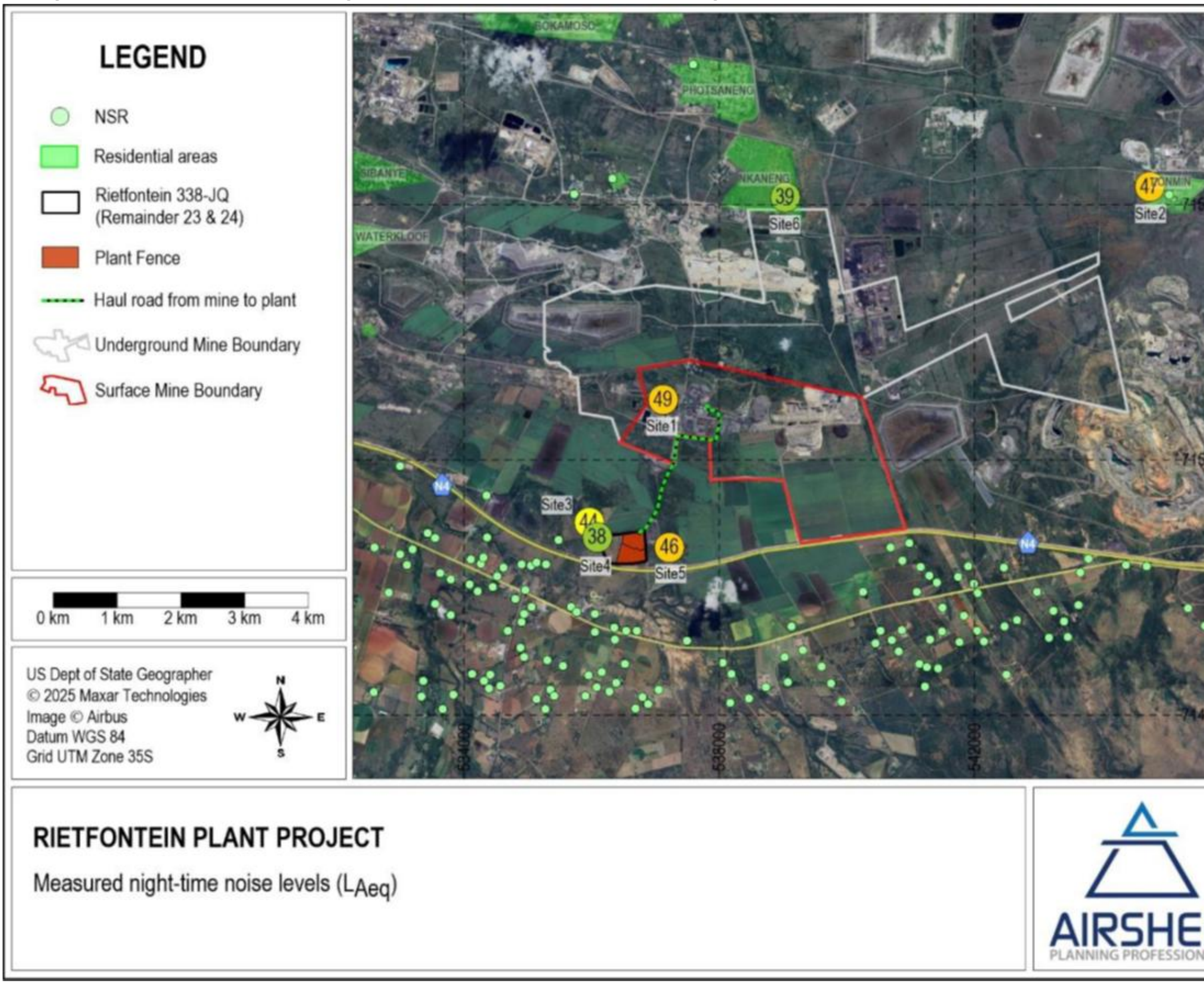
8.1.7 NOISE BASELINE

A noise impact assessment for the Rietfontein plant was conducted with the aim of establishing a noise baseline as well as identifying any potential impacts which the plant may have retrospectively had or may have in relation to the proposed new infrastructure. The full Noise impact assessment is included in Appendix D.

To establish the baseline acoustic environment, a comprehensive environmental noise survey was conducted from 7 to 9 April 2025. Six survey sites were selected based on proximity to potential noise-sensitive receptors (NSRs), accessibility, and safety considerations. These NSRs include individual dwellings, farmsteads, and informal settlements located near the plant and haul roads.

The survey methodology adhered to international best practices, including standards set by the International Finance Corporation (IFC) and SANS 10103:2008. Measurements were taken using calibrated Type 1 sound level meters, with data collected during both day-time (06:00–22:00) and night-time (22:00–06:00) periods. Acoustic indices recorded included LAeq(T), LAIeq(T), LAFmax, LAFmin, LA90, and frequency spectra.

Measured baseline noise levels ranged from 44 dBA to 55 dBA during day-time (Figure 18) and 38 dBA to 46 dBA during night-time (Figure 19



). These values were compared against the draft Environmental Noise Standards for urban districts, which recommend thresholds of 55 dBA (day) and 45 dBA (night). Slight exceedances were observed at some sites during night-time conditions, notably at Site 1, Site 2, and Site 5.

Environmental factors influencing noise propagation were also assessed. The terrain is moderately undulating with mixed ground cover, contributing to partial attenuation of sound. Meteorological data from the Weather Research and Forecasting (WRF) model indicated prevailing winds from the north during the day and east-southeast at night, which can enhance sound propagation in certain directions. Temperature inversions at night further increase the potential for sound to travel longer distances, making night-time impacts more pronounced.

This baseline information provides a critical reference for evaluating the potential noise impacts of the Rietfontein Plant and informs the development of appropriate mitigation and monitoring strategies.

To assess the potential noise impacts of the Rietfontein Plant, noise propagation simulations were conducted using the CadnaA software, applying the ISO 9613 methodology for outdoor industrial noise. The model incorporated a detailed source inventory, terrain data, and meteorological conditions, and simulated sound pressure levels over a 5 km × 5 km grid with 50 m resolution.

The simulations revealed that day-time noise levels from plant operations (Figure 20

) may exceed the draft Environmental Noise Standard of 55 dBA up to approximately 200 meters north and east of the operational boundary. However, no residential receptors were identified within this zone of exceedance. Interestingly, measured noise levels at survey Sites 3 and 4 (west of the plant) were higher than simulated values, while Site 5 (east of the plant) showed lower measured levels than predicted. This suggests that the model underestimated noise to the west and overestimated it to the east, with discrepancies of up to 7 dBA and 6 dBA, respectively.

During night-time conditions (Figure 21), simulated noise levels exceeded the 45 dBA threshold up to 650 m north, 500 m east, 200 m south, and 350 m west of the plant. These exceedances potentially affect NSRs R8, R9, and R10. However, measured night-time levels at these receptors were consistently lower than simulated values, indicating that the model likely overestimated actual impacts. Differences ranged from 2 dBA to 11 dBA, reinforcing the conservative nature of the simulation.

Overall, the simulations provide a precautionary estimate of noise impacts, ensuring that mitigation strategies are robust. The actual extent of exceedance is expected to be smaller than predicted, and the plant is not anticipated to cause significant acoustic disturbance under normal operating conditions.

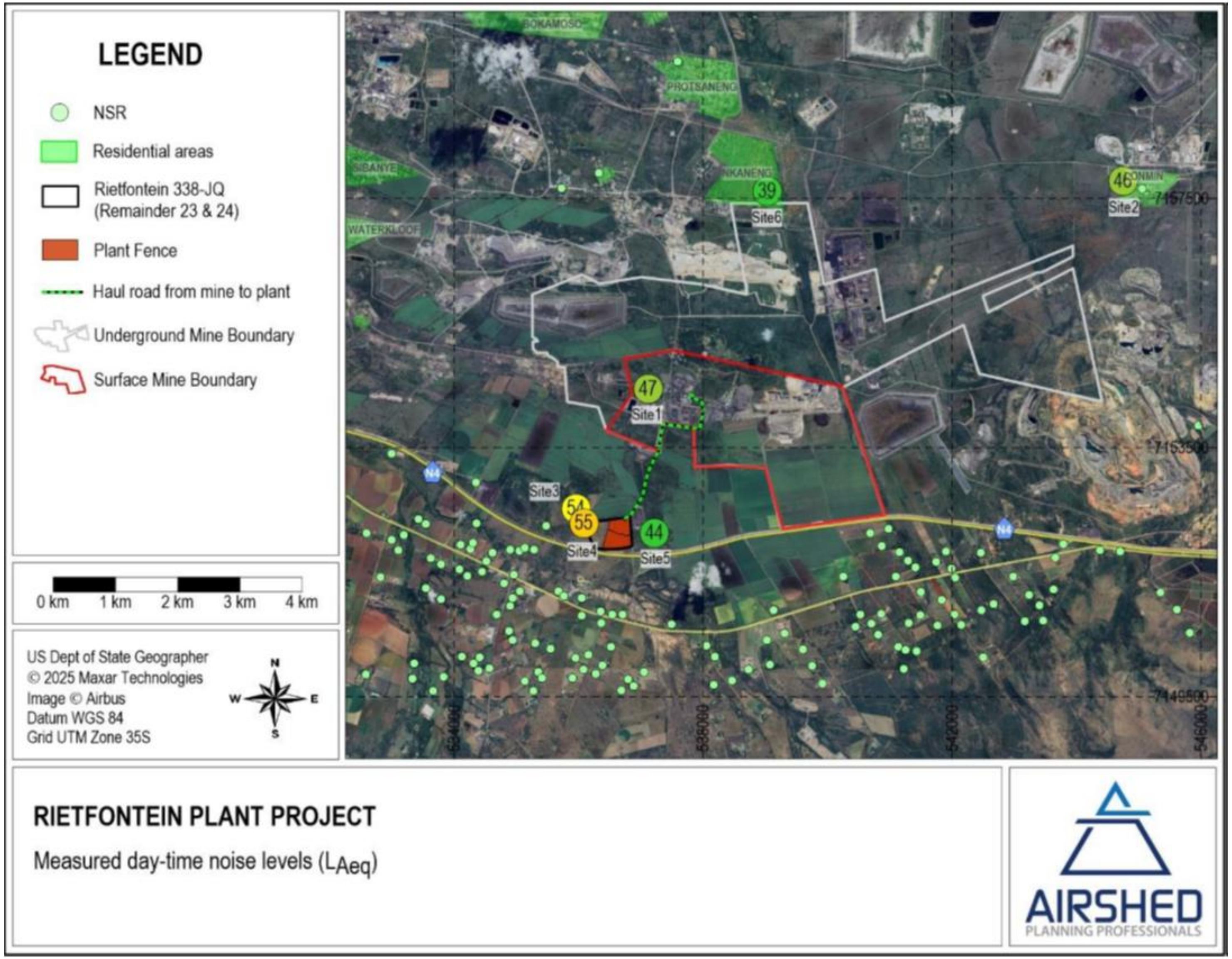


Figure 18: Measured daytime baseline

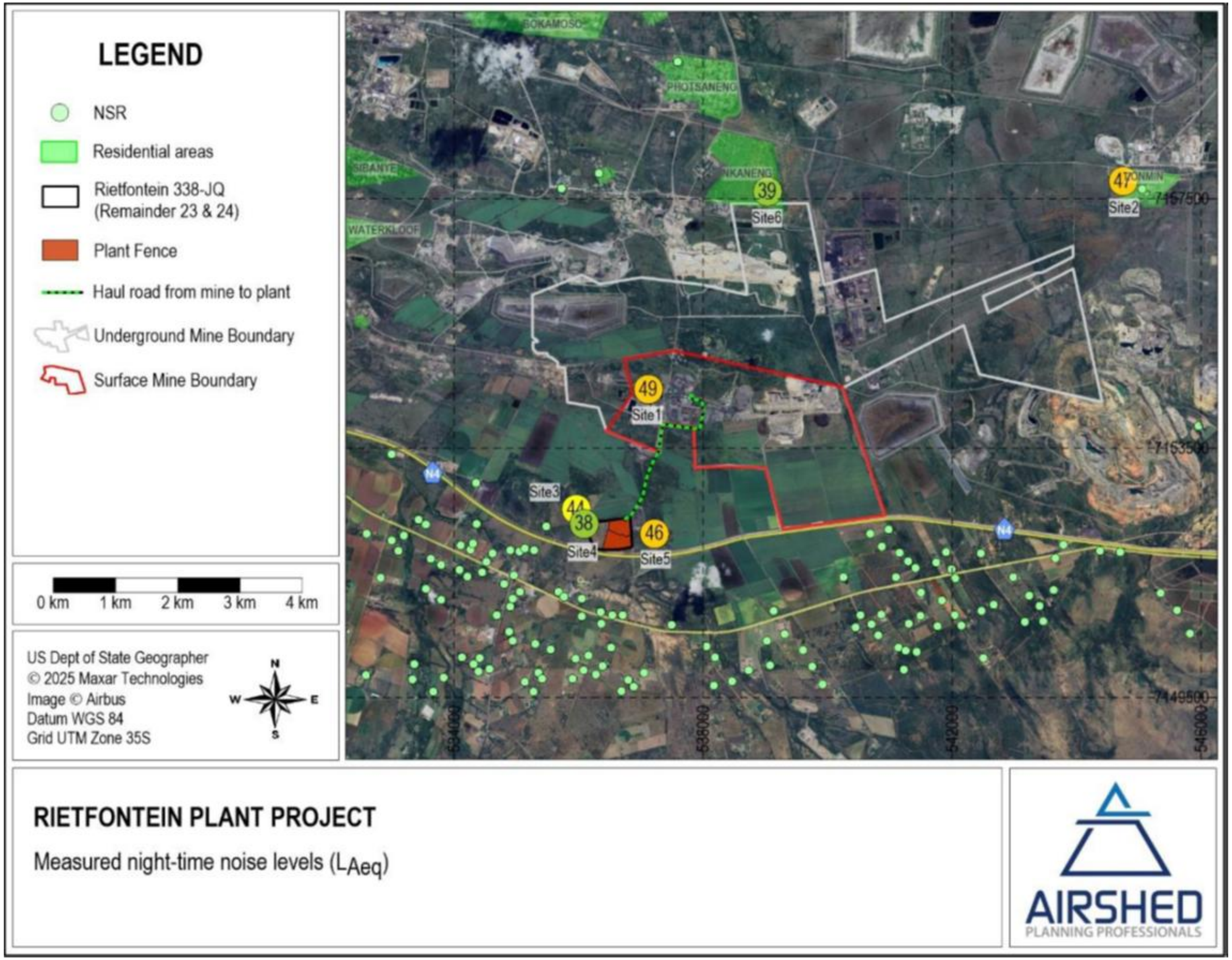


Figure 19: Measure nighttime baseline

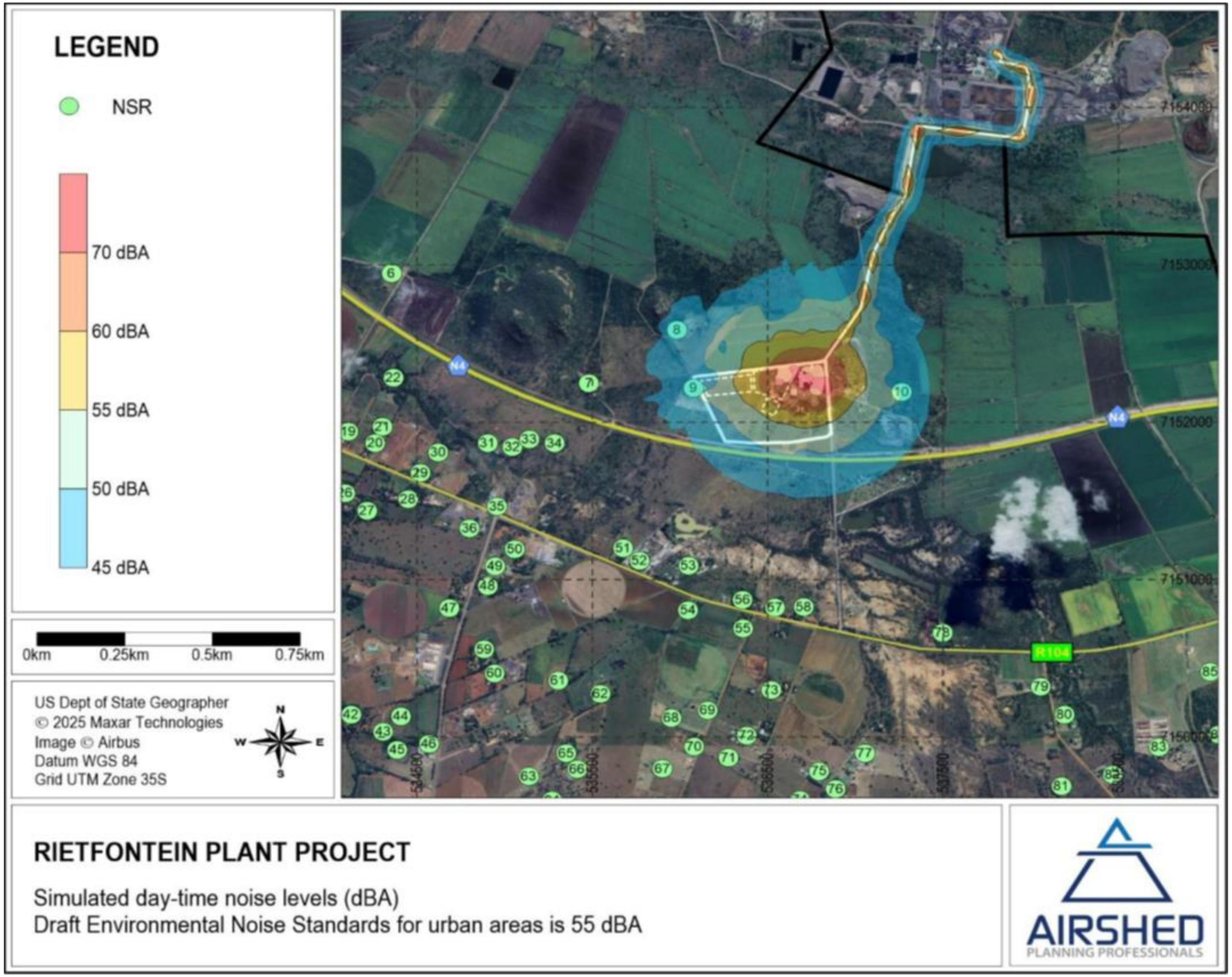


Figure 20: Daytime Noise simulation

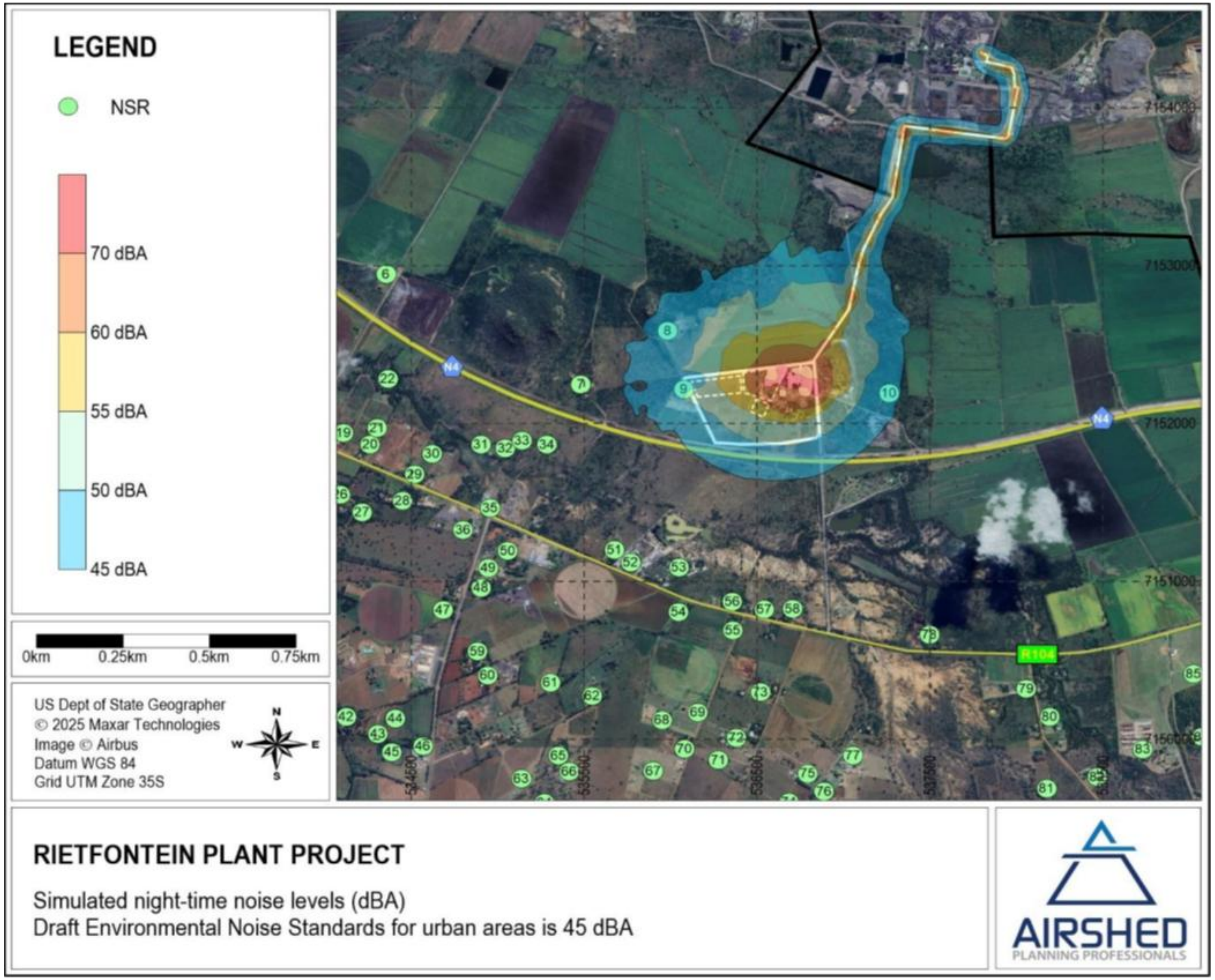


Figure 21: Night time noise simulation

8.1.8 LANDSCAPE QUALITY AND VISUAL

Currently the visual aspects of the site consist mainly of a combination of two industrial operations, the existing Rietfontein Plant as well as the neighbouring Rustenburg Chrome Plant. The stockpiles for the Rietfontein plant are also visible on -site. There are some farmlands (crop fields) to the North of Rietfontein plant. The area along the pipeline route consists of disturbed areas along a dirt road.

Figure 22: Chrome plant at the Rietfontein plant

Figure 23:View of the Rietfontein Plant stockpiles from the fuel storage area

Figure 24: Proposed surface pipeline route vegetation

Figure 25: Neighbouring Rustenburg Chrome Plant

8.2 BIOLOGICAL ENVIRONMENT

The terrestrial and aquatic environment has been assessed by The Biodiversity Company (TBC) and the associated specialist reports aare included in Appendix D. The baseline biological environments and specialist findings are presented in the following subsections.

The spatial data collected and analysed to determine the desktop ecological sensitivity of the site is listed in Table 15 below, and a desktop sensitivity map is presented in Figure 26.

Table 15: List of sensitive ecological landscape features relevant to the project area.

Desktop Information Considered	Relevance	Reasoning
Ecosystem Threat Status	Relevant	Overlaps with an Endangered (EN) ecosystem (RLE, 2021)
Ecosystem Protection Level	Relevant	Overlaps with a Poorly Protected (PP) Ecosystem (NBA, 2018)

Desktop Information Considered	Relevance	Reasoning
Provincial Conservation Plan	Relevant	Overlaps with a Critical Biodiversity Area (CBA) 2, Ecological Support Area (ESA) 1 and ESA 2 (READ, 2015)
National Protected Areas Expansion Strategy (NPAES)	Relevant	Overlaps with NPAES Priority Focus Areas (NPAES, 2018).
Key Biodiversity Areas (KBA)	Relevant	Falls within ~4.6 km of the Magaliesberg KBA (2024).
South African Protected and Conservation Areas Databases (SAPAD & SACAD)	Relevant	Falls within the Magaliesberg Biosphere Reserve Transition Zone (SAPAD & SACAD, 2024).
National Freshwater Ecosystem Priority Area (NFEPA)	Relevant	Overlaps with a non-priority FEPA wetland (NFEPA, 2011).
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Irrelevant	Does not overlap with any SAIIAE systems (NBA, 2018).
Strategic Water Source Area (SWSA)	Relevant	Overlaps with the Kroondal/Marikana Groundwater Strategic Water Source Area (SWSA, 2018).
Mining and Biodiversity Guidelines	Relevant	The PAOI is of high Biodiversity Importance (BI), therefore, there is a correlating high risk for mining (Mining & Biodiversity Guidelines, 2013).

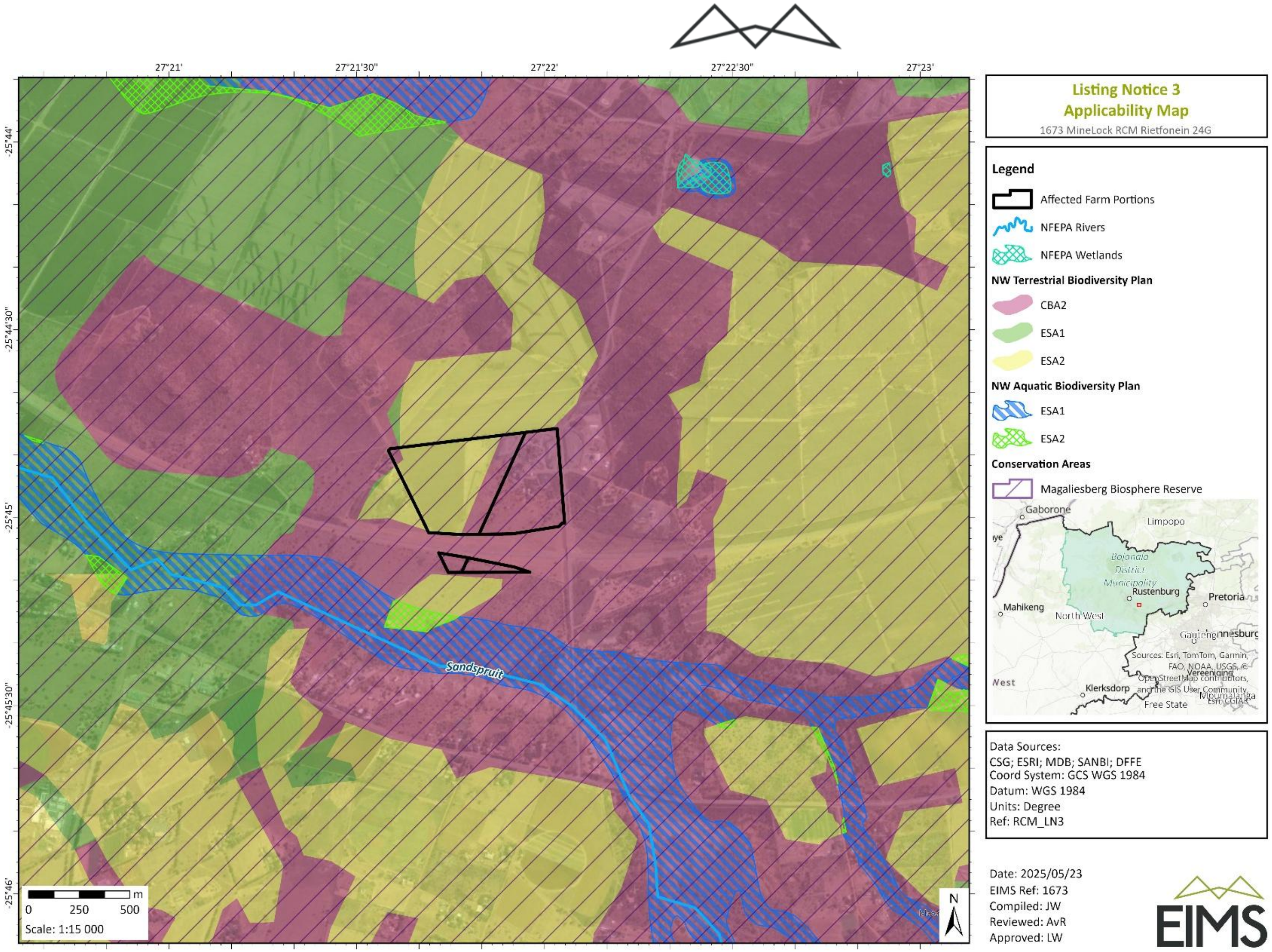


Figure 26: NEMA Listing notice 3 applicability.

8.2.1 FLORA

8.2.1.1 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).

The PAOI is situated in the Marikana Thornveld vegetation type according to SANBI (2018), (Figure 27), which is a member of the Central Bushveld Bioregion.

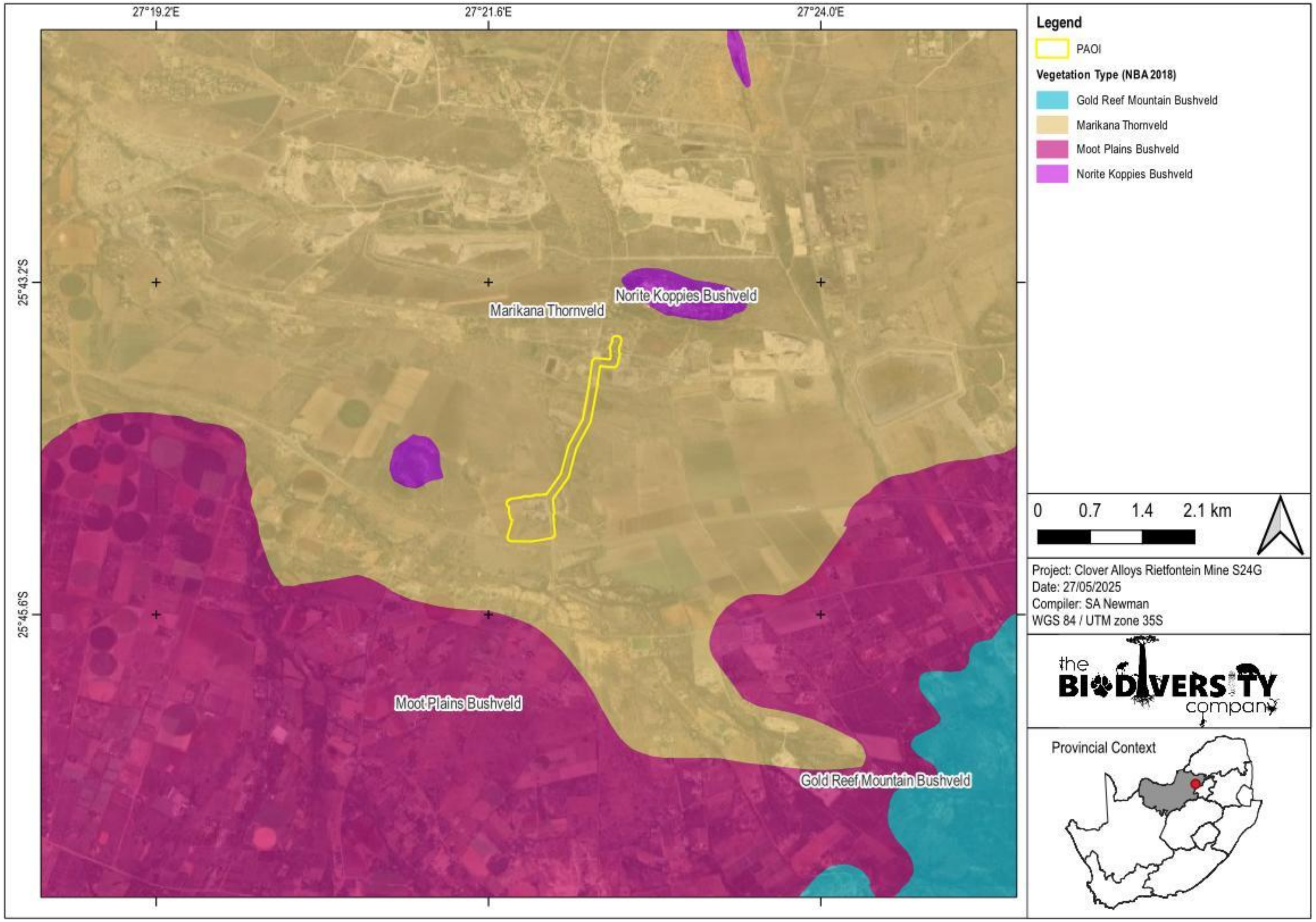


Figure 27: Map illustrating the vegetation types associated with the PAOI and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland

8.2.1.2 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).

8.2.1.3 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.*

8.2.1.4 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).

8.2.1.5 EXPECTED FLORA SPECIES

The POSA database indicates that 318 species of indigenous plants are expected to occur within the PAOI. No SCC are expected to occur within the PAOI based on the POSA database. The Screening Tool did not list any flora SCC for the PAOI.

8.2.1.6 RESULTS OF THE FIELD ASSESSMENT

The Precautionary Principle is a critical approach in biodiversity surveys for environmental assessments, particularly when the status of biodiversity receptors cannot be precisely determined. This principle operates on the assumption that the sensitivity of these biodiversity receptors is high, thereby ensuring that any potential risks to ecosystems and species are minimised. By adopting this cautious stance, environmental assessments prioritise the protection of biodiversity, even in the face of scientific uncertainty. This approach is essential for maintaining ecological integrity, as it prevents irreversible damage to biodiversity that might occur if the sensitivity of receptors were underestimated (Cooney, 2004). For example, in scenarios involving habitat destruction or the introduction of new species, the Precautionary Principle necessitates comprehensive impact assessments and the implementation of robust mitigation measures to protect sensitive biodiversity receptors (Raffensperger and Tickner, 1999). Consequently, the Precautionary Principle serves as a guiding framework for environmental decision-making, promoting sustainable development and conservation efforts by assuming high sensitivity of biodiversity receptors and prioritising their protection.

In the case of this assessment, the Precautionary Principle is applied when assuming the state of the habitats on site prior to vegetation clearing, as well as the vegetation composition. In the absence of seeing the site prior to clearing, it can be assumed that the vegetation that was cleared was largely indigenous.

The PAOI was composed predominantly of degraded and modified areas. Assessment of the areas surrounding the areas of vegetation clearing suggests that the natural areas within the PAOI were originally composed of Disturbed Thornveld habitat.

High numbers of alien and invasive plant species were recorded throughout the PAOI and pose a serious threat to the natural habitats in and around the PAOI. Dominant alien and invasive plant species include, *Tagetes minuta, Bidens pilosa, Solanum seaforthianum, Xanthium strumarium, Datura ferox, Argemone ochroleuca, Datura stramonium, Campuloclinium macrocephalum, Tecoma stans, Flaveria bidentis, Lantana camara, Ipomoea purpurea and Melia azedarach*. These high numbers necessitate the implementation of an Alien Invasive Plant (AIP) management plan.

No flora SCCs were recorded from the PAOI, and none are expected. One nationally protected tree species was recorded from the site, Sclerocarya birrea (Marula), which is protected under the National Forests Act of 1998 (Act 84 of 1998). A map indicating the location of this individual can be seen below (Figure 28). This individual, and any others recorded during a protected plant walkdown are not to be disturbed in any way without acquiring the relevant permits for their relocation or destruction.

A species list of the species recorded from the surrounding area can be found at https://www.inaturalist.org/projects/clover-alloys. Some examples of indigenous flora species recorded in and around the PAOI can be seen depicted in Figure 29 and some examples of the alien and invasive plant species recorded from the PAOI can be seen depicted in Figure 30Figure 30.

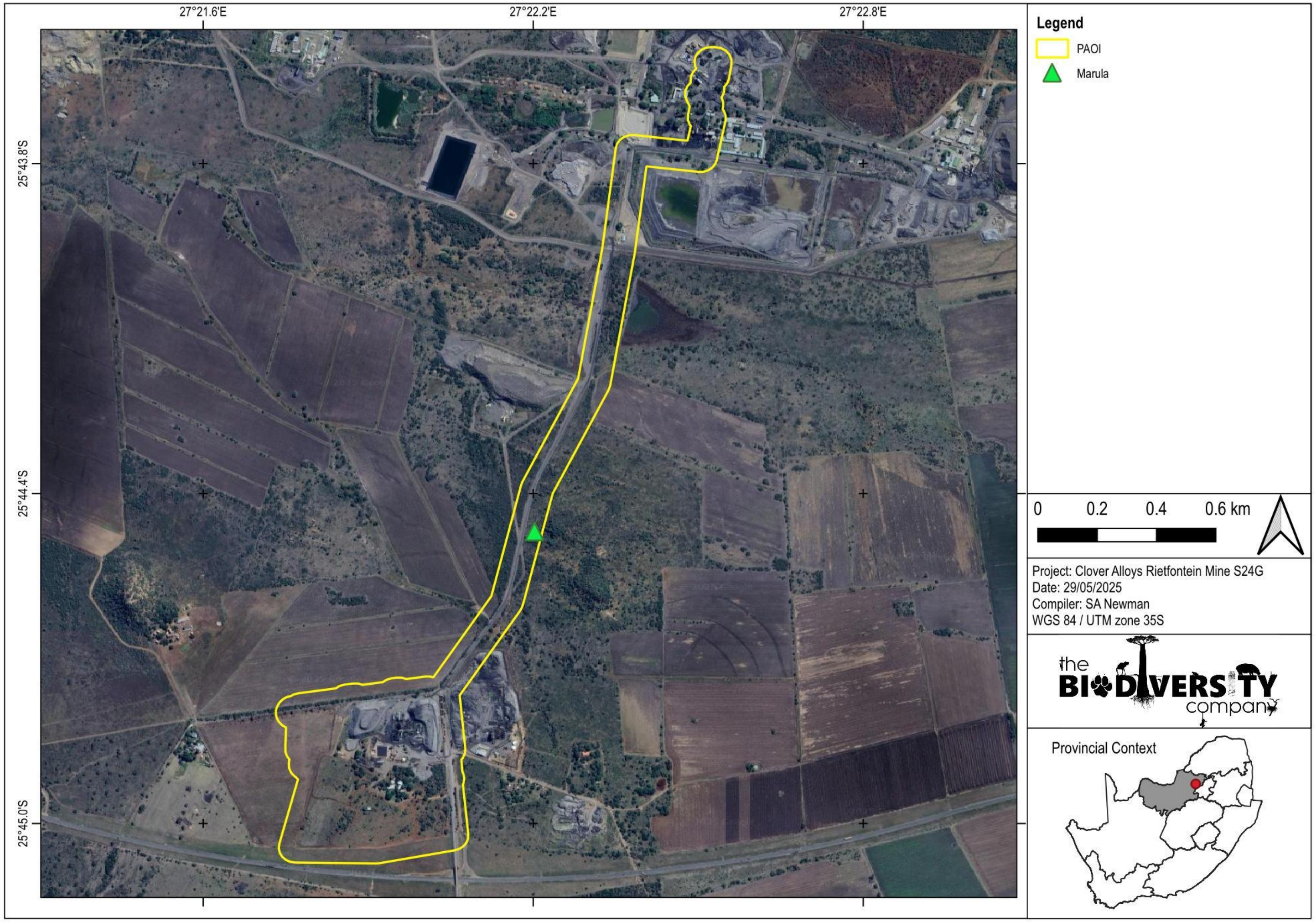


Figure 28: Map illustrating the location of the protected tree species recorded from the site, *Sclerocarya birrea* (Marula)

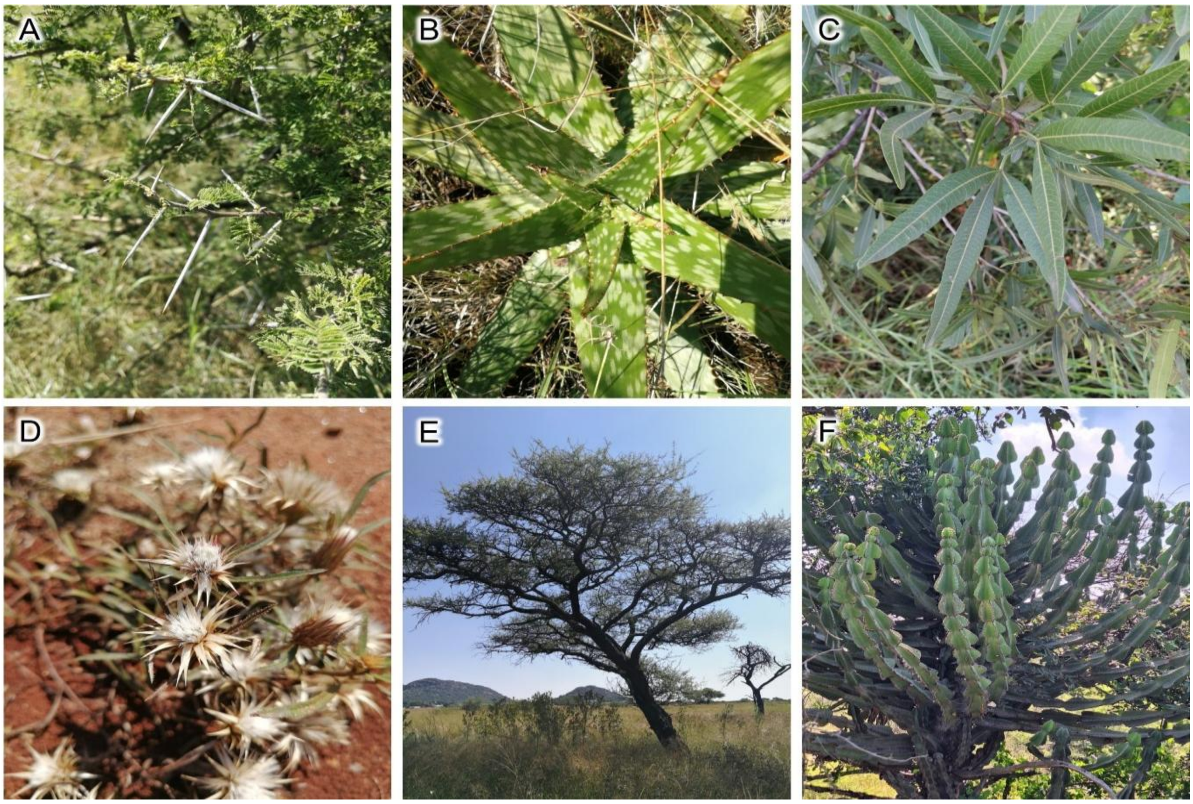


Figure 29: Photographs presenting some of the indigenous flora species recorded from and around the PAOI: *A) Vachellia tortilis, B) Aloe davyana, C) Searsia lancea, D) Dicoma anomala and E) Vachellia nilotica and F) Euphorbia cooperi*

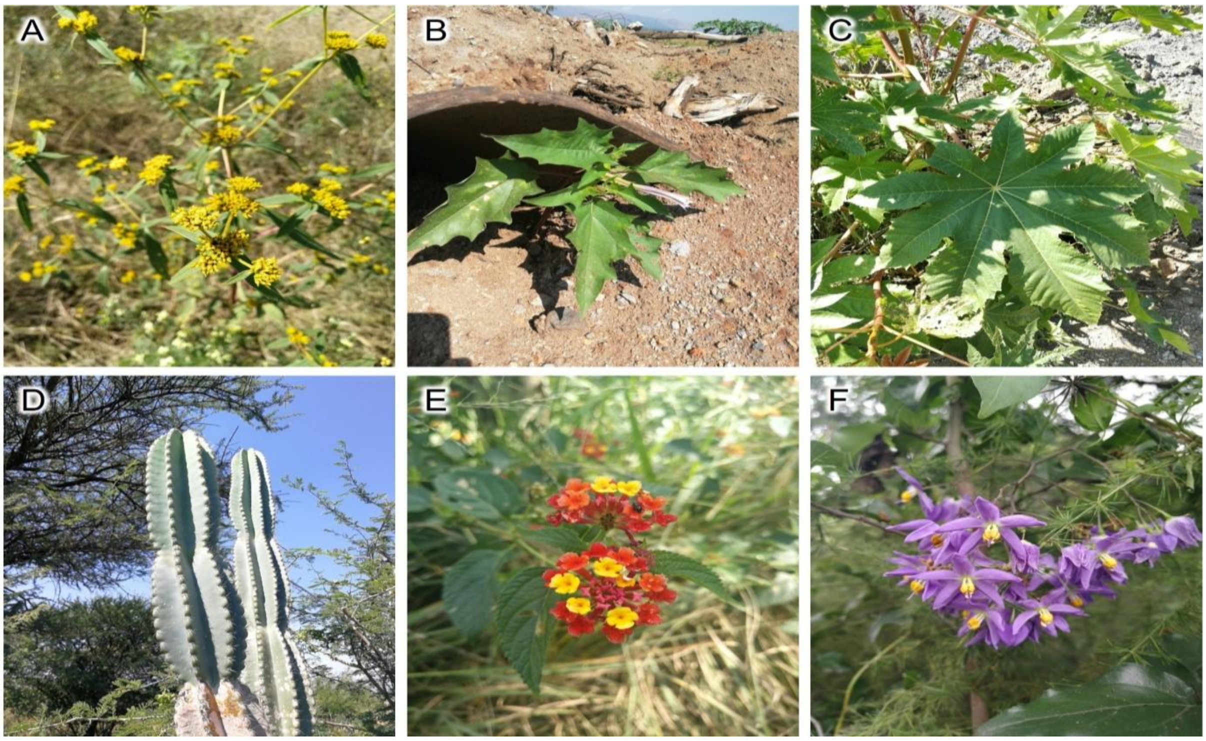


Figure 30: Photographs presenting some of the alien and invasive plant species recorded from the PAOI: *A) Flaveria bidentis, B) Datura stramonium, C) Ricinus communis, D) Epiphyllum oxypetalum, E) Lantana camara and F) Solanum seaforthianum*

8.2.2 FAUNA

8.2.2.1 MAMMALS

The MammalMAP database lists 73 non-volant mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are normally restricted to protected areas. Thirteen of these expected species are regarded as SCC (Table 16). Two (2) species were listed by the Screening Tool.

Table 16: List of mammal Species of Conservation Concern that may occur in the PAOI. EN = Endangered, NT = Near Threatened, LC = Least Concern and VU = Vulnerable

Scientific name	Common name	Screening Tool	Red list		Likelihood of Occurrence	Reason
			SANBI	IUCN		
Aonyx capensis	Cape Clawless Otter	-	NT	NT	Moderate	Some suitable habitat present on site
Atelerix frontalis	South African Hedgehog	-	NT	LC	Moderate	Some suitable habitat present on site
Crocidura maquassiensis	Makwassie Musk Shrew	Medium	VU		Low	No suitable habitat present on site
Crocidura mariquensis	Swamp Musk Shrew	-	NT	LC	Low	No suitable habitat present on site
Dasymys robbertsii	African Marsh Rat	Medium	NT	LC	Low	No suitable habitat present on site
Felis nigripes	Black-footed Cat	-	VU	VU	Low	No suitable habitat present on site
Hydrictis maculicollis	Spotted-necked Otter	-	VU	NT	Low	No suitable habitat present on site
Mystromys albicaudatus	White-tailed Rat	-	VU	EN	Low	No suitable habitat present on site
Ourebia ourebi	Oribi	-	EN	LC	Low	No suitable habitat present on site

Scientific name	Common name	Screening Tool	Red list		Likelihood of Occurrence	Reason
			SANBI	IUCN		
Panthera pardus	Leopard	-	VU	VU	Low	No suitable habitat present on site
Parahyaena brunnea	Brown Hyaena	-	NT	NT	Low	No suitable habitat present on site
Pelea capreolus	Grey Rhebok	-	NT	LC	Low	No suitable habitat present on site
Redunca fulvorufula	Mountain Reedbuck	-	EN	LC	Low	No suitable habitat present on site

8.2.2.2 REPTILES

Based on the ReptileMAP database, 66 reptile species are expected to occur within the area. No reptile SCCs are expected to occur within the area. No species were listed by the Screening Tool.

8.2.2.3 AMPHIBIANS

Based on the FrogMap database, 22 amphibian species are expected to occur within the area (Appendix D). No amphibian SCCs are expected to occur within the area. No species were listed by the Screening Tool.

8.2.2.4 AVIFAUNA

The SABAP2 database lists 359 avifauna species that could be expected to occur within the PAOI and surrounding landscape (Appendix D). Twenty-one (21) of these expected species are regarded as SCC (Table 17). One (1) species was listed by the Screening Tool.

Table 17: List of avifauna Species of Conservation Concern that may occur in the PAOI. EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable

Scientific Name	Common Name	Screening Tool	RED List		Likelihood of Occurrence	Reason
			SANBI	**IUCN**		
Ciconia abdimii	Abdim's Stork	-	NT	LC	Low	No suitable habitat present on site
Ciconia nigra	Black Stork	-	VU	LC	Moderate	Some suitable habitat present on site
Glareola nordmanni	Black-winged Pratincole	-	NT	NT	Moderate	Some suitable habitat present on site

Scientific Name	Common Name	Screening Tool	RED List		Likelihood of Occurrence	Reason
			SANBI	IUCN		
Gyps coprotheres	Cape Vulture	-	EN	VU	Low	No suitable habitat present on site
Hydropogne caspia	Caspian Tern	-	VU	LC	Low	No suitable habitat present on site
Calidris ferruginea	Curlew Sandpiper	-	LC	NT	Low	No suitable habitat present on site
Phoenicopterus roseus	Greater Flamingo	-	NT	LC	Low	No suitable habitat present on site
Rostratula benghalensis	Greater Painted-snipe	-	NT	LC	Moderate	Some suitable habitat might be present within the PAOI.
Alcedo semitorquata	Half-collared Kingfisher	-	NT	LC	Low	No suitable habitat present on site
Falco biarmicus	Lanner Falcon	-	VU	LC	Moderate	Some suitable habitat present on site
Phoeniconaias minor	Lesser Flamingo	-	NT	NT	Low	No suitable habitat present on site
Oxyura maccoa	Maccoa Duck	-	NT	EN	Low	No suitable habitat present on site
Polemaetus bellicosus	Martial Eagle	-	EN	EN	Moderate	Some suitable habitat present on site
Sagittarius serpentarius	Secretarybird	-	VU	EN	Moderate	Some suitable habitat present on site
Aquila rapax	Tawny Eagle	Medium	EN	VU	Low	No suitable habitat present on site

Scientific Name	Common Name	Screening Tool	RED List		Likelihood of Occurrence	Reason
			SANBI	IUCN		
Aquila verreauxii	Verreaux's Eagle	-	NA	LC	Low	No suitable habitat present on site
Gyps africanus	White-backed Vulture	-	CR	CR	Low	No suitable habitat present on site
Mycteria ibis	Yellow-billed Stork	-	EN	LC	Moderate	Some suitable habitat present on site
Pterocles gutturalis	Yellow-throated Sandgrouse	-	NT	LC	Moderate	Some suitable habitat present on site

8.2.2.5 RESULTS FROM THE FIELD ASSESSMENT

Some common fauna species (LC) were recorded from the PAOI during the survey, including *Equus quagga* (Plains Zebra, *introduced*), *Xerus inauris* (Cape Ground Squirrel) and *Hippotragus niger* (Sable Antelope, VU, *introduced*). Additional common species are expected.

Common avifauna species (LC) were recorded for the site, including *Merops bullockoides* (White-fronted Bee-eater), *Vanellus coronatus* (Crowned Lapwing), *Bostrychia hagedash* (Hadeda Ibis), *Spilopelia senegalensis* (Laughing Dove), *Cisticola juncidis* (Zitting Cisicola), *Euplectes albonotatus* (White-winged Widow Bird), *Trachyphonus vaillantii* (Crested Barbet) and *Corythaixoides concolor* (Grey Go-away-bird). Many more common avifauna species are expected for the PAOI.

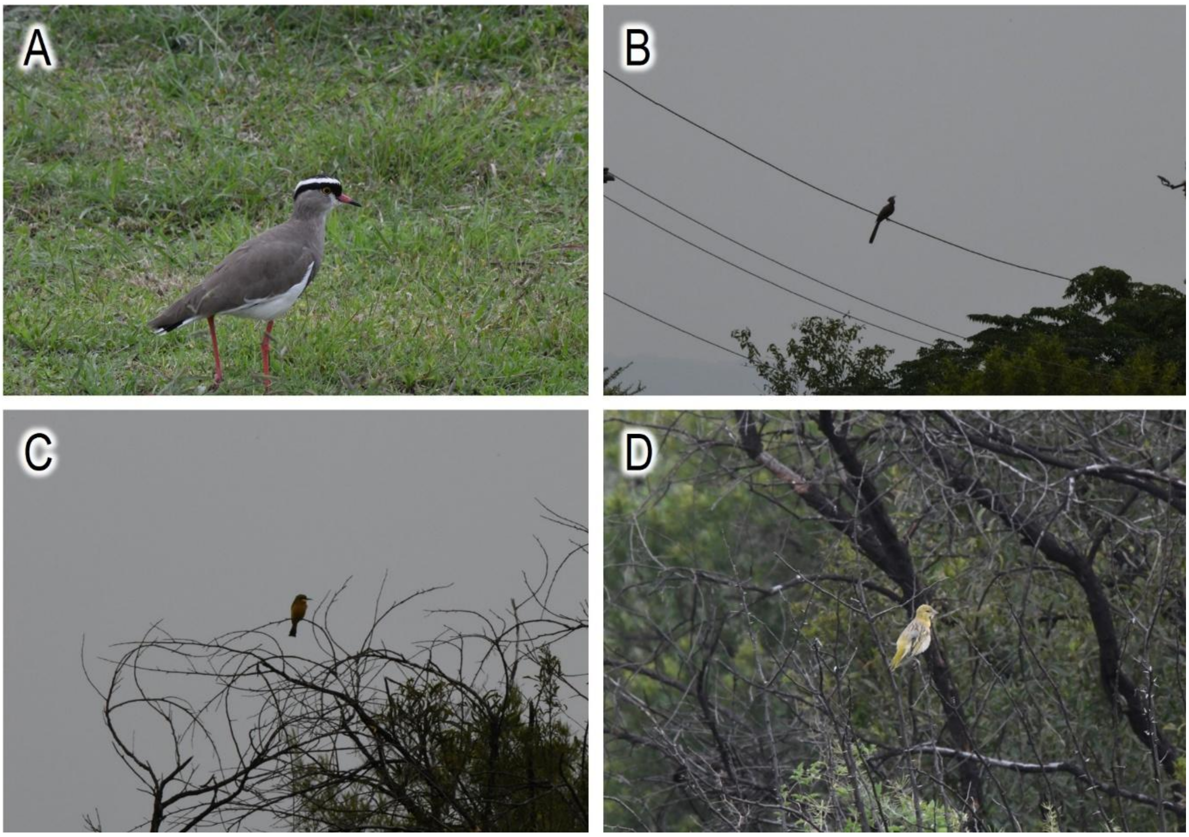


Figure 31: Photographs presenting some of the avifauna species recorded from the PAOI: A) Vanellus coronatus (Crowned Lapwing), B) Corythaixoides concolor (Grey Go-away-bird), C) Merops bullockoides (White-fronted Bee-eater) and D) Ploceus velatus (Southern Masked Weaver)

8.2.3 HABITATS

The habitat survey is conducted in a manner that utilises the data collected from the PAOI and surrounds (during the field survey), as well as satellite imagery between 2004 and 2025, to make assumptions on the state of the habitats prior to land clearing. The Precautionary Approach is applied here when assuming the state on the habitats expected on site prior to unauthorised vegetation clearing.

The main habitat types identified across the PAOI were initially identified largely based on aerial imagery from 2014, before the area was cleared of vegetation in preparation for development. These main habitat types were then refined based on the field coverage and data collected during the survey.

Four (4) main habitat types were identified across the PAOI and include:

- Degraded Thornveld (Figure 33);
- Disturbed Thornveld (Figure 34);
- Water Resource (Figure 35Figure 35); and
- Modified (Figure 36).

The habitat units delineated for the pre-development PAOI can be seen presented in Figure 32 and a description of the habitat units can be found in Table 18.

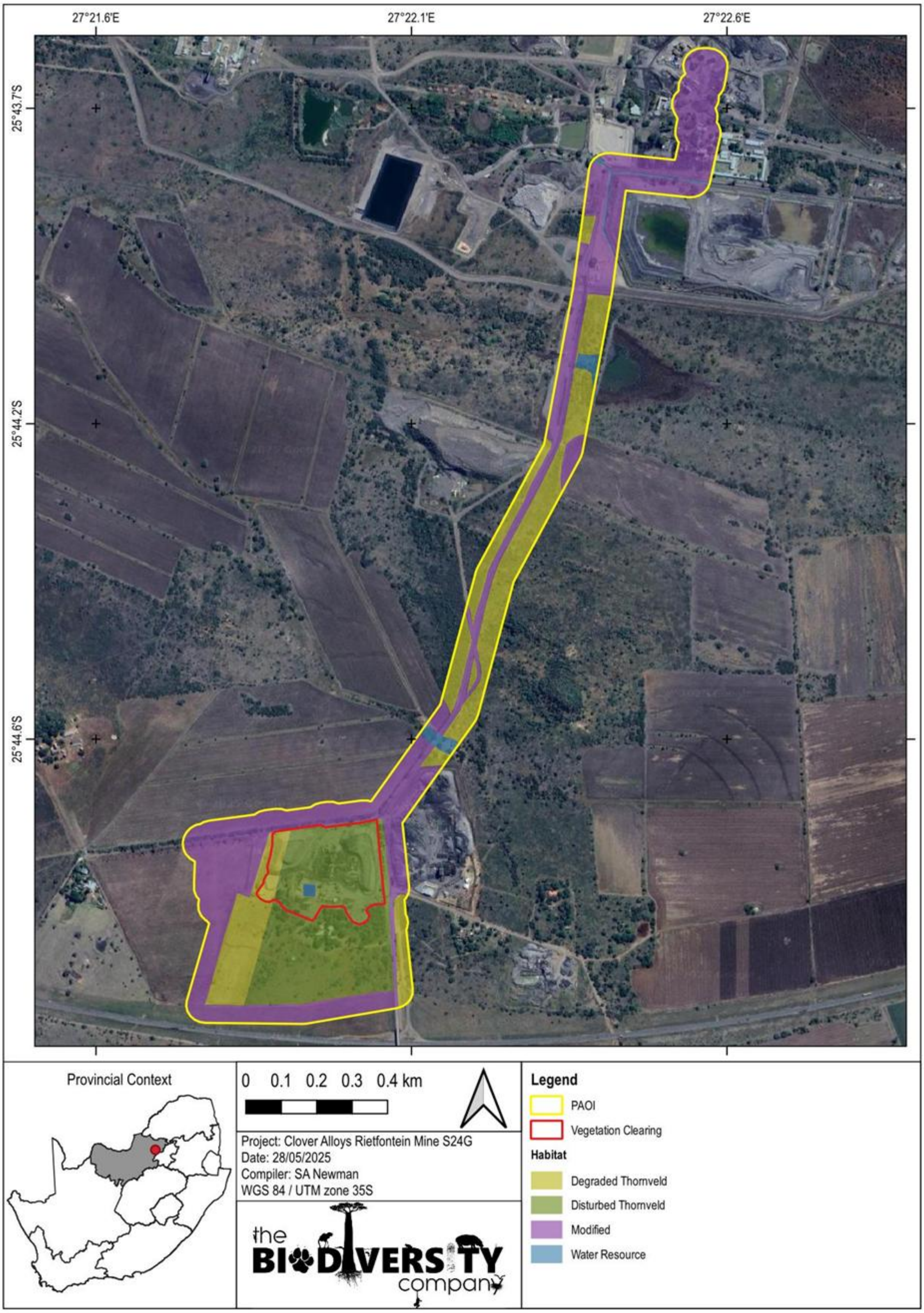


Figure 32: Map illustrating the pre-clearing habitats delineated for the PAOI

Table 18: Table providing descriptions of the habitat units delineated for the PAOI

Habitat	Description and Condition
Degraded Thornveld	This habitat unit is characterised by thornveld habitat that has experienced severe levels of degradation owing to the ongoing mining activities in the area, as well as nearby agricultural practices. This habitat unit exists in small, fragmented patches that experience frequent human ingress, and the associated impacts, such as littering and illegal dumping. Bush encroachment *by Dichrostachys cinerea* and *Vachellia tortilis* in some areas is so dense that it is impenetrable. This habitat unit also experiences invasions and infestations by alien and invasive plant species, such as Tagetes minuta, Bidens pilosa, Solanum seaforthianum, Xanthium strumarium, Datura ferox, Argemone ochroleuca, Datura stramonium, Campuloclinium macrocephalum, Tecoma stans, Flaveria bidentis, Lantana camara, Ipomoea purpurea and Melia azedarach. This habitat unit has lost much of its functionality and can be considered a poor representation of the Marikana Thornveld which it once was. Without active rehabilitation, it will continue to degrade further until it eventually loses all functionality, as it has done in some areas. Dominant species within this habitat unit, apart from those listed above, include; *Themeda triandra, Aristida congesta, Paspalum urvillei, Aristida diffusa, Hyparrhenia hirta, Setaria sphacelata, Cymbopogon caesius, Heteropogon contortus, Hilliardiella elaeagnoides, Aloe davyana and Vachellia robusta.* No flora or fauna SCC were recorded and none are expected for this habitat unit. This habitat unit is no longer considered representative of a CBA or ESA.
Disturbed Thornveld	This habitat unit is characterised by Marikana Thornveld habitat that has experienced high levels of disturbance owing to its close proximity to active mining practices and the high incidence of human ingress within the area. In addition, this habitat unit experiences invasions by alien and invasive plant species such as; *Tagetes minuta, Bidens pilosa, Flaveria bidentis, Lantana camara, Ipomoea purpurea* and *Melia azedarach.* This habitat unit still maintains some of its functionality, but without human intervention and the implementation of mitigations against the nearby anthropogenic disturbances, it will continue to degrade. Dominant species include, but are not limited to, Themeda triandra, Heteropogon contortus, Hyparrhenia hirta, Aloe davyana, Vachellia robusta, V. nilotica, Ziziphus mucronata, and Searsia lancea. No flora SCC were recorded and none are expected for this habitat unit. Some fauna SCC may make use of this habitat unit for foraging and as a movement corridor, however, none are likely to be resident here due to the high levels of human presence and none were recorded during the field survey. Prior to clearing, it is possible that this habitat could have been considered representative of a CBA.
Water Resource	This is a non-terrestrial habitat made up of wetlands, drainage features, and streams within the PAOI. This habitat unit is associated with hydrophytes and provides habitat for many fauna species, as well as an important source of water for fauna passing through the area. It is associated with high levels of degradation

Habitat	Description and Condition
	due to the ongoing mining and agricultural activities in the area, as well as human ingress. No fauna or flora SCC were recorded and none are expected. Additional information regarding this habitat unit may be found in the accompanying wetland assessment (TBC, 2025).
Modified	This habitat unit includes all areas that maintain little to no native vegetation and/or where anthropogenic activity has substantially modified an area's primary ecological functions and species composition. Within the PAOI, these areas are mostly comprised of active mining areas, the associated infrastructure, existing roads and agricultural fields. These areas include very few, if any, indigenous species and are associated with alien and invasive plant species. No fauna or flora SCC were observed, and none are expected for the habitat unit.

Figure 33: Photograph illustrating the Degraded Thornveld habitat type

Figure 34: Photographs illustrating the Disturbed Thornveld habitat type

Figure 35: Photographs illustrating the Water Resource habitat type

Figure 36: Photographs illustrating the Modified habitat type

8.3 SOCIAL AND CULTURAL ENVIRONMENT

The plant is located in Ward 32, and directly adjacent to Ward 35 and 33 of the Rustenburg Local Municipality (RLM) which falls under the Bojanala Platinum District Municipality (BPDM) of the North West Province.

8.3.1 BOJANALA PLATINUM DISTRICT MUNICIPALITY

The Bojanala Platinum District Municipality forms one of the four District Municipalities of the North West Province, and covers an area of approximately 18 300km2. The neighbouring municipalities include Waterberg District Municipality in Limpopo, the West Rand District and Tshwane Metropolitan Municipalities in Gauteng, as well as the Ngaka Molema and Dr. Kenneth Kaunda District Municipalities of the North West Province. Five Local Municipalities fall within the BPDM including Madibeng, Rustenburg, Kgetlengrivier and Moses Kotane Local Municipalities. The seat of the BPDM is the city of Rustenburg in the Rustenburg Local Municipality. Due to the BPDM's rich source of mining minerals, especially the platinum group metals, mining is a large contributor to the BPDM's economy, as well as other industries such as agriculture and tourism.

8.3.2 RUSTENBURG LOCAL MUNICIPALITY

The Rustenburg Local Municipality (RLM) covers an area of 3 423km2 within the Bojanala Platinum District Municipality. The Royal Bafokeng Nation is the traditional tribal community of the northern region of the RLM and covers an area of 1 500km2. Rustenburg is situated approximately 120km from Johannesburg and Thswane, linked by the R24 and the N4 Freeway. Most of the BPDM's platinum mining activities are located in the RLM, mainly within the 'N4 Platinum Development Corridor' that runs from the east of the RLM to the west. The platinum mining belt extends along the northern region of the Magalies Mountain range, from the Pilanesburg area to the City of Tshwane. The urban settlement pattern has been largely controlled by the Platinum mines and a number of informal settlements have been established in this mining region. Rural villages and small towns (mostly under traditional leadership) are located in more northern regions of the municipality (RLM IDP Review 2024/2025, 2024). Settlements such as Tlaseng, Thekwane, Photsaneng, Luka, Phokeng, Chaneng, and Rankelenyane fall under the Bafokeng tribal land (RLM IDP Review 2024/2025, 2024).

8.3.3 DEMOGRAPHICS

North West has a growing population of 3 804 547. Rustenburg Local Municipality has the highest population density in the North West with a population of 562 315. The working age population (aged between 15 and 64 years old) comprises 71.3% of the population in RLM (Stats SA, 2022).

The most common language spoken in the North West is Setswana (72.8%) followed by Sesotho (5.9%) and Afrikaans (5.2%) (Stats SA, 2022).

Table 19: Population growth rate estimates (sources: Census 2011, Census 2022)

Area	Population (2011)	Population (2022)	Population Growth (% p.a.)
North West Province	3 509 953	3 804 547	0.8
Bojanala Platinum District Municipality	1 507 505	1 624 428	0.7
Rustenburg Local Municipality	549 575	562 315	0.2

8.3.4 ECONOMY

The mining sector is generally the main contributor to economic growth in the North West Province. Figure 37 represents the Gross Value Added (GVA) by Broad Economic Sector for the year 2021 as per the BPDM 2024/2025 Reviewed IDP. The GVA is an indicator of the sectors' contribution to the overall economy. The mining sector in 2021 contributed the most to the economies for the North West, the BPDM and RLM.

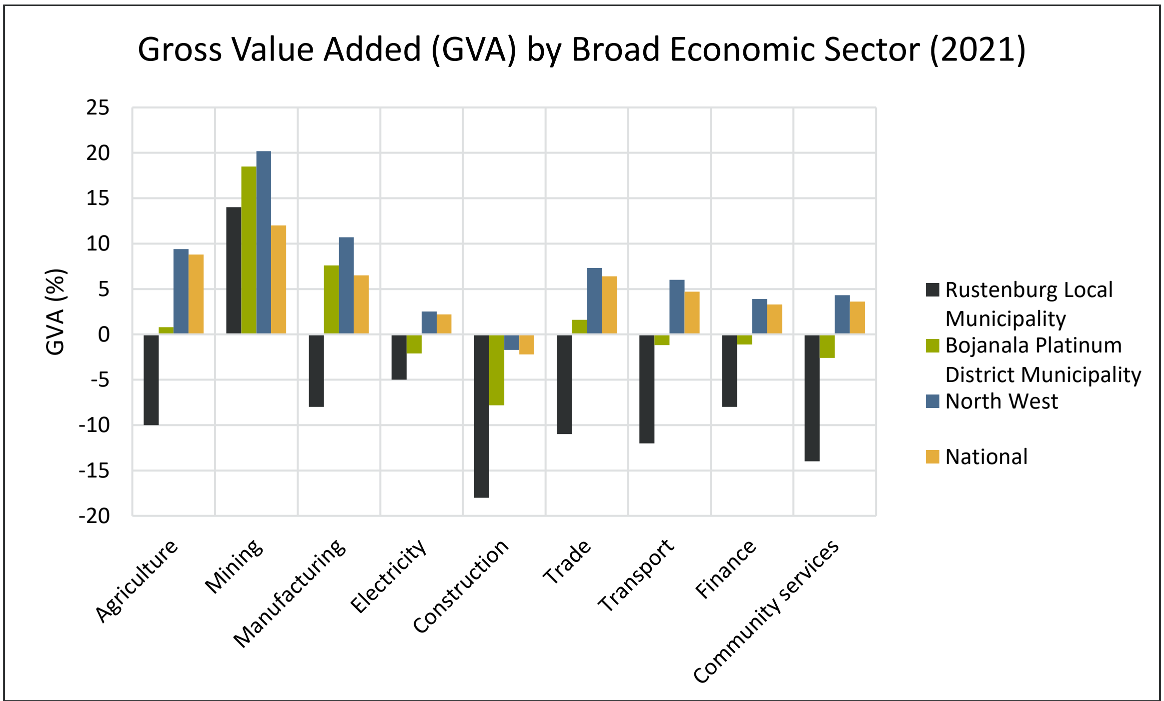


Figure 37: Gross Value Added (GVA) by Broad Economic Sector for the year 2021 (Data source: BPDM - 2024/2025 Reviewed IDP, p. 41 - 42)

The Rustenburg Local Municipality contributed 36.30% towards the Bojanala Platinum District Municipality's Gross Domestic Product (GDP) (R158 billion) in 2020 and is forecasted to have an annual GDP growth rate of

3.68% from 2020 to 2025. The GDP of RLM experienced an increase from R38.2 billion in 2010 to R57.3 billion in 2020. The Rustenburg Local Municipality's economy is heavily reliant on the mining sector which contributed to 80.5% (R43.7 billion) of the total Gross Value Added (GVA) of the RLM in 2020, this was followed by the finance (6.2%) and community services (5.0%) sectors. The lowest contributor to the RLM GVA was the agricultural sector (below 1%) in 2020 (RLM IDP Review 2024/2025, 2024).

Key contributors to the inhibition of economic development in the Bojanala Platinum District Municipality include factors such as high rates of unemployment and poverty, social inequality (mainly amongst women, youth and people with disability), limited integration between stakeholders, poor roads infrastructure, shortages of energy and water, among others (BPDM - 2024/2025 Reviewed IDP).

8.3.5 EMPLOYMENT

Rustenburg Local Municipality has shown an increasing trend in unemployment with an unemployment rate of 56.6% recorded for 2021 (BPDM - 2024/2025 Reviewed IDP). Unemployment of the economically active youth population (142,219) was calculated to be at a rate of 34.7% (Stats SA, 2011). In 2020, it was estimated that 12.95% of households in the RLM received an annual income of R30 000 or less (RLM IDP Review 2024/2025, 2024). According to the RLM IDP Review 2024/2025 (2024), 49.1% of the Rustenburg Local Municipality's population is living in poverty.

A key challenge that is experienced by the RLM is that the main economic contributor is the mining sector, leading to a lack of diversity in the economic space, thereby limiting alternative job opportunities (RLM IDP Review 2024/2025, 2024).

8.3.6 INFRASTRUCTURE AND PUBLIC SERVICES

The Rustenburg Local Municipality is currently facing challenges with housing and development of settlements, according to the RLM IDP Review 2024/2025 (2024), there are approximately 400 000 families in Rustenburg that do not have adequate shelter. Of the total 203,658 households in the RLM, 53% of households have access to piped water, and 94.5% of households have access to electricity for lighting (Stats SA, 2022). Local authorities remove refuse from 75.6% of households at least once a week, and 1.6% of households less frequently. 72.8% of households have access to flushing toilets which is followed by 24% of households making use of pit toilets (Stats SA, 2022).

8.3.7 EDUCATION

According to Census 2022, over 31% of the population aged between 5 and 24 years old in the RLM did not attend an educational institution. 3.9% of the population over the age of 20 did not receive schooling, while 42.1% received a matric (Stats SA, 2022).

8.3.8 CULTURAL HERITAGE

The Rietfontein Chrome Wash Plant is located within a region of notable archaeological and historical significance in the Rustenburg area of the North West Province. The broader landscape has been shaped by successive cultural phases, beginning with the Early Stone Age (ESA), followed by the Middle and Later Stone Ages, and culminating in the Iron Age and historical periods.

Although no ESA sites are recorded directly within the project footprint, regional studies confirm the presence of ESA hominid activity in the wider North West Province, particularly near permanent water sources. The Middle Stone Age (MSA) is represented by sites such as Olieboomspoort Shelter, while the Later Stone Age (LSA) is evidenced by nearby sites like Jubilee Shelter and Kruger Cave, which contain microlithic tools, bone points, and ostrich eggshell beads.

The Iron Age occupation of the region is particularly well documented. Ceramic traditions such as the Bambata, Eiland, Olifantspoort, Madikwe, Uitkomst, and Buispoort facies reflect the cultural evolution of early farming communities and their settlement patterns. These traditions are associated with the broader Moloko and Blackburn branches of the Urewe Ceramic Tradition and are linked to the historical Bafokeng and other Sotho-Tswana groups.

Historical topographic maps and archival sources indicate that the area surrounding the Rietfontein farm has been subject to various phases of settlement and land use, including colonial farming, missionary activity, and early mining operations. The region also played a role in significant historical events, such as the South African War and the establishment of Bophuthatswana.

8.3.8.1 PREVIOUS HERITAGE IMPACT ASSESSMENT REPORTS FROM THE STUDY AREA AND SURROUNDINGS

A search of the SAHRIS database revealed that several previous archaeological and heritage impact assessments had been undertaken within the surroundings of the study area. In each case, the results of each study are shown in bold. These previous studies are listed below in ascending chronological order:

- VAN SCHALKWYK, J., & PELSER, A. (1999). A Survey of Cultural Resources on the Farms Spruitfontein 341 JQ and Kafferskraal 342 JQ, Rustenberg District. Pretoria: National Cultural History Museum. **The study identified an extensive LIA site consisting of cattle kraals, terraces and other stone structures, a site with decorated pottery, grinding stones and hammer stones, foundations/remains of an old homestead/farmstead and two unmarked graves.**

- VAN SCHALKWYK, J., & PELSER, A. (2001). A survey of Cultural Resources on the farm Kroondal 304JQ, East of Rustenburg. Pretoria: National Cultural History Museum. **The study indicated the historical town of Kroondal (1889) and identified three sites with extensive LIA walling.**

- PISTORIUS, J.C.C. 2003. A Heritage Impact Assessment (HIA) for SA Ferrochrome's New Proposed Expansion Operations in Boschhoek, North of Rustenburg in the North-West Province of South Africa. **The study identified a number of features and sites. However, only a grave and the remains of old mining activities were considered to be of any significance.**

- COETZEE, F., 2008. Cultural Heritage Survey of the Farm Rietfontein 338JQ, Rustenburg District, North West Province. **This study is located within the current project footprint. A LIA settlement was recorded and is described below.**

- PELSER, A.J. 2013. A Report on a Heritage Impact Assessment for the proposed establishment of the Mmaditlhokwa cemetery on portion 122 of the Kafferskraal 342JQ, Rustenburg Magisterial district near Marikana North-West Province. **No sites, features or artifacts of cultural heritage origin were identified during the study.**

- PISTORIUS, J.C.C. 2014. Heritage Baseline Report for the Proposed Boshoek Smelter on Portions of the Farms Boschoek 103 JQ, Bultfontein 259 JQ, Boekenhoutfontein 260 JQ and Stellite 255 JQ. **Two graveyards and three single graves were identified during the study. The nearest of these sites to the present study area is the graveyard GY01 which is located approximately 1 km north-east of the present study area.**

- COETZEE, F. 2014. Proposed Crushing and Screening Plant on the Farm Rietfontein 338JQ, Rustenburg District, North West Province. **This study is located within the current project footprint. Six suspected graves and an unidentified site were recorded and are described below.**

- COETZEE, F. 2015. Cultural Heritage Assessment for the Amendment to the Environmental Management Programme for the Proposed Tailings Storage Facility (TSF) and Associated Infrastructure at Royal Bafokeng Platinum Styldrift Mine Complex, Rustenburg Local Municipality, Bojanala District Municipality, North West Province. **No historical or archaeological resources or graves were identified by this assessment.**

- HIGGIT, N., 2015. Heritage Scoping Report for Lanxess Chrome Mine: Section 102 Amendment. Six Iron Age stone localities and one MSA scatter were identified by the study. This includes a historically sunk shaft from 1949. This report is located within the same area as the current study.

- MNGOMEZULU, M. 2015. Phase 1 Heritage Impact Assessment for Section 24G Rectification Process and Water Use License Application for the Chrome Crushing, Screening and Washing plant on Portion 8 of the Farm Boshoek 103 JQ in Rustenburg, Bojanala Platinum District Municipality, North West Province. **One cemetery was identified during the study.**

- VAN VOLLENHOVEN, A.C. 2016. A Report on a Cultural Heritage Impact Assessment for the Proposed Further Development on Portion 385 of the farm Waterkloof 305 JQ, Rustenburg, North-West Province. **During the study three buildings of cultural heritage significance were identified.**

- VAN VOLLENHOVEN, A.C. 2017. A Report on a Cultural Heritage Impact Assessment for the Proposed Rustenburg x 31 Housing Development close to Rustenburg, North-West Province. **During the study no sites of cultural heritage significance were identified.**

- ANGEL. J. 2023a. Proposed Boshoek Solar PV Cluster Boshoek Solar 1 On Portion 0 of the farm Rhenosterdoorns 531, portion 1 and 18 of the farm Zwaarverdiend 234, portion 1 of the farm Elandsfontein 102 and the farm Onderstepoort 98, within the Rustenburg Local Municipality and the Bojanala District Municipality in the North West Province. **During the study no heritage resources were identified.**

- ANGEL. J. 2023b. Proposed Boshoek Solar PV Cluster Boshoek Solar 2 On Portion 2, 11 and 12 of the farm Rhebokhoek, portion 18 of the farm Zwaarverdiend 234, portion 1 of the farm Elandsfontein 102 and the farm Onderstepoort 98, within the Rustenburg Local Municipality and the Bojanala District Municipality in the North West Province. **Two recent stone-built structures and one mixed archaeological site were observed.**

- ANGEL. J. 2023c. Proposed Boshoek Solar PV Cluster Boshoek Solar 3 On Portion 1, 2 and 4 of the farm Zwaarverdiend 234 within the Rustenburg Local Municipality and the Bojanala District Municipality in the North-West Province. **During the study eleven heritage features and resources were identified consisting of one burial ground, six Iron Age sites, three Stone Age sites and one mixed context archaeological site.**

- TASKER. D., 2024. Clover Alloys proposed mining of chrome, on the farm Rietfontein 338 JQ, near Rustenburg, North-West Province. **During the study twenty-one heritage features and resources where identified. These consist of two burial grounds with approximately six graves and twenty-eight graves respectively, ten Iron-Age ruins, one site with historical infrastructure, six localities with recent historical homestead structures, and two low significance archaeological sites.**

- VAN VOLLENHOVEN, A.C. 2024. A Report on a Heritage Impact Assessment for the Proposed Chrome Washing Plant on the Remaining Portion of Portion 8 (Portion Of Portion 2) of the Farm Rietfontein 338 JG, Rustenburg Local Municipality, Bojanala Platinum District Municipality, North West Province, Republic of South Africa. **No sites of heritage significance were identified.**

Of specific importance is Coetzee's (2008) HIA as it occurred within the current project footprint. The study identified a LIA settlement on the rocky outcrop koppie (Site 1), consisting of six enclosures clustered together, with a main enclosure (approximately 8 m in diameter), a large enclosure (approximately 25 m in diameter) with several secondary stone walling and enclosures attached to it, and several large, packed stone heaps (it is unclear if these are graves). No house remains were found but a lower grindstone was seen, as such, the author concluded (pending further investigation) that the settlement was most likely a large cattle outpost associated with the Bafokeng of Kgosi August Molotlegi Mokgatle. Coetzee (2008) stated that the structures were of conservation worthy status, older than 100 years and protected by the NHRA. Coetzee (2008) recommended that: The settlement should be surveyed and mapped; The client must apply for a permit from SAHRA for the construction of a training/educational centre on the site and; a conservation management plan must be compiled for the site. PGS does not currently know of any Phase 2 mitigation or management plans associated with the 2008 report. Figure 38 below illustrates the site’s location and it is clearly visible in that the structures were disturbed/destroyed during previous construction activities.

Figure 38: Site 1's location (taken from Coetzee 2008)

As part of an EMPr ordered by the DMRE (ref no. 34/2014 ER), Coetzee (2014), conducted a HIA based on the mobile crushing and screening plant set up without authorisation in the current study area. In this unlisted HIA provided by the client, after the fieldwork had been completed, an additional seven heritage sites were noted Figure 39. Six of which (SG01-SG06) are possible graves whereas the final feature is listed as an unidentified site (US01). The possible graves appear to be stone packed features; but little else is known. The unidentified site is described in the report as a u-shaped packed stone feature with a lower grinding stone visible. It could possibly be disturbed LIA walling given its proximity to Site01. Of these sites, as far as can be ascertained, only possible grave - SG05 appears to have not been disturbed or destroyed by development (as is evident in Figure 57). However, it’s current preservation state is unknown as the site was not seen during the fieldwork undertaken for this study due to vegetation cover. Coetzee (2014) indicated the following mitigation measures:

- Damage to Heritage site would constitute a wilful act and the perpetrator(s) could face criminal prosecution;
- The Heritage Sites will be clearly demarcated;
- A buffer zone of at least 50 metres will be maintained between the Plant Operation and Heritage site;
- Prohibiting access to and any form of interference with the Heritage sites by unauthorised persons;
- All relevant Clover Alloys personnel and contractor personnel will be properly briefed on the locations of the sites and the importance of avoiding damage to them; and

- The Heritage site could become a tourist attraction in conjunction with the North West Government Tourist Department.

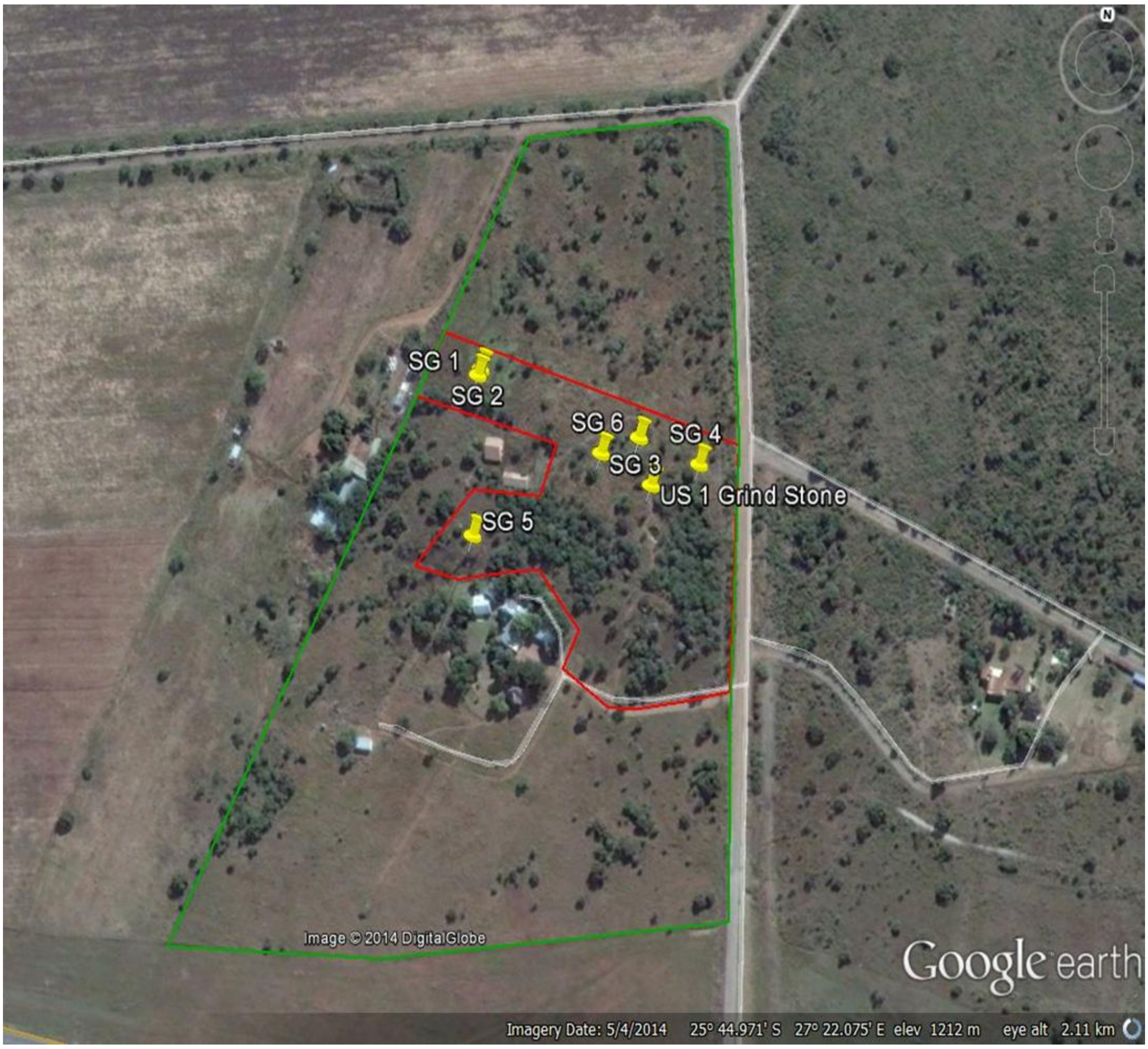


Figure 39: Coetzee's (2014) sites noted during the HIA as appended in the EMPR.

Figure 40: Suspected grave SG01 (Coetzee 2014).

Figure 41: Suspected grave SG02 (Coetzee 2014).

Figure 42:Suspected grave SG03 (Coetzee 2014).

Figure 43: Suspected grave SG04 (Coetzee 2014).

Figure 44: Suspected grave SG05 (Coetzee 2014).

Figure 45: Suspected grave SG06 (Coetzee 2014).

Figure 46: Unidentified site US01 (Coetzee 2014).

8.3.8.2 FIELDWORK FINDINGS

The fieldwork was conducted on 7th of March and the 10th of July 2025 by a field team of PGS. Their movement on site was tracked by Global Positioning System (GPS) and a tracklog map can be seen in Figure 56. Due to the disturbed nature of the site (at the time of the survey approximately 80 percent developed), the 20 percent of undeveloped, un-surveyed area was the main focus of the in-field survey. The field description forms were collected with ArcGIS Survey123 in field software.

During the fieldwork a total of six heritage features and resources where identified (Figure 57). These consist of one NCW site which includes a lithic and pottery scatter (Riet01) one medium density pottery scatter with a heritage grading of IIIC (Riet03), one intangible heritage resource (memorial site) with a heritage grading of IIIC

(Riet08), and two demolished historical homestead with only the stone-lined foundation remaining, which may possibly have infant burials present; therefore provisionally graded as IIIC (Riet04 and Riet07). Both Riet03 and Riet04 lie outside of the current footprint and are not directly threatened. It should be noted that Riet03 is part of the larger Iron Age occupation of the flat koppie and will require mitigation along with Riet06a-m described below.

Aerial imagery (see Figure 57) and prior research (Coetzee 2008; Coetzee 2014) reveal a significant network of LIA stone walling and possible graves in the study area. Evidence such as Site 1, SG01-SG06 and US01 all previously recorded by Coetzee - and now disturbed within the Plant's construction zone, supports this. In depth assessment of the project area indicated a large number of LIA sites (Riet06a-m) already disturbed by the development.

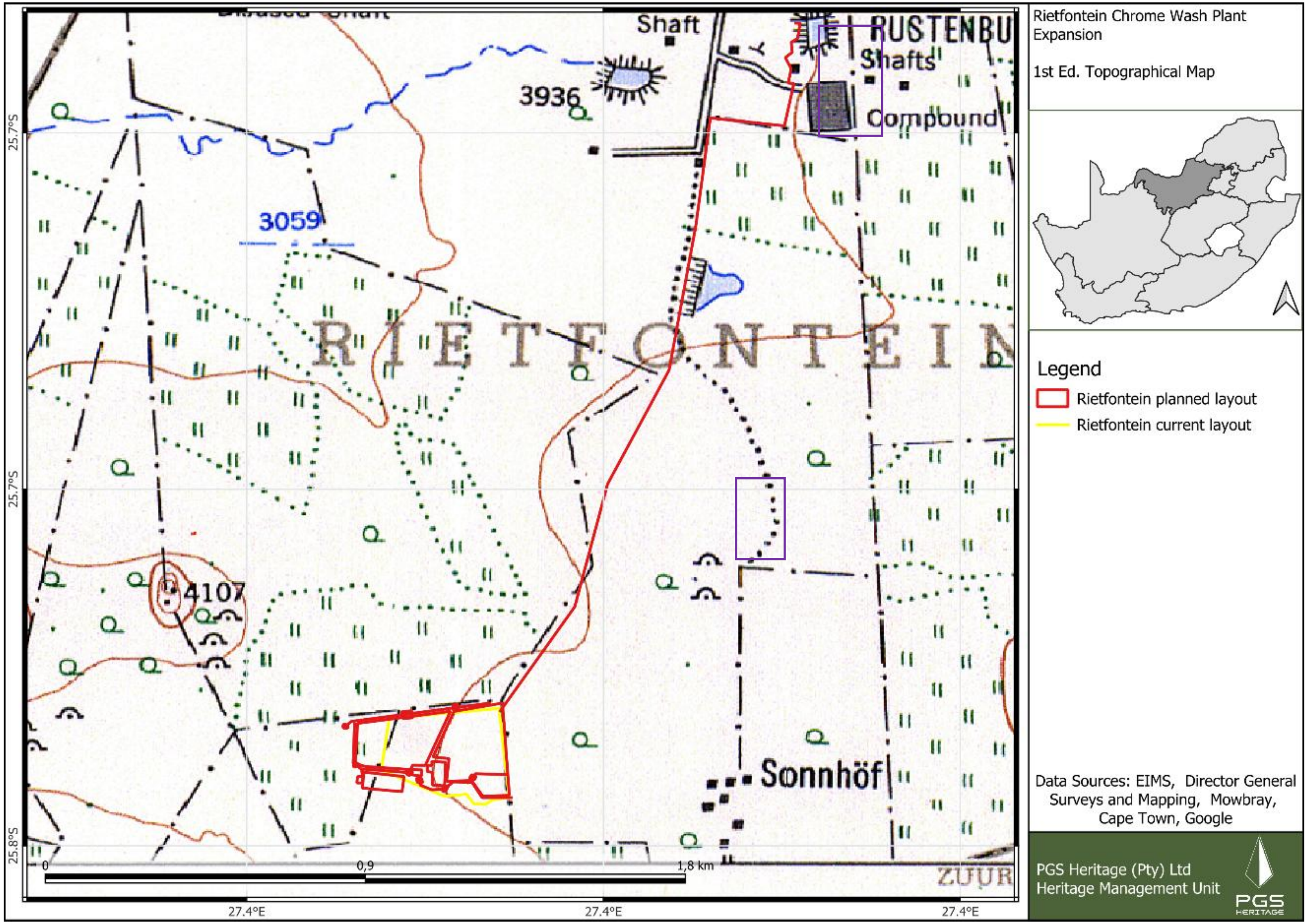


Figure 47: First Edition topographical map 2527CB-1968 (features highlighted in purple).

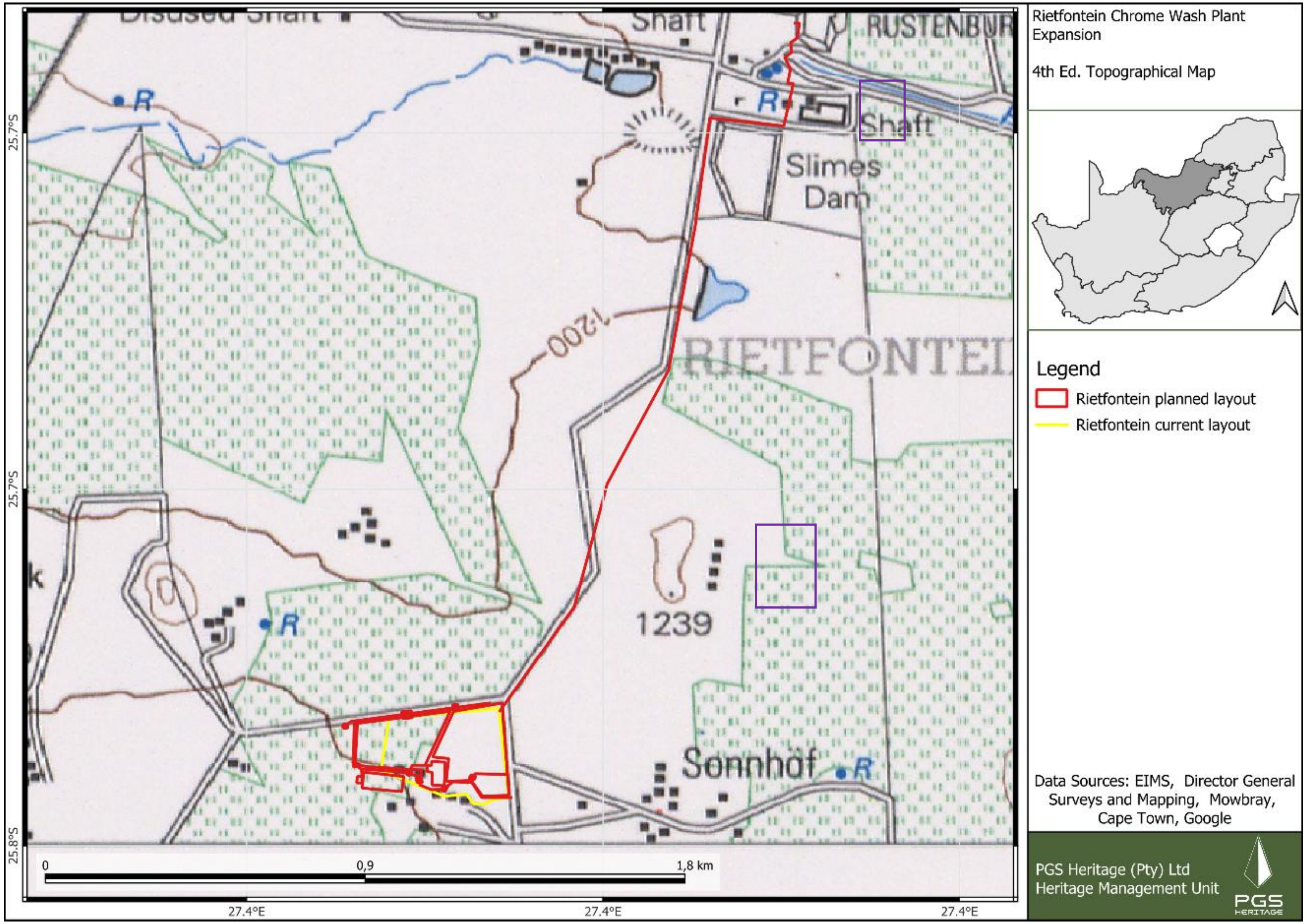


Figure 48: Fourth Edition topographical map 2527CB-1996 (features highlighted in purple).

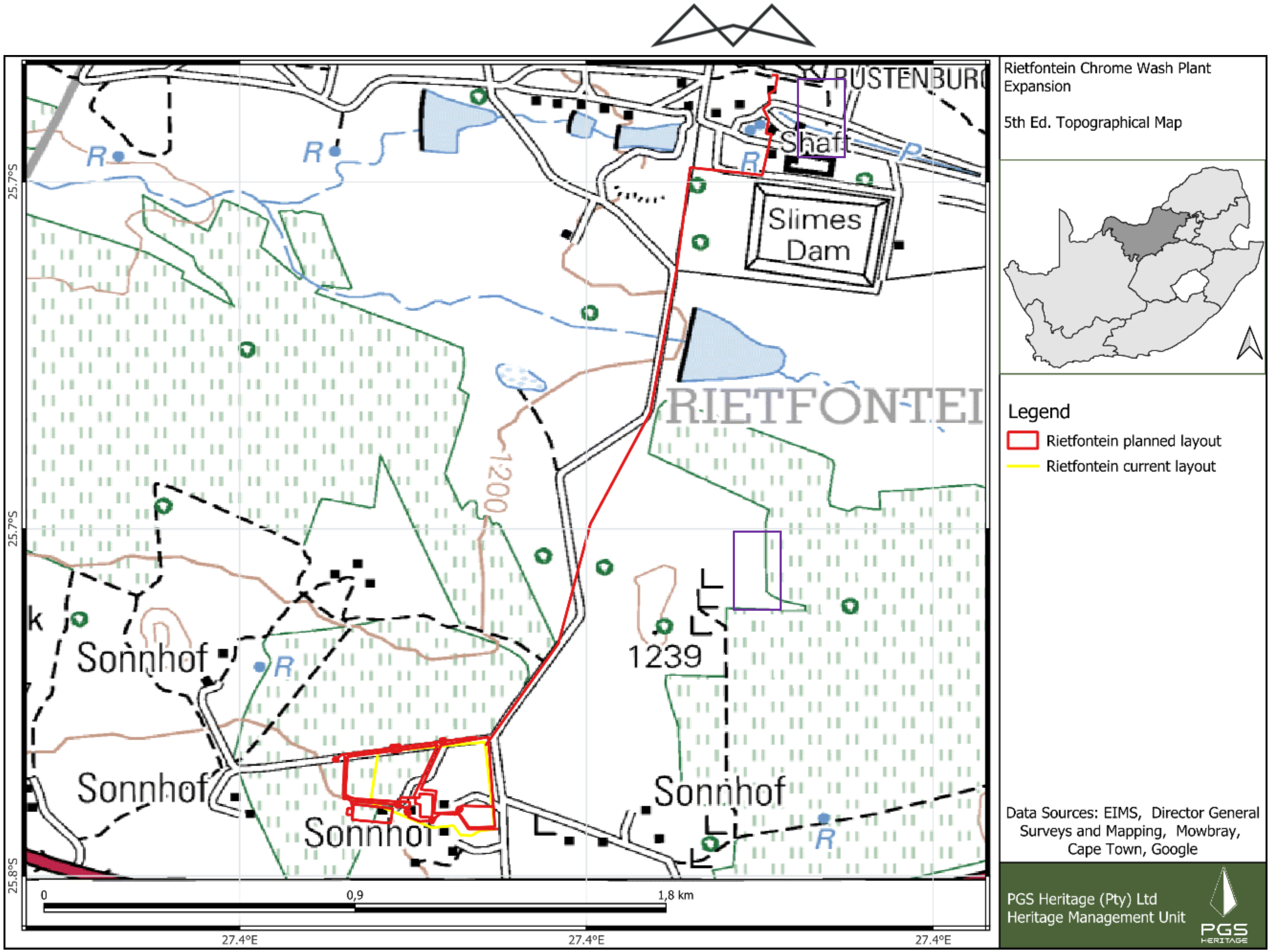


Figure 49: Fifth Edition topographical map 2527CB-2010 (features highlighted in purple).

Figure 50: First Edition orthophoto 0107, 603 1:36000 (1968)

Figure 51: First Edition orthophoto 0107, 603 1:36000 – zoomed on the Plant (1968)

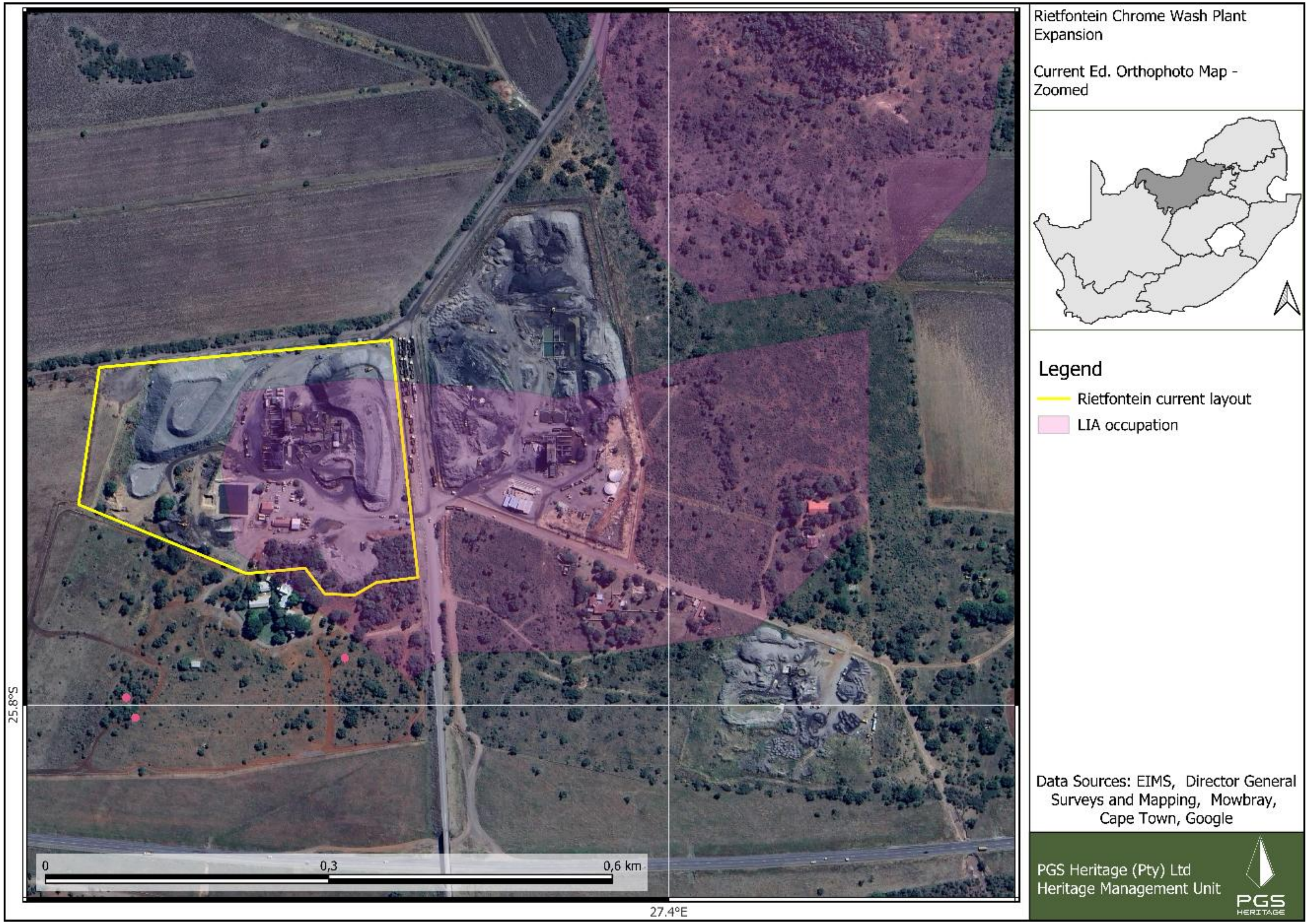


Figure 52: Current orthophoto imagery of the Plant.

Site 1 (25.748250°S 27.366602°E) is an LIA settlement with potential graves atop a rocky outcrop (Figure 53, Figure 54 and Figure 55) identified by Coetzee (2008). A visit to the site resulted in the documentation of thirteen distinct walling features (Riet06a-m) and a pottery scatter (Riet03). Desktop analysis indicates the current Chrome Wash Plant constructed over the Iron Age area (Figure 51, Figure 52 and Figure 57), thus disturbing and destroying the archaeological features. At site Riet06e fencing cuts through the Iron Age kraal stone walling.

Figure 53: Broken lower grinding stone (taken from Coetzee 2008).

Figure 54: A section of the stone walling (taken from Coetzee 2008).

Figure 55: A clear view of a larger section of walling (taken from Coetzee 2008).

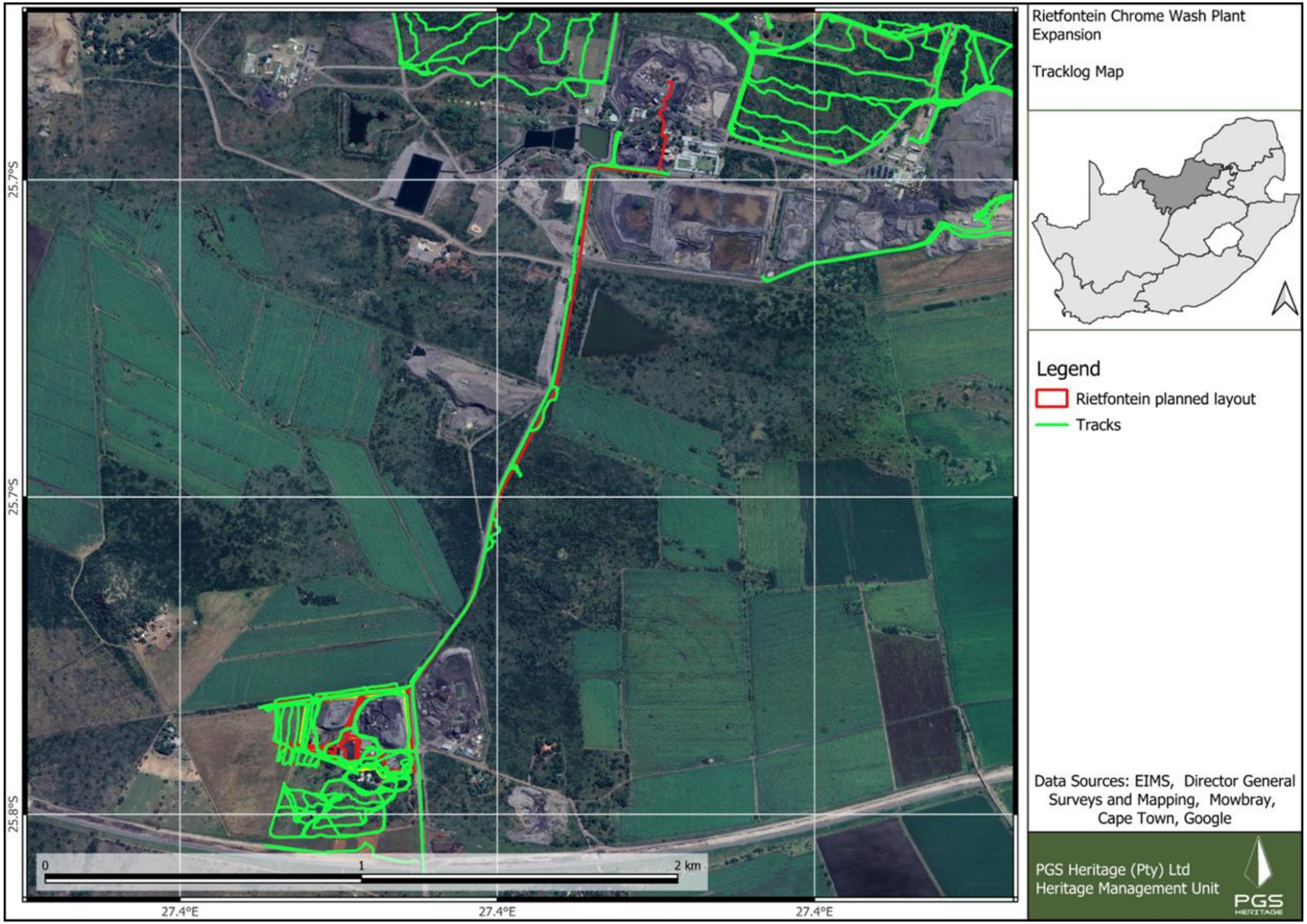


Figure 56: Fieldwork tracklogs (track in green).

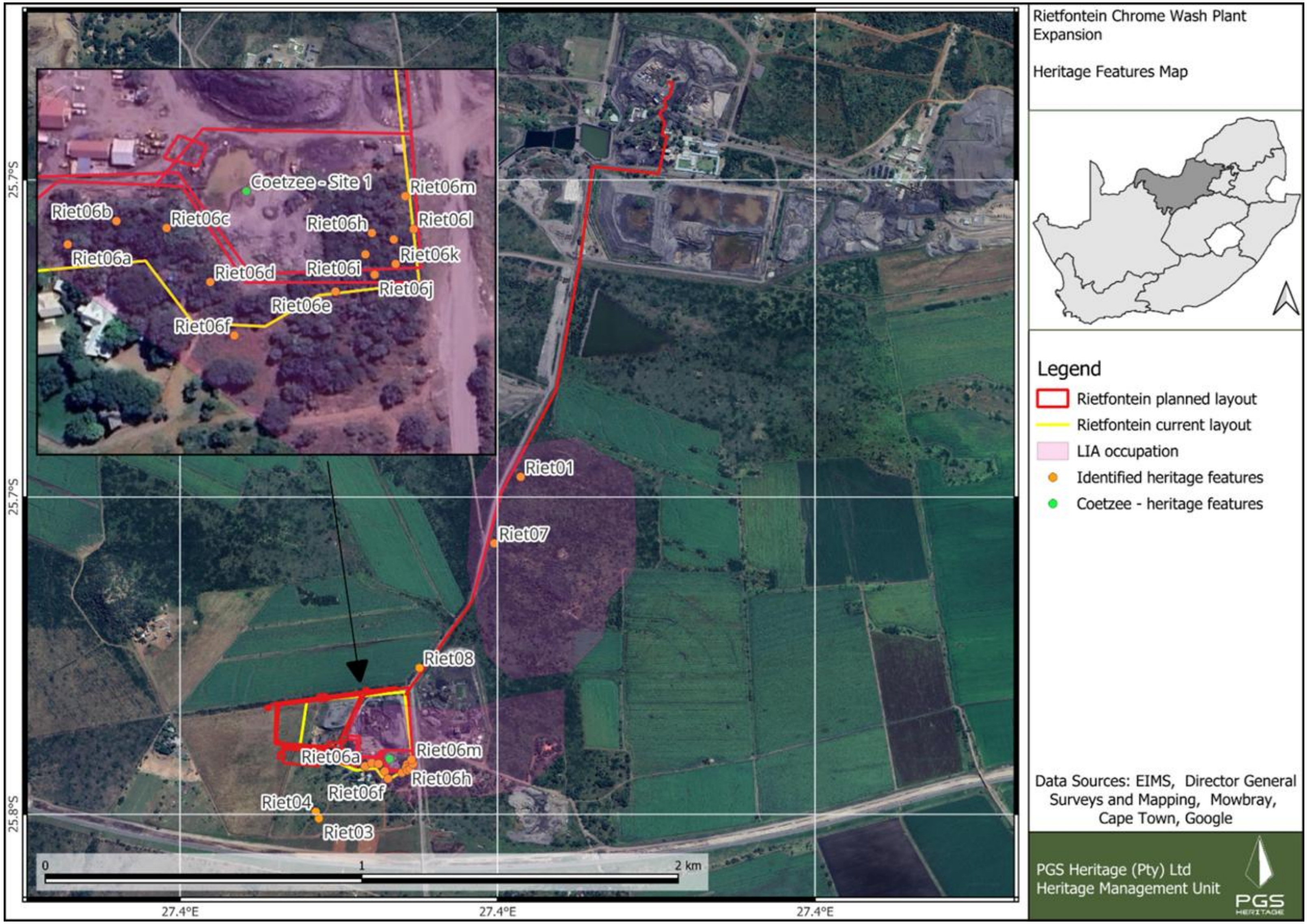


Figure 57: Identified heritage resources within the development area.

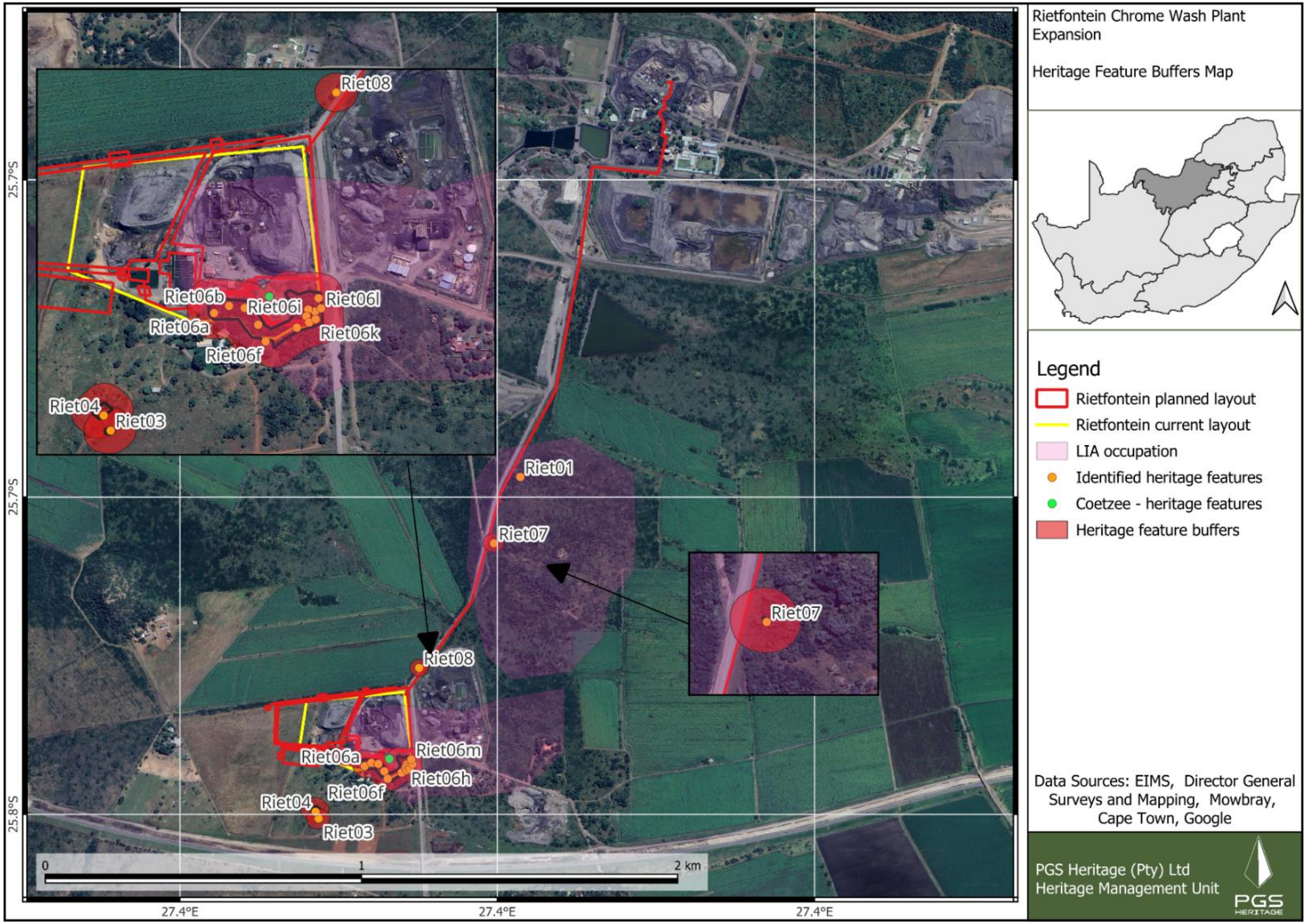


Figure 58: Identified heritage feature buffers.

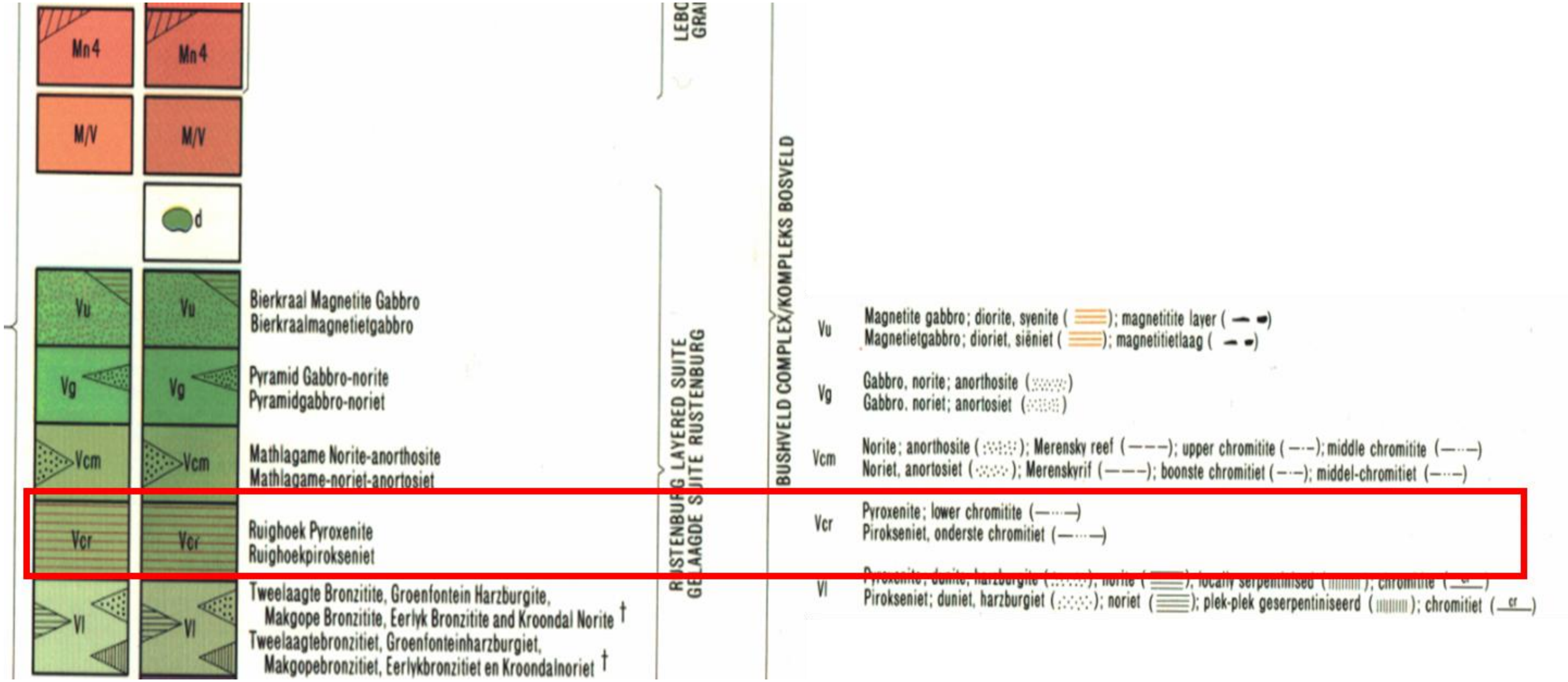
8.3.8.3 PALEONTOLOGICAL SETTING

The study area near Rustenburg, in North-West Province is entirely underlain by Ruighoek Pyroxenite (Vcr, green) of the Rustenburg Layered Suite (Bushveld Complex) (Figure 59

Table 20). 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).

Figure 59: Extract of the 1:250 000 Rustenburg 2526 (1981) Geological Map (Council for Geosciences, Pretoria) indicating that the proposed study area near Rustenburg, in North-West Province is entirely underlain by Ruighoek Pyroxenite of the Rusternburg Layered Suite (Vcr, green) of the Rustenburg Layered Suite (Bushveld Complex).

Table 20: Legend of the 2824 Kimberly (1993) Geological Map (Council for Geosciences, Pretoria).



9 ENVIRONMENTAL IMPACT ASSESSMENT

9.1 IMPACTS IDENTIFIED

This Section presents the impacts that have been identified and assessed for the Environmental Assessment Report. Potential environmental impacts were identified by the EAP, the appointed specialists (where applicable), as well as the preliminary input from the public. The impacts are included in Table 21 below.

When considering cumulative impacts, it is important to bear in mind the scale at which different impacts occur. The identification of impacts is an objective iterative process of considering the project components and activities and how these may interact with the different environmental components. An activity/ environmental component matrix is presented in Table 21 below. The matrix represents which environmental components are likely to be impacted upon by the project activities. Table 22 provides a list of the identified impacts associated with each environmental component.

Table 21: Identification of impacts

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
Existing Infrastructure	Construction and operation of existing infrastructure without prior authorisation	Erosion due to storm water runoff Soil erosion, compaction, land degradation and contamination Impact due to topsoil stripping Surface and groundwater contamination Impact on wetlands and water courses and hydropedology Reduced Groundwater quantity Loss of flow paths Loss of fertility Emissions and dust Climate change impacts Air Quality impacts and dust generation	Loss/ destruction / fragmentation of natural habitat Introduction/ Invasion by Alien Species Displacement of faunal species Impacts on terrestrial and aquatic biodiversity	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

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
Site preparation (Planning)	Vegetation clearance Planned placement of infrastructure	Erosion due to storm water runoff Soil erosion, compaction, land degradation and soil contamination Impact due to topsoil stripping Surface and groundwater contamination Impact on wetlands and water courses and hydropedology Loss of fertility Loss of flow paths Emissions and dust Climate change impacts Air Quality impacts and dust generation	Temporary disturbance of wildlife Loss/ destruction / fragmentation of natural habitat Introduction/ Invasion by Alien Species Impacts terrestrial and aquatic biodiversity	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 (if any)
Human resources management (Planning)	Employment/recruitment I&AP consultations Environmental awareness training			Employment opportunities.	

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
	Integration with Municipalities' strategic long-term planning				
Earthworks (Construction)	Topsoil Stockpile Expansion Construction of PCD Construction of Stormwater Infrastructure Placement of plinths for pipeline and pipeline placement Trucking of materials	Erosion due to storm water runoff Soil erosion, compaction, land degradation and soil contamination Impact due to topsoil stripping Surface and groundwater contamination Impact on wetlands and water courses and hydropedology Loss of fertility Loss of flow paths Emissions and dust Climate change impacts Air Quality impacts and dust generation	Loss/ destruction / fragmentation of natural habitat Introduction/ Invasion by Alien Species Displacement of faunal species Impacts terrestrial and aquatic biodiversity	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
Earthworks (Construction)	Stripping and stockpiling of soils				

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
	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 erosion, compaction, land degradation and soil contamination Impact due to topsoil stripping Surface and groundwater contamination Impact on wetlands and water courses and hydropedology Loss of fertility Loss of flow paths Emissions and dust Climate change impacts Air Quality impacts and dust generation	Loss/ destruction / fragmentation of natural habitat Introduction/ Invasion by Alien Species Displacement of faunal species Impacts terrestrial and aquatic biodiversity	Nuisance and impact on sense of place (i.e. noise, dust, etc.). Safety and security (i.e. access to properties, theft, fire hazards, etc.). Perceptions and expectations Increase in social pathologies Employment opportunities	Disturbance/ destruction of archaeological sites or historic structures Disturbance/ destruction of fossils
Civil Works (Construction)	Establishment of infrastructure and services Mixing of concrete and concrete works				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
	Establishment of dewatering pipelines Sewage and sanitation Establishment of waste area Access control and security General site management	Erosion due to storm water runoff Soil erosion, compaction, land degradation and soil contamination Impact due to topsoil stripping Surface and groundwater contamination Impact on wetlands and water courses and hydropedology Loss of fertility Loss of flow paths Emissions and dust Climate change impacts Air Quality impacts and dust generation	Loss/ destruction of natural habitat Introduction/ Invasion by Alien Species Displacement of faunal species Impacts on birds and bats	Nuisance and impact on sense of place (i.e. noise, dust, etc.). Safety and security (i.e. access to properties, theft, fire hazards, etc.). Perceptions and expectations Employment opportunities Increase in social pathologies	
Beneficiation at the Chrome plant (Operation)	Ore Processing Maintenance and management of stormwater system		Continued fragmentation and degradation of habitats and ecosystems		

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
	Water management	Emissions and dust Emission and dispersion of particulate matter that contains radionuclides Soil erosion, Land degradation Groundwater and surface water quality impacts		Nuisance and impact on sense of place (i.e. noise, dust, etc.). Safety aspects related to radiation and health as well as stability. Employment opportunities	
Closure and Rehabilitation of Plant (Decommissioning and Closure)	Revegetation Slope stabilisation Erosion control	Emissions and dust Emission and dispersion of particulate matter that contains radionuclides Soil erosion, Land degradation Groundwater and surface water quality impacts	Spread of alien and invasive species	Nuisance and impact on sense of place (i.e. noise, dust, etc.). Safety and security (i.e. access to properties, theft, fire hazards, etc.). Employment opportunities	
Maintenance (Post closure)	Initiate maintenance and monitoring programmes	Long-term groundwater quality, air quality impacts	Spread of alien and invasive species	Site security and access control	

Table 22: Impacts Identified and Assessed during the assessment.

Aspect	Impact	Alternative	Phase
Air Quality & Dust Emissions	Increased dust from demolition activities.	Existing and Proposed Infrastructure	Decommissioning
	Continuous dust generation from hauling, tipping, and stockpiling.	Existing and Proposed Infrastructure	Operation
	Gaseous emissions (SO_2, NOx, CO_2) from mine vehicles and processing plants.	Existing and Proposed Infrastructure	Operation
	Dust emissions from land clearing, excavation, and material transport affecting local air quality.	Existing and Proposed Infrastructure	Construction
	Emissions from construction vehicles and equipment contributing to greenhouse gases.	Existing and Proposed Infrastructure	Construction
Biodiversity & Ecological Impacts	Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Existing Infrastructure	Decommissioning
	Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Proposed Infrastructure	Decommissioning
	Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Existing Infrastructure	Operation

Aspect	Impact	Alternative	Phase
	Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.).	Existing Infrastructure	Operation
	Environmental pollution due to water/ mine drainage runoff.	Existing Infrastructure	Operation
	Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Proposed Infrastructure	Operation
	Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.).	Proposed Infrastructure	Operation
	Environmental pollution due to water/ mine drainage runoff.	Proposed Infrastructure	Operation
	Destruction, loss and fragmentation of the vegetation community	Existing Infrastructure	Construction
	Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Existing Infrastructure	Construction
	Introduction of alien species, especially plants	Existing Infrastructure	Construction
	Indirect loss, disturbance and degradation of wetlands	Existing Infrastructure	Construction

Aspect	Impact	Alternative	Phase
	Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	Existing Infrastructure	Construction
	Destruction, loss and fragmentation of the vegetation community	Proposed Infrastructure	Construction
	Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Proposed Infrastructure	Construction
	Introduction of alien species, especially plants	Proposed Infrastructure	Construction
	Indirect loss, disturbance and degradation of wetlands	Proposed Infrastructure	Construction
	Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	Proposed Infrastructure	Construction
	Degradation of wetland vegetation and proliferation of alien and invasive species	Proposed Infrastructure	Decommissioning
Land Restoration & Vegetation Recovery	Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Existing Infrastructure	Rehab and Closure
	Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Proposed Infrastructure	Rehab and Closure

Aspect	Impact	Alternative	Phase
Community Health & Safety	Risk of accidents related to operational activities and transport of hazardous materials.	Existing and Proposed Infrastructure	Operation
Employment & Economic Contributions	Job creation and economic benefits for surrounding communities.	Existing and Proposed Infrastructure	Operation
	Potential skills development and training programs for employees.	Existing and Proposed Infrastructure	Operation
	Temporary job creation and increased demand for local goods and services.	Existing and Proposed Infrastructure	Construction
Groundwater Quality	Impacts on water quality by plant operations (Current and future Waste rock dumps)	Existing and Proposed Infrastructure	Operation
Groundwater Quantity	Impacts on water quantity by abstraction boreholes. (Pumping from pro-duction boreholes)	Existing and Proposed Infrastructure	Operation
Heritage	Historical site disturbed	Existing and Proposed Infrastructure	Construction
	Disturbed suspected graves/unidentified site	Existing and Proposed Infrastructure	Operation

Aspect	Impact	Alternative	Phase
	Undisturbed suspected grave	Existing and Proposed Infrastructure	Decommissioning
	Archaeological site disturbed	Existing and Proposed Infrastructure	Construction
Hydropedology	Erosion due to overland flow	Existing Infrastructure	Construction
	Decrease in subsurface flows and return flows	Existing Infrastructure	Construction
	Erosion due to overland flow	Proposed Infrastructure	Construction
	Decrease in subsurface flows and return flows	Proposed Infrastructure	Construction
	Erosion due to overland flow	Existing Infrastructure	Operation
	Decrease in subsurface flows and return flows	Existing Infrastructure	Operation
	Erosion due to overland flow	Proposed Infrastructure	Operation
	Decrease in subsurface flows and return flows	Proposed Infrastructure	Operation

Aspect	Impact	Alternative	Phase
	Erosion due to overland flow	Existing Infrastructure	Rehab and Closure
	Decrease in subsurface flows and return flows	Existing Infrastructure	Rehab and Closure
	Erosion due to overland flow	Proposed Infrastructure	Rehab and Closure
	Decrease in subsurface flows and return flows	Proposed Infrastructure	Rehab and Closure
Land & Soil Degradation	Continuous stripping of topsoil for opencast mining, leading to ongoing land degradation, including erosion	Existing Infrastructure	Operation
	Continued encroachment by alien and invasive plant species	Existing Infrastructure	Operation
	Continuous stripping of topsoil for beneficiation plant, leading to ongoing land degradation, including erosion	Proposed Infrastructure	Operation
	Continued encroachment by alien and invasive plant species	Proposed Infrastructure	Operation
Soil & Land Disturbance	Clearing of vegetation leading to soil erosion and loss of topsoil.	Existing Infrastructure	Construction
	Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Existing Infrastructure	Construction

Aspect	Impact	Alternative	Phase
	Clearing of vegetation leading to soil erosion and loss of topsoil.	Proposed Infrastructure	Construction
	Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Proposed Infrastructure	Construction
	Increased risk of soil erosion and instability due to removal of infrastructure.	Existing Infrastructure	Decommissioning
	Increased risk of soil erosion and instability due to removal of infrastructure.	Proposed Infrastructure	Decommissioning
Loss of Land Capability	Soil compaction, Soil erosion, Land degradation and Soil contamination	Existing Infrastructure	Construction
	Soil compaction, Soil erosion, Land degradation and Soil contamination	Existing Infrastructure	Construction
	Soil compaction, Soil erosion, Land degradation and Soil contamination	Existing Infrastructure	Decommissioning
	Soil compaction, Soil erosion, Land degradation and Soil contamination	Proposed Infrastructure	Decommissioning
	Soil compaction, Soil erosion, Land degradation and Soil contamination	Existing Infrastructure	Operation
	Soil compaction, Soil erosion, Land degradation and Soil contamination	Proposed Infrastructure	Operation

Aspect	Impact	Alternative	Phase
	Soil compaction, Soil erosion, Land degradation and Soil contamination	Existing Infrastructure	Rehab and Closure
	Soil compaction, Soil erosion, Land degradation and Soil contamination	Proposed Infrastructure	Rehab and Closure
Noise & Vibration	Continuous low-frequency noise affecting local settlements and livestock.	Existing and Proposed Infrastructure	Operation
	Increased noise and vibrations from earth-moving equipment affecting nearby communities and wildlife.	Existing and Proposed Infrastructure	Construction
Palaeontology	Loss of fossil Heritage	Existing and Proposed Infrastructure	Construction
	Loss of fossil Heritage	Existing and Proposed Infrastructure	Decommissioning
	Loss of fossil Heritage	Existing and Proposed Infrastructure	Operation
	Loss of fossil Heritage	Existing and Proposed Infrastructure	Planning

Aspect	Impact	Alternative	Phase
Water Resources & Drainage	Increased bare surfaces, runoff and potential for erosion	Existing Infrastructure	Construction
	Increased sediment loads to downstream reaches	Existing Infrastructure	Construction
	Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste.	Existing Infrastructure	Construction
	Alteration of hydrological regime	Existing Infrastructure	Construction
	Increased bare surfaces, runoff and potential for erosion	Proposed Infrastructure	Construction
	Increased sediment loads to downstream reaches	Proposed Infrastructure	Construction
	Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste.	Proposed Infrastructure	Construction
	Alteration of hydrological regime	Proposed Infrastructure	Construction
	Disruption of wetland soil profile, hydrological regime and increased sediment loads	Proposed Infrastructure	Decommissioning
	Increased water inputs (clean) to downstream wetlands	Existing Infrastructure	Operation

Aspect	Impact	Alternative	Phase
	Increased water inputs (clean) to downstream wetlands	Proposed Infrastructure	Operation

9.2 IMPACT ASSESSMENT METHODOLOGY

The impact significance rating methodology, as provided by EIMS, 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 environmental risk (ER) by considering the consequence I of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. 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 ER to determine the overall significance (S). The impact assessment will be applied to all identified alternatives. Where possible, mitigation measures will be recommended for impacts identified.

The impact assessment matrix (including pre- and post-mitigation assessment) is included in Appendix E. The potential cumulative impacts have been identified, evaluated, and mitigation measures suggested and have been updated during the investigation.

9.2.1 DETERMINATION OF ENVIRONMENTAL RISK

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence I of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent I, Duration (D), Magnitude (M), and reversibility I applicable to the specific impact.

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

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

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 23 below.

Table 23: 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
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),
	4	Regional (i.e. extends between 5 and 50 km from the site
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),
	4	Long term (the impact will cease after the operational life span of the project),

Aspect	Score	Definition
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).
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),
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 24.

Table 24: Probability Scoring.

Probability	1	Improbable (Rare, the event may occur only in exceptional circumstances, the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <5% chance).
	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 ER associated with the impact. ER is therefore calculated as follows:

ER= C x P

Table 25: Determination of Environmental Risk.

Consequence	5- Very High	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
	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 environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 26.

Table 26: Significance Classes.

Risk Score	Description
< 10	Low (i.e. where this impact is unlikely to be a significant environmental risk).
≥ 10; < 20	Medium (i.e. where the impact could have a significant environmental risk),
≥ 20	High (i.e. where the impact will have a significant environmental risk).

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

9.2.2 IMPACT PRIORITISATION

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

1. Cumulative impacts; and
2. 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 impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk 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 ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 27: 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 27. The impact priority is therefore determined as follows:

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 28).

Table 28: Determination of Prioritisation Factor.

Priority	Ranking	Prioritisation Factor
2	Low	1

Priority	Ranking	Prioritisation Factor
3	Medium	1.125
4	Medium	1.25
5	Medium	1.375
6	High	1.5

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a 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 high significance).

Table 29: Environmental Significance Rating.

Value	Description
< -10	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ -10 < -20	Medium negative (i.e. where the impact could influence the decision to develop in the area).
≥ -20	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
0	No impact
< 10	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ 10 < 20	Medium positive (i.e. where the impact could influence the decision to develop in the area).
≥ 20	High positive (i.e. where the impact must have an influence on the decision process to develop in the area).

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.

9.3 DESCRIPTION AND ASSESSMENT OF IMPACTS

This section describes each identified environmental impact in the context of the activity and associated aspect and provides mitigation measures to be implemented which justify why specific ranking/ rating of the component attributes of the impact assessment are given.

9.3.1 AIR QUALITY

The significance of environmental air quality impacts for proposed activities was assessed according to the EIMS impact assessment methodology.

The objective of this study was to provide an assessment of all current and future activities at the RCM plant. The impact of construction, operational and decommissioning activities, based on qualitative and modelled air quality impacts, are provided in Table 30.

The significance of the project can thus be summarized as follows:

- Air quality as a result from dust generation activities and gaseous emissions from vehicles and equipment during the construction phase, with no mitigation in place would result in Medium to High negative impacts, but with mitigation it can reduce to Medium to Low negative impacts.
- Air quality as a result from dust generation activities (i.e. hauling, tipping, and stockpiling) and gaseous emissions from vehicles and equipment during the operational phase, with no mitigation in place would result in Medium to High negative impacts, but with mitigation it can reduce to Medium to Low negative rating.
- Air quality as a result from dust generation activities during the decommissioning phase, with no mitigation in place would result in Medium to Low negative impacts, and an even lower Medium to Low negative rating with mitigation in place.

Table 30: Air Quality Impacts and Mitigation Measure

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Increased dust from demolition activities.	Decommissioning	Medium to low -	Medium to low -	Medium to low -
Mitigation Measures				
• Regular water sprays on unpaved roads to ensure at least 75% control efficiency. Literature indicates an application rate >2 litre/m²/hour should achieve this; • Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces; • Drop height into haul trucks to be kept at a minimum for ore and product; • Tipping onto ROM and product storage piles to be controlled through water sprays. This should result in a 50% control efficiency; • Keep material handled by frontend loaders moist to achieve a control efficiency of 50%, especially during dry periods;				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Regular clean-up at loading areas; • Water sprays at ROM stockpiles can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds; • Wind screens around the stockpile areas could achieve a further 30% control efficiency. • Reshape all disturbed areas to their natural contours; and • Cover disturbed areas with previously collected topsoil and replant native species.				
Continuous dust generation from hauling, tipping, and stockpiling.	Operation	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• Regular water sprays on unpaved roads to ensure at least 75% control efficiency. Literature indicates an application rate >2 litre/m^2/hour should achieve this; • Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces; • Drop height into haul trucks to be kept at a minimum for ore and product; • Tipping onto ROM and product storage piles to be controlled through water sprays. This should result in a 50% control efficiency; • Keep material handled by frontend loaders moist to achieve a control efficiency of 50%, especially during dry periods; • Regular clean-up at loading areas; • Water sprays at ROM stockpiles can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds; • Wind screens around the stockpile areas could achieve a further 30% control efficiency. • Reshape all disturbed areas to their natural contours; and • Cover disturbed areas with previously collected topsoil and replant native species.				
Gaseous emissions (SO_2, NOx, CO_2) from mine vehicles and processing plants.	Operation	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Regular water sprays on unpaved roads to ensure at least 75% control efficiency. Literature indicates an application rate >2 litre/m²/hour should achieve this; • Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces; • Drop height into haul trucks to be kept at a minimum for ore and product; • Tipping onto ROM and product storage piles to be controlled through water sprays. This should result in a 50% control efficiency; • Keep material handled by frontend loaders moist to achieve a control efficiency of 50%, especially during dry periods; • Regular clean-up at loading areas; • Water sprays at ROM stockpiles can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds; • Wind screens around the stockpile areas could achieve a further 30% control efficiency. • Reshape all disturbed areas to their natural contours; and • Cover disturbed areas with previously collected topsoil and replant native species.				
Dust emissions from land clearing, excavation, and material transport affecting local air quality.	Construction	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• Regular water sprays on unpaved roads to ensure at least 75% control efficiency. Literature indicates an application rate >2 litre/m²/hour should achieve this; • Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces; • Drop height into haul trucks to be kept at a minimum for ore and product; • Tipping onto ROM and product storage piles to be controlled through water sprays. This should result in a 50% control efficiency; • Keep material handled by frontend loaders moist to achieve a control efficiency of 50%, especially during dry periods; • Regular clean-up at loading areas;				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Water sprays at ROM stockpiles can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds; • Wind screens around the stockpile areas could achieve a further 30% control efficiency. • Reshape all disturbed areas to their natural contours; and • Cover disturbed areas with previously collected topsoil and replant native species.				
Emissions from construction vehicles and equipment contributing to greenhouse gases.	Construction	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• Regular water sprays on unpaved roads to ensure at least 75% control efficiency. Literature indicates an application rate >2 litre/m²/hour should achieve this; • Monthly physical inspection of road surface, daily visual observation of entrained dust emissions from unpaved road surfaces; • Drop height into haul trucks to be kept at a minimum for ore and product; • Tipping onto ROM and product storage piles to be controlled through water sprays. This should result in a 50% control efficiency; • Keep material handled by frontend loaders moist to achieve a control efficiency of 50%, especially during dry periods; • Regular clean-up at loading areas; • Water sprays at ROM stockpiles can achieve 50% control efficiency. Increase in moisture content provides higher threshold friction velocity and ensures that particulates are not as easily entrained due to high surface winds; • Wind screens around the stockpile areas could achieve a further 30% control efficiency. • Reshape all disturbed areas to their natural contours; and • Cover disturbed areas with previously collected topsoil and replant native species.				

9.3.1 NOISE

The impact significance of the project is provided below and follows the method provided by EIMS and is presented in Appendix E and the Noise Assessment in Appendix D. The project is expected to have the following significance rating:

- Construction Phase:
  - Without mitigation: medium to low negative significance rating.

- With Mitigation: low negative significance rating.

- Operation Phase:

  - Without mitigation: medium to low negative significance rating. o With Mitigation: medium to low negative significance rating.

  - Decommissioning Phase: significance rating will be similar to the construction phase.

A summary of the impact significance and the associated mitigation measures is provided in Table 31.

Table 31: Description and assessment of Noise Impacts

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Continuous low-frequency noise affecting local settlements and livestock.	Operation	Medium to low -	Medium to low -	Medium to low -
Mitigation Measures				
• Avoid clustering of mobile plant near receptors and enforce rest periods for unavoidable maximum noise events; • Investigate use of alternatives to audible reversing alarms (such as broadband noise emitting models) or configure to maximise forward movements of mobile plant; • Regular inspection and maintenance of all equipment is to be established; • Avoid unnecessary equipment idling; o Limit activities to day-time working hours (6am – 6pm); • Establish community engagement and ensure all affected persons have been consulted with prior to the commencement of and during activities.				
Increased noise and vibrations from earth-moving equipment affecting nearby communities and wildlife.	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• Train operational staff on noise control plan during health & safety briefings; o Regular inspection and maintenance of all equipment. • Noise berms. • Avoid clustering of noisy equipment near sensitive receptors. • A noise complaints register must be kept. • If complaints are received, noise sampling • should be undertaken at the NSRs and source of noise should be investigated.				

9.3.2 GEOHYDROLOGY

This section will discuss the impacts identified and assessed in terms of geohydrology for the site operations. The most prominent inclusion relates to the implementation of an appropriate monitoring plan as out line in the geohydrology assessment (Appendix D). The impacts identified and the description of the relevant mitigation measures and related significance are provided in Table 32.

Table 32: Description and assessment of Groundwater Impacts

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Impacts on water quality by plant operations (Current and future Waste rock dumps)	Operation	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• Currently there are no groundwater monitor-ing boreholes at the Rietfontein Chrome Plant. Geophysical surveys need to be con-ducted on site and around the facility to determine the placement of monitoring bore-holes in an upgradient position, on-site and down gradient position of the stockpiles, pollution control dam and plant. • Monitoring of abstraction boreholes water quality to ensure water quality is to standard required by plant. • Stormwater management infrastructure through a lined PCD dam will be in place to mitigate the risk to groundwater.				
Impacts on water quantity by abstraction boreholes. (Pumping from pro-duction boreholes)	Operation	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• 48–72-hour aquifer testing of the three boreholes (RP01, RP02 and RP03) to deter-mine a sustainable yield for the aquifer and the effect on each other. • Monitoring of abstraction volumes and monitoring boreholes water levels to ensure abstraction rates are sustainable and man-aged. • Stormwater management infrastructure through a lined PCD dam will be in place to mitigate the risk to groundwater.				

9.3.3 HERITAGE

Impacts related to heritage were assessed using the EIMS impact assessment methodology. The ffull impact assessment is presented in Appendix D and Appendix E. Table 33 indicates a summarised interpretation of the impacts assessed and their relevant mitigation measures and how the mitigation measures will serve to lower the impact to acceptable levels during the project. The impacts presented in Table 33 represent both the existing and proposed impacts.

Table 33: Description and assessment of heritage Impacts

<table>
<tr><th>Impact</th><th>Phase</th><th>Pre-Mitigation Significance</th><th>Post-Mitigation Significance</th><th>Final Significance</th></tr>
<tr><td>Historical site disturbed (Riet07)</td><td>Construction</td><td>High -</td><td>Low -</td><td>Low -</td></tr>
<tr><td colspan="5">Mitigation Measures</td></tr>
<tr><td colspan="5">Additionally, newly identified Riet07 must be protected by a minimum buffer of 5 m ensured with temporary fencing during construction. Additionally, archaeological monitoring must be ensured during constructional activities 10m away from the site.
The potential for burials at Riet07 cannot be overlooked, should burials be discovered through any type of excavation, a 30 m buffer is suggested in place of the minimum 5m buffer currently suggested. All BGG must be retained and avoided with a buffer zone of 30 m as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of section 36 of the NHRA and its regulations as well as the National Health Act (Act 12 of 2013) and its regulations.</td></tr>
<tr><td>Disturbed suspected graves/unidentified site (SG01/SG02/SG03/SG04/SG06/US01)</td><td>Operation</td><td>High -</td><td>Low -</td><td>Low -</td></tr>
<tr><td colspan="5">Mitigation Measures</td></tr>
<tr><td colspan="5">Previous mitigation measures of sites SG01-SG06 and US01 (Coetzee 2014) included:
Damage to Heritage site would constitute a wilful act and the perpetrator(s) could face criminal prosecution
The Heritage Sites will be clearly demarcated.
A buffer zone of at least 50 metres will be maintained between the Plant Operation and Heritage site.
Prohibiting access to and any form of interference with the Heritage sites by unauthorised persons.
All relevant Clover Alloys personnel and contractor personnel will be properly briefed on the locations of the sites and the importance of avoiding damage to them.
Heritage site could become a tourist attraction in conjunction with the North West Government Tourist Department.
PGS is in agreement with the original recommendations. However, current non-compliance has led to the situation where it has already been destroyed/damaged with only potentially site SG05 remaining. Therefore, PGS newly proposes a Phase 2 mitigation, which includes excavations at SG01, SG02, SG03, SG 04, SG 06 and US01, site layout drawings, photographic records and a mitigation report along with SAHRA permits must be completed in a rescue effort for the site before construction may begin for the Chrome Wash Plant Expansion. It should be noted that the Phase 2 mitigation will not include SG05 as it possibly remains undisturbed. Instead a 30 m buffer is suggested. All BGG must be retained and avoided with a buffer zone of 30 m as per SAHRA</td></tr>
</table>

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
guidelines. Should that not be feasible, the grave if confirmed could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of section 36 of the NHRA and its regulations as well as the National Health Act (Act 12 of 2013) and its regulations.				
Undisturbed suspected grave (SG05)	Decommissioning	High -	Low -	Low -
Mitigation Measures				
Previous mitigation measures of sites SG01-SG06 and US01 (Coetzee 2014) included: • Damage to Heritage site would constitute a wilful act and the perpetrator(s) could face criminal prosecution • The Heritage Sites will be clearly demarcated. • A buffer zone of at least 50 metres will be maintained between the Plant Operation and Heritage site. • Prohibiting access to and any form of interference with the Heritage sites by unauthorised persons. • All relevant Clover Alloys personnel and contractor personnel will be properly briefed on the locations of the sites and the importance of avoiding damage to them. • Heritage site could become a tourist attraction in conjunction with the North West Government Tourist Department. PGS is in agreement with the original recommendations. However, current non-compliance has led to the situation where it has already been destroyed/damaged with only potentially site SG05 remaining. Therefore, PGS newly proposes a Phase 2 mitigation, which includes excavations at SG01, SG02, SG03, SG 04, SG 06 and US01, site layout drawings, photographic records and a mitigation report along with SAHRA permits must be completed in a rescue effort for the site before construction may begin for the Chrome Wash Plant Expansion. It should be noted that the Phase 2 mitigation will not include SG05 as it possibly remains undisturbed. Instead a 30 m buffer is suggested. All BGG must be retained and avoided with a buffer zone of 30 m as per SAHRA guidelines. Should that not be feasible, the grave if confirmed could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of section 36 of the NHRA and its regulations as well as the National Health Act (Act 12 of 2013) and its regulations.				
Archaeological site disturbed (Site 1/Riet06a-m and Riet03)	Construction	High -	Low -	Low -
Mitigation Measures				
Previous mitigation measures of Site 1 (Coetzee 2008) included: • The settlement should be surveyed and mapped.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance

- Apply for a permit from the SAHRA for the construction of a training/educational centre on the site.
- Conservation management plan must be compiled for the site.

PGS is in agreement with the original recommendations. However, current non-compliance has led to the situation where it has already been destroyed./damaged with a section of the site remaining. Therefore, PGS newly proposes a Phase 2 mitigation, which includes excavations at Site 1/Riet06a-m and Riet03, site layout drawings, photographic records and a mitigation report along with SAHRA permits must be completed in a rescue effort for the site before construction may begin for the Chrome Wash Plant Expansion. It should be noted that the Phase 2 mitigation will include not just the affected Site 1/Riet06a-m and Riet03, but also the identified larger Iron Age complex identified through aerial photography to understand the occupation of the site as a whole.

The potential for burials at Site 1/Riet06a-m cannot be overlooked, should burials be discovered a 30 m buffer is indicated. All BGG should be retained and avoided with a buffer zone of 30 m as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of section 36 of the NHRA and its regulations as well as the National Health Act (Act 12 of 2013) and its regulations.

9.3.4 PALAEONTOLOGY

The excavations and clearing of vegetation during the construction phase will consist of digging into the superficial sediment cover as well as underlying deeper bedrock. These excavations will change the existing topography and may possibly destroy or even permanently close-in fossils at or below the ground surface. These fossils will then be lost for research. The overall palaeontological impact of both existing and proposed infrastructure was observed to be low, Table 34 describes the significance of impacts and proposed mitigation measures.

Table 34: Paleontological impact assessment and mitigation

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Loss of fossil Heritage	Construction	Low -	Low -	Low -
Mitigation Measures				

- 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 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

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012).				

9.3.5 TERRESTRIAL BIODIVERSITY

Table 35 shows a summary of the significance of potential impacts associated with the proposed infrastructure on biodiversity before and after the implementation of mitigation measures, as well as cumulative and irreplaceable loss. The full impact assessment can be seen presented in Appendix D.

Table 36 shows the significance of potential impacts associated with the existing infrastructure on biodiversity before and after the implementation of mitigation measures, as well as cumulative and irreplaceable loss. The impacts associated with the proposed new infrastructure is presented in Table 36. The precautionary principal has been applied here as an impact assessment was not performed prior to the unlawful vegetation clearing and the site has already undergone impacts associated with the construction phase and the plant is currently in operation.

Table 35: Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the proposed infrastructure

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Destruction, loss and fragmentation of the vegetation community	Construction	High -	Medium to high -	Medium to high -
Mitigation Measures				
• The clearing of vegetation must be minimised where possible. All activities must be restricted to within the authorised areas. • 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, should under no circumstances be fragmented or disturbed further. • 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. • Offsets may be required for the CBA 2 areas, and at the required ratio for the EN ecosystem, pending discussions with the provincial authorities. Offsets are at the discretion of the department. • A habitat rehabilitation plan must be compiled and implemented for all areas that must be rehabilitated back to Thornveld. • Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• 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. • A dust management plan must be compiled and implemented.				
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	Medium to high -	Medium to high -	Medium to high -
Mitigation Measures				
• Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and 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 amphibian species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense. • 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. • 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.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
- A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion. - 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. - 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 where relevant. - Only existing access routes and walking paths may be made use of.				
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
- 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 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. - 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.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• 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.				
Introduction of alien species, especially plants	Construction	Medium to high -	Low -	Low -
Mitigation Measures				
• An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition. • 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. • 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. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.				
Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Operational	Medium to high -	Medium to low -	Medium to high -
• **Mitigation Measures**				
• Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals. • 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. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces. • 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.				
Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.).	Operational	Medium to high -	Medium to low -	Medium to low -

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Mitigation Measures				
• No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense. • 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. • Waste management must be a priority, and a Solid Waste Management Plan must be developed and implemented. All waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility. • Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and controlled according to the waste management plan.				
Environmental pollution due to water/ mine drainage runoff.	Operational	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• A stormwater management plan must be compiled and implemented. • A pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes. Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water sources.				
Continuous stripping of topsoil for beneficiation plant, leading to ongoing land degradation, including erosion	Operational	Medium to high -	Medium to high -	Medium to high -
Mitigation Measures				
• A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion. • 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. • 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 where relevant.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• **Continued encroachment by alien and invasive plant species**	Operational	High -	Low -	Low -
Mitigation Measures				
• An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual change in AIP composition. • 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. • 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.				
Increased risk of soil erosion and instability due to removal of infrastructure.	Decommissioning	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion. • 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. • 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 where relevant.				
Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Decommissioning	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals. • 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. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces. • A dust management plan must be compiled and implemented.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• 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. • An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition. • A habitat rehabilitation plan must be compiled and implemented for all areas that must be rehabilitated back to Thornveld.				

Table 36: Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the existing infrastructure

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Destruction, loss and fragmentation of the vegetation community	Construction	High -	Medium to high -	Medium to high -
Mitigation Measures				
• Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. • Offsets may be required for the CBA 2 areas, and at the required ratio for the EN ecosystem, pending discussions with the provincial authorities. Offsets are at the discretion of the department. • A habitat rehabilitation plan must be compiled and implemented for all areas that must be rehabilitated back to Thornveld. • Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation. • A dust management plan must be compiled and implemented.				
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	Medium to high -	Medium to high -	Medium to high -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• 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 amphibian species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense. • 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. • 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.				
Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	High -	Medium to low -	Medium to high -
Mitigation Measures				
• 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. • A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion. • 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 where relevant. • Only existing access routes and walking paths may be made use of.				
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• 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 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. • 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. • 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.				
Introduction of alien species, especially plants	Construction	Medium to high -	Low -	Low -
Mitigation Measures				
• An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition. • 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. • 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. • Assess the state of rehabilitation and encroachment of alien vegetation quarterly for up to two years after the closure.				
Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Operational	Medium to high -	Medium to low -	Medium to high -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals. • 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. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces. • A dust management plan must be compiled and implemented.				
Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.)	Operational	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• 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. • No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense. • Waste management must be a priority and a Solid Waste Management Plan must be developed and implemented. All waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility. • Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and controlled according to the waste management plan. • 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.				
Environmental pollution due to water/ mine drainage runoff.	Operational	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• A stormwater management plan must be compiled and implemented. • A pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes. Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water sources.				

<table>
<tr><th>Impact</th><th>Phase</th><th>Pre-Mitigation Significance</th><th>Post-Mitigation Significance</th><th>Final Significance</th></tr>
<tr><td>Continuous stripping of topsoil for opencast mining, leading to ongoing land degradation, including erosion</td><td>Operational</td><td>Medium to high -</td><td>Medium to high -</td><td>Medium to high -</td></tr>
<tr><td colspan="5">Mitigation Measures</td></tr>
<tr><td colspan="5">
A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
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.
Only existing access routes and walking paths may be made use of.
</td></tr>
<tr><td>Continued encroachment by alien and invasive plant species</td><td>Operational</td><td>High -</td><td>Low -</td><td>Low -</td></tr>
<tr><td colspan="5">Mitigation Measures</td></tr>
<tr><td colspan="5">
An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.
Assess the state of rehabilitation and encroachment of alien vegetation twice a year.
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.
</td></tr>
<tr><td>Increased risk of soil erosion and instability due to removal of infrastructure.</td><td>Decommissioning</td><td>Medium to high -</td><td>Medium to low -</td><td>Medium to low -</td></tr>
<tr><td colspan="5">Mitigation Measures</td></tr>
<tr><td colspan="5">
Habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
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.
</td></tr>
<tr><td>Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.</td><td>Decommissioning</td><td>Medium to low -</td><td>Low -</td><td>Medium to low -</td></tr>
<tr><td colspan="5">Mitigation Measures</td></tr>
</table>

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals. • 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. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces. • A dust management plan must be compiled and implemented.				
Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• 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. • Assess the state of rehabilitation and encroachment of alien vegetation quarterly for up to two years after the closure. • An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.				

9.3.6 WETLANDS

The development of the project will result in the modification of watercourse habitats where infrastructure traverses or is placed inside of the wetland. The clearing of topsoil and vegetation will be required for the installation and placement of infrastructure. 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 provide by the affected systems. 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. 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.

The impacts associated with the proposed activities, was assessed in the impact matrix provided by EIMS and the results are given in Table 37. The impact assessments presented herein considers the proposed activities and the retrospective impacts for the existing infrastructure. The results obtained indicate that the retrospective impacts for the construction and operational phases were of low consequence and significance. The mitigation measures proposed for retrospective assessment are primarily aimed at the continuation of operations, as the activities have already commenced and it is not possible to fully mitigate against impacts that have already occurred.

Table 37: Summative results of the Impact Assessment conducted for the proposed project

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Indirect loss, disturbance and degradation of wetlands	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• Minimise the construction footprint and restrict vegetation clearing to the designated construction area. • Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation. • Limit vehicle and machinery movement near the wetland to designated routes. • Limit all other activities in watercourse areas to those explicitly authorised. • Install the pipeline above ground when crossing the watercourse, ensuring supports span the entire width wherever feasible.				
Increased bare surfaces, runoff and potential for erosion	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Maintain access roads to prevent erosion and sedimentation. • If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion. • Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.				
Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Monitor and manage invasive species in disturbed areas. • Minimise the construction footprint and restrict vegetation clearing to the designated construction area. Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.				
Increased sediment loads to downstream reaches	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Maintain access roads to prevent erosion and sedimentation. • If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.				
Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Prohibit mixing of chemicals or concrete within the watercourse. Store all fuels and chemical mixtures in a bunded area, away from the watercourse. • Regularly inspect and maintain bunded areas around fuel, chemical, and waste storage. • Ensure all solid and hazardous waste is stored in designated, impermeable areas and regularly removed to licensed facilities. • Prevent any waste dumping or littering near the wetland. • Ensure all dirty water reports to a PCD (Pollution Control Dam). • Develop and implement emergency response protocols for potential pipeline leaks.				
Alteration of hydrological regime	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• Install the pipeline above ground when crossing the watercourse, ensuring supports span the entire width wherever feasible. • Limit all other activities in watercourse areas to those explicitly authorised.				
Increased water inputs (clean) to downstream wetlands	Operation	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge. • Perform regular maintenance and inspections of the pipeline to ensure its integrity and prevent increased volumes of water (with potential contaminates) from entering the watercourse. • Develop and implement emergency response protocols for potential pipeline leaks.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Degradation of wetland vegetation and proliferation of alien and invasive species	Decommissioning	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Monitor and manage invasive species in disturbed areas. • Minimise the construction footprint and restrict vegetation clearing to the designated construction area. Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.				
Disruption of wetland soil profile, hydrological regime and increased sediment loads	Decommissioning	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion. • Limit vehicle and machinery movement near the wetland to designated routes. • Maintain access roads to prevent erosion and sedimentation.				

Table 38: Summative results of the Impact Assessment conducted for the existing impacts

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Indirect loss, disturbance and degradation of wetlands	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation. • Limit vehicle and machinery movement near the wetland to designated routes. • Limit all other activities in watercourse areas to those explicitly authorised.				
Increased bare surfaces, runoff and potential for erosion	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Maintain access roads to prevent erosion and sedimentation.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge. • Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.				
Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Monitor and manage invasive species in disturbed areas. • Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.				
Increased sediment loads to downstream reaches	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Maintain access roads to prevent erosion and sedimentation. • Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.				
Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste	Construction	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Regularly inspect and maintain bunded areas around fuel, chemical, and waste storage. • Ensure all solid and hazardous waste is stored in designated, impermeable areas and regularly removed to licensed facilities. • Prevent any waste dumping or littering near the wetland. • Ensure all dirty water reports to a PCD (Pollution Control Dam).				
Alteration of hydrological regime	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• Limit all other activities in watercourse areas to those explicitly authorised. • Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Increased water inputs (clean) to downstream wetlands	Operation	Medium to low -	Low -	Medium to low -
Mitigation Measures				
• Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.				

9.3.7 SOILS AND AGRICULTURE

In accordance with the requirements for Environmental Authorisation rectification as per NEMA Section 24G, a retrospective assessment must take place to determine the potential state of the environment prior to development taking place as well as the likely impacts that the development has had on the area. The following list provides the identified retrospective impacts which contributed to the loss of land capability:

Soil erosion: Bare soil surfaces within the proposed project area and along the 2 stockpiles contributed to increased susceptibility to wind and water erosion, leading to loss of topsoil.

Soil compaction from vehicle traffic: The movement and operation of vehicles within the project footprint resulted in increased soil compaction, which negatively affected soil structure and permeability.

Soil contamination: Surface flow from dirty water channels, spillages from the chrome wash plant led to soil contamination, impacting soil health and productivity, and

Soil compaction and degradation from the existing stockpiles: The presence of existing stockpiles caused further soil compaction and land degradation, disturbing soil structure and reducing overall soil quality.

The following table provides the framework for the prospective impacts, albeit limited, for the proposed project (Table 39). Table 40 presents the anticipated impacts for the existing infrastructure.

Table 39: Summative results of the Impact Assessment conducted for the proposed project

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil compaction, Soil erosion, Land degradation and Soil contamination	Constructio n	Medium to low -	Low -	Low -
Mitigation Measures				
• Avoidance of all high agricultural production land and other actively cultivated areas, where avoidance is not feasible stakeholder engagement should occur to compensate affected landowners; • Minimise project footprint as far as possible. Manage location of topsoil stripping stockpiling, demarcation of topsoil stockpiles and prevention of stockpile erosion and contamination. This can protect the topsoil stockpiles to keep it viable for rehabilitation purposes. • Make use of existing roads or upgrades tracks before new roads are constructed. The number and width of internal access routes must be kept to a minimum. Usually, areas with sandy soils are				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
avoided as far as possible for heavy vehicles, areas dominated with sandy soils, dust suppressions methods should be implemented to reduce wind erosion during this phase; • Implementation of embedded controls such as geotextiles, gabion baskets can effective control soil erosion on-site; • Associated infrastructure foundations must be (preferably) located in already disturbed areas where possible; • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. • Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds. • No non-environmentally friendly suppressants may be used as this could result in pollution of water sources. • A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures; • Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and • An alien invasive plant species and control programme must be implemented from the onset of the project.				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. • No non-environmentally friendly suppressants or cleaning agents may be used as this could result in pollution of water sources. • A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures; • Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and • An alien invasive plant species and control programme must be implemented from the onset of the project.				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Decommissioning	Low -	Low -	Medium to low -
Mitigation Measures				
• Install erosion and sediment control measures (silt fences, sediment basins, straw bales).				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Remove infrastructure, like racking, inverters, and electrical infrastructure. Remove all above-ground and below-ground cabling, foundations, and concrete pads. • Remove hazardous materials (batteries, oils, chemicals) for proper disposal. • Remove all construction debris and waste from the site. • Decompact soils in areas affected by heavy machinery (use subsoiling or deep ripping). • Replace and evenly spread any stockpiled topsoil. • Reseed or replant with native or pre-existing vegetation suited to the soil capability. • Maintain erosion and sediment controls until vegetation is re-established • Conduct post-restoration soil assessments (compaction, fertility, structure). • Document and report restoration outcomes to relevant authorities.				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Rehab and Closure	Low -	Low -	Low -
Mitigation Measure				
• Install erosion and sediment control measures (silt fences, sediment basins, straw bales). • Remove all construction debris and waste from the site. • Loosen soils in areas affected by heavy machinery (use subsoiling or deep ripping). • Replace and evenly spread any stockpiled topsoil. • Reseed or replant with native or pre-existing vegetation suited to the soil capability. • Maintain erosion and sediment controls until vegetation is re-established • Conduct post-restoration soil assessments (compaction, fertility, structure). • Document and report restoration outcomes to relevant authorities. • Conduct a final site inspection with stakeholders and authorities.				

Table 40: Summative results of the Impact Assessment conducted for the existing project

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil compaction, Soil erosion, Land degradation and Soil contamination	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• Avoidance of all high agricultural production land and other actively cultivated areas, where avoidance is not feasible stakeholder engagement should occur to compensate affected landowners;				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Minimise project footprint as far as possible. Manage location of topsoil stripping stockpiling, demarcation of topsoil stockpiles and prevention of stockpile erosion and contamination. This can protect the topsoil stockpiles to keep it viable for rehabilitation purposes. • Make use of existing roads or upgrades tracks before new roads are constructed. The number and width of internal access routes must be kept to a minimum. Usually, areas with sandy soils are avoided as far as possible for heavy vehicles, areas dominated with sandy soils, dust suppressions methods should be implemented to reduce wind erosion during this phase; • Implementation of embedded controls such as geotextiles, gabion baskets can effective control soil erosion on-site; • Associated infrastructure foundations must be (preferably) located in already disturbed areas where possible; • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. • Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds. • No non-environmentally friendly suppressants may be used as this could result in pollution of water sources. • Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and • An alien invasive plant species and control programme must be implemented from the onset of the project.				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. • No non-environmentally friendly suppressants or cleaning agents may be used as this could result in pollution of water sources. • Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and • An alien invasive plant species and control programme must be implemented from the onset of the project.				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Decommissioning	Low -	Low -	Medium to low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Install erosion and sediment control measures (silt fences, sediment basins, straw bales). • Remove infrastructure, like racking, inverters, and electrical infrastructure. Remove all above-ground and below-ground cabling, foundations, and concrete pads. • Remove hazardous materials (batteries, oils, chemicals) for proper disposal. • Remove all construction debris and waste from the site. • Loosen compacted soils in areas affected by heavy machinery (use subsoiling or deep ripping). • Replace and evenly spread any stockpiled topsoil. • Reseed or replant with native or pre-existing vegetation suited to the soil capability. • Maintain erosion and sediment controls until vegetation is re-established • Conduct post-restoration soil assessments (compaction, fertility, structure). • Document and report restoration outcomes to relevant authorities.				
Soil compaction, Soil erosion, Land degradation and Soil contamination	Rehab and Closure	Low -	Low -	Low -
Mitigation Measure				
• Install erosion and sediment control measures (silt fences, sediment basins, straw bales). • Remove all construction debris and waste from the site. • Loosen soils in areas compacted by heavy machinery (use subsoiling or deep ripping). • Replace and evenly spread any stockpiled topsoil. • Reseed or replant with native or pre-existing vegetation suited to the soil capability. • Maintain erosion and sediment controls until vegetation is re-established • Conduct post-restoration soil assessments (compaction, fertility, structure). • Document and report restoration outcomes to relevant authorities. • Conduct a final site inspection with stakeholders and authorities.				

9.3.8 HYDROPEDOLOGY

The expected impacts on the catchment water regimes were assessed following the EIMS (2025) impact matrix methodology. The following existing infrastructure includes, expansion of one of the existing stockpile areas, construction of dirty water channels and culverts, installation of a clean water channel and Pollution Control Dam (PCD). 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. These effects are manageable as the post mitigation for the existing infrastructure has been scored low and low to medium post mitigation for the proposed infrastructure.

The phase will include closure and ceasing of the processing plant, stockpiles and associated infrastructure processing activities. Some of the infrastructure will be removed from the site for decommissioning, this will be done with specialist on the site. Increased traffic will occur on-site, though the effects are expected to be minimal and manageable and mitigation measures will already be implemented. These effects are manageable as the post mitigation has been scored low.

Table 41: Impact assessment of erosion due to increased overland flow and potential decrease in subsurface lateral flow and return flow on the environment for the proposed infrastructure.

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil erosion due to increased overland flow	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Potential decrease in subsurface lateral flow and return flow	Construction	Medium to high -	Low -	Medium to Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Soil erosion due to increased overland flow	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Potential decrease in subsurface lateral flow and return flow	Operation	Medium to low -	Low -	Medium to Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Soil erosion due to increased overland flow	Decommissioning and Closure	Low -	Low -	Low -

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Potential decrease in subsurface lateral flow and return flow	Decommissioning and Closure	Low -	Low -	Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				

Table 42: Impact assessment of erosion due to increased overland flow and potential decrease in subsurface lateral flow and return flow on the environment for the existing infrastructure.

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Soil erosion due to increased overland flow	Construction	Medium to low -	Low -	Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Potential decrease in subsurface lateral flow and return flow	Construction	Medium to low -	Low -	Medium to Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Soil erosion due to increased overland flow	Operation	Medium to low -	Low -	Low -
Mitigation Measures				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Potential decrease in subsurface lateral flow and return flow	Operation	Medium to low -	Low -	Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Soil erosion due to increased overland flow	Decommissioning and Closure	Low -	Low -	Low -
Mitigation Measures				
• 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;				

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
• Installation of pre-treatment stormwater practices which remove large sediment and other solids upstream of infiltration practice; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				
Potential decrease in subsurface lateral flow and return flow	Decommissioning and Closure	Low -	Low -	Low -
Mitigation Measures				
• 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; and • Adhering to the recommended footprint buffers and wetland buffers (15 m minimal) or wetland rehabilitation measures if encroaching within this buffer as proposed with the wetland specialist for the proposed project area should be sufficient to reduce the deductible water losses in the catchment. Also prevent any discharge of untreated potential wastewater into the catchment as responsive saturated soils (mostly associated with the valley bottoms or along water channels) have a high tendency to promote contaminant (i.e., Bacteria and inorganic elements) migrations towards water resources.				

9.3.9 SOCIAL

The social impacts as they relate to the project are few and were assessed by the EAP for the operational phase of the project. Table 43 below indicates the impacts assessed.

Table 43: Social impacts anticipated for both existing and proposed activities

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Job creation and economic benefits for surrounding communities.	Operation	Low +	Low +	Low +
Mitigation Measure				

Local persons to be employed as far as possible.				
Potential skills development and training programs for employees.	Operation	Low +	Low +	Low +
Mitigation Measure				
Local persons to be employed as far as possible.				
Temporary job creation and increased demand for local goods and services.	Construction	Low +	Low +	Low +
Mitigation Measure				
Local persons to be employed as far as possible.				

10 CONCLUSIONS AND RECOMMENDATIONS

The process identified potential issues and impacts associated with the proposed project. The report addresses those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with applicable phases and activities of the project and recommends appropriate mitigation measures for potentially significant environmental impacts. The report provides sufficient information regarding the potential impacts and the acceptability of these impacts in order for the Competent Authority to make an informed decision regarding the project. The release of the report for public review and comment provides stakeholders with an opportunity to verify that the issues they have raised throughout the process to date has been captured and adequately considered. All issues raised throughout the public participation process will be captured and responded to as far as possible.

The EAR aims to achieve the following:

- Provide an overall assessment of the social and biophysical environments affected by the project. (Section8);
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed project (Section 9);
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts (Section 9); and
- Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded (Section 0).

10.1 CONCLUSIONS FROM SPECIALIST STUDIES

The conclusions and recommendations of this EAR are the result of the assessment of identified and assessed impacts by specialists where applicable, and the parallel process of public participation. The main conclusions from each of the specialist studies are presented below.

10.1.1 AIR QUALITY

Impacts from the Rietfontein Processing Plant operations, including the expansion, were found to be within the respective PM10 and PM2.5 NAAQSs, with dustfall rates within the NDCR residential limit at all AQSRs for both unmitigated and mitigated scenarios.

From an air quality perspective, the impacts from the Plant can be regarded to have a Medium to Low significance provided mitigation and monitoring measures are applied, and dustfall monitoring be done to ensure compliance with the NDCR.

10.1.2 NOISE / ACOUSTICS

Based on the findings of the noise survey and sound pressure level simulations, the draft Environmental Noise Standard (to be promulgated soon, when the Environmental Conservation Act (ECA) regulations will fall away) is potentially exceeded at NSR R10 (albeit slightly) during night-time conditions.

It is the specialist’s opinion that the Rietfontein Plant can continue without significant detrimental impact on the receiving environment. If complaints are received, it is recommended that these complaints be timeously investigated, and best practice management and mitigation measures be employed to ensure compliance with the draft Environmental Noise Standard for urban areas at all off-site NSR locations.

10.1.3 GEOHYDROLOGY

The potential environmental impacts associated with the proposed new infrastructure—such as the pollution control dam (PCD), clean and dirty water separation systems, and related channels—have been reviewed in the context of the existing operations assessed under the Section 24G application. Based on the nature, location, and function of the planned infrastructure, the associated impacts are anticipated to be materially similar in type, extent, and significance to those already identified and assessed.

As such, these impacts are considered to be sufficiently addressed by the current impact assessment. Should any deviations or unique site-specific impacts arise during implementation, these will be managed under the existing environmental management framework and mitigation measures already in place.

The project is considered viable from a groundwater perspective, provided that the recommended mitigation measures and supporting studies are implemented to better define water availability and quality on site. The associated risks can be effectively managed through regular monitoring of groundwater quality, water levels, and abstraction volumes from the aquifer.

10.1.4 ECOLOGY

An impact statement is required as per the NEMA regulations with regard to the proposed development.

The main impact of the unauthorised clearing of vegetation and ongoing project activities include:

- Habitat loss and fragmentation as well as degradation of surrounding habitat, including CBA 2, ESA 1 and ESA 2 areas, an Endangered ecosystem and NPAES;
- Disturbance and displacement caused during the construction and operational phases where mitigations were not applied due to the lack of an EMPr;
- Direct mortality during the construction phase; and
- Potential loss of protected flora.

As project activities went ahead without authorisation, and subsequently the impacts associated with the project potentially incur a listed (and notable) change to:

Biodiversity of major potential concern:

- CBA 2; and

- Endangered ecosystem.

Biodiversity of potential concern:

- ESAs;
- Strategic Water Source Areas;
- Areas evaluated as to be of Medium SEI; and
- Priority Focus Areas in the NPAES.

In accordance with the Biodiversity Offset Guidelines (2023), offsets are required at a ratio agreed upon with the provincial authorities. In the case of the CBA 2 areas, like-for-like or better habitat has to be secured and managed for conservation in perpetuity. Any remaining areas of EN ecosystem must also be offset, at ratios up to 25:1. However, due to the levels of degradation of the habitats in the surrounding area owing to the long-term, ongoing mining and associated activities in the region, it is unlikely that the CBA 2 areas were representative of such.

In addition, it must be noted that the current state of degradation of the habitats within the PAOI was likely exacerbated by the plant activities that have been occurring since the initial clearing in 2014, and unauthorised clearing between 2022 and 2023. Therefore, the current state of the habitats is likely a poor reflection of the state of the habitat lost during the clearing event.

It is the opinion of the specialist that offsets are not strictly necessary in this particular case as the habitats on site were expected to have been of a medium sensitivity prior to vegetation clearing and in fair to poor condition, but this decision is at the discretion of the department. The following course of action is recommended by the specialist, along with the mitigation measures listed in this report:

- The potential for offsets must be discussed with the provincial authorities for the unauthorised clearing of vegetation. Should the provincial authorities deem them unnecessary under the circumstances, offsets may not be required;
- A rehabilitation plan must be compiled and implemented for all areas affected by construction and project activities; and
- An AIP management plan must be compiled and implemented throughout the PAOI with immediate effect.

10.1.5 SOILS & AGRICULTURE

The current existing infrastructure under the section 24G application post development has an overall low impact on the available soil resources.

The proposed development infrastructure will have an overall low residual impact on the agricultural production capability of the area. The proposed development can be favourably considered for authorisation. The following serves to substantiate this statement:

- The site verified land capability of the proposed project area ranges from low to medium with marginal high areas;
- The agricultural potential of the area ranges from low to marginal high within the 50 m buffer area;
- Active crop farming was only identified within the 50 m buffer of the proposed linear development; and
- The overall agricultural sensitivity for the project area is categorised as low, with high sensitivity along the buffer area (only).

The project may be favourably considered for authorisation and is not subject to any conditions.

10.1.6 WETLANDS

The overall post-mitigation residual risk of the proposed development was calculated to be "Low" given that the proposed areas for development intersect with a unchannelled valley-bottom of Low sensitivity. The impacts are deemed acceptable as a small portion of the unchannelled valley-bottom wetland will be affected by the pipeline development and the post-construction rehabilitation of the watercourse may result in an overall positive effect.

The findings of the prospective risk assessment indicate that the anticipated risks of the proposed activities are low once mitigation is applied. Furthermore, it is reasonable to infer that the retrospective risks associated with the existing infrastructure have similarly been low. This assumption is further supported by the fact that the natural watercourses are situated a considerable distance from the area of activity and are buffered from direct impact by intervening land uses, such as cultivated crop fields, which provide an additional layer of separation between the watercourse and the activities.

Considering the assessment findings, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project can be considered for authorisation by the Competent Authority.

10.1.7 HERITAGE

The HIA identified various heritage resources within the study area including archaeological resources and possible BGG and memorial sites which are rated as having a high to low heritage significance and will require further mitigation before the project can continue.

During the fieldwork a total of six heritage features and resources where identified. These consist of one NCW site which includes a lithic and pottery scatter (Riet01) one medium density pottery scatter with a heritage grading of IIIC (Riet03), one intangible heritage resource (memorial site) with a heritage grading of IIIC (Riet08), and two demolished historical homestead with only the stone-lined foundation remaining, which may possibly have infant burials present; therefore provisionally graded as IIIC (Riet04 and Riet07). Both Riet03 and Riet04 lie outside of the current footprint and are not directly threatened. It should be noted that Riet03 is part of the larger Iron Age occupation of the flat koppie and will require mitigation along with Riet06a-m described below.

Since the Rietfontein Chrome Wash Plant was constructed without prior EA, this report aims to assess the potential heritage impacts caused during its development. Aerial imagery and prior research (Coetzee 2008; Coetzee 2014) reveal significant LIA stone walling and possible graves in the area. Evidence such as Site 1, SG01-SG06 and US01 previously recorded by Coetzee - and now disturbed within the Plant's construction zone, supports this conclusion. Assessment of the site indicated LIA sites (Riet06a-m) already disturbed by the development.

It is the combined considered opinion of the heritage specialists that the proposed project already has had a direct impact on the identified heritage resources (Site 1/Riet06a-m) rated as being of high heritage significance.

With the implementation of recommended mitigation measures the overall impact on heritage resources will be reduced to acceptable levels during the further activities of the project.

10.1.8 HYDROPEDOLOGY

The project has an overall low residual impact, and this is acceptable. The following aspects must be considered for the development to reduce overland flows and surface return flows:

- Prevent flood damage or concentration of run-off;
- Divert stormwater and surface run-off from buildings, roads and parking areas into an attenuation pond;
- Preserve the natural and beneficial functions of the natural drainage system downstream;
- Preserve and enhance stormwater quality;

- Attenuate the difference between pre and post-development flows;
- Prevent disposal of untreated wastewater into the catchment system or surrounding areas; and
- Leakage monitoring plan along the infrastructure pipeline should be implemented.

Such measures for these systems will ensure that adequate water deducted from the catchment as run-off will be re-applied into the system which can minimise losses from the total deductible regimes as most of the hillslopes have recharge soils. Application of good quality water will promote lateral flows associated with these hydropedological groups. Improved water quality in the area is important to minimise pollutes migrations. From a hydropedological perspective, the proposed monitoring will be sufficient for water flows and groundwater recharge receptors.

10.1.8.1 SPECIALIST OPINION

From a hydropedological perspective, the impact of the development on hydropedological flow paths would be acceptable and the impacts can be managed sustainably.

10.1.9 PALAEONTOLOGY

A Low Palaeontological Significance has been allocated for impacts associated with the construction phase of the development 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 Operational and Decommissioning phases. 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 development are considered to be Low (as the area is not highly fossiliferous) and falls within the acceptable limits for the project. It is therefore considered that the Section 24GApplication will not lead to damaging impacts on the palaeontological resources of the area. The development 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.

10.2 SENSITIVITY MAP

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (base maps 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 refined by specialists' input within each respective specialist field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of sensitive areas within and surrounding the proposed application area

Figure 60 superimposes the proposed activity and its associated structures and infrastructure on the combined environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. Furthermore Figure 61 indicates the intensity across all of the intensities mentioned above.

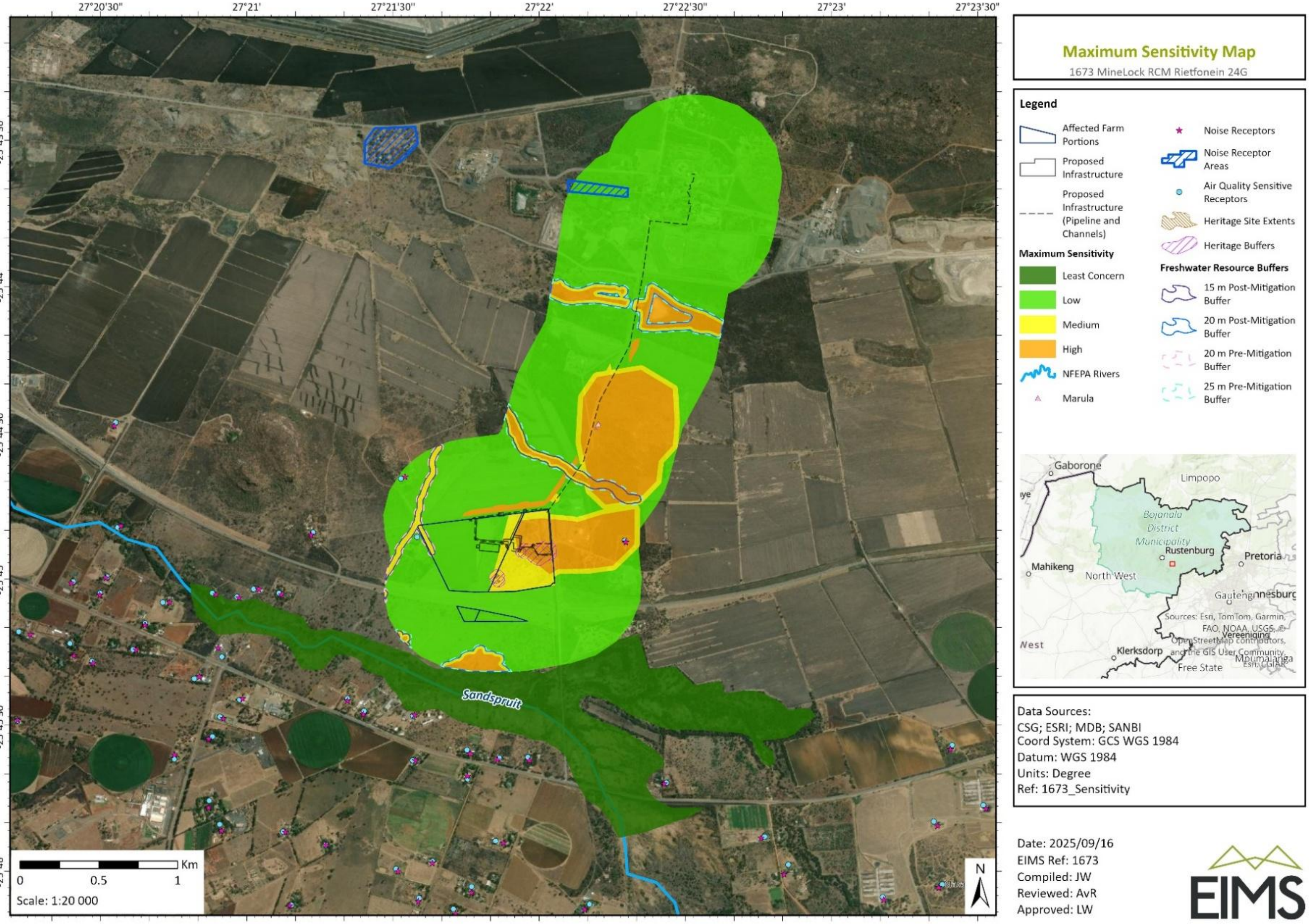


Figure 60: Maximum sensitivity map

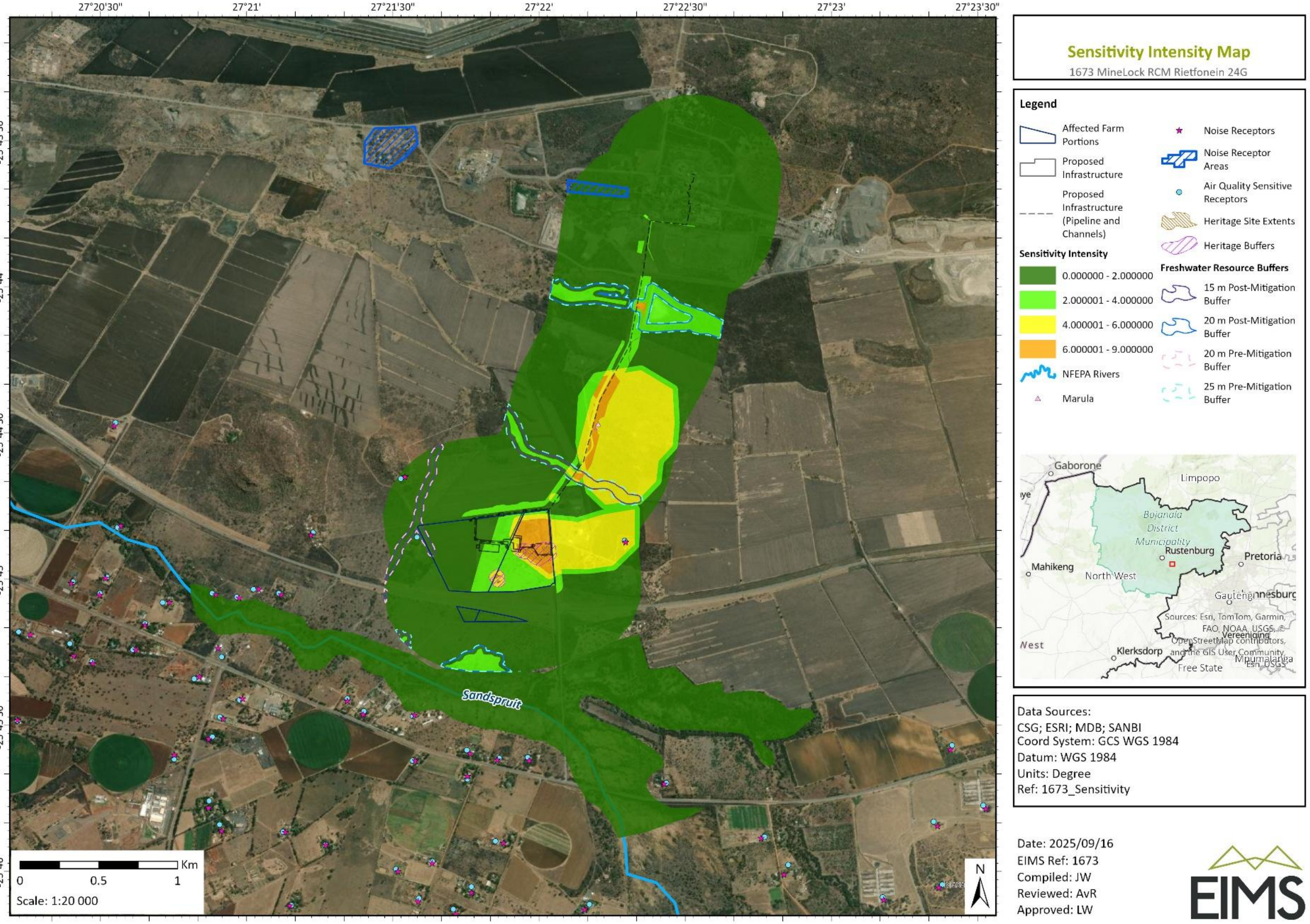


Figure 61: Intensity map for sensitive areas

10.3 ASSESSMENT OF ALTERNATIVES

The assessment of alternatives for the Clover Alloys Rietfontein Plant Section 24G application was conducted in alignment with the requirements of the National Environmental Management Act (NEMA). Given the retrospective nature of the application and the presence of existing infrastructure, the scope for alternative options was limited. Nonetheless, the following categories of alternatives were considered:

- Location Alternatives: Relocation was deemed impractical due to the operational status of the plant, existing infrastructure, and zoning. The current site (Portion 23/24 of Rietfontein 338 JQ) remains the only feasible location.

- Design/Layout Alternatives: Layouts for the stockpile expansion, pipeline routing, and stormwater infrastructure were evaluated. Preferred designs aim to minimise disturbance to wetlands and sensitive areas, while optimising use of already disturbed land.

- Scheduling Alternatives: These alternatives are considered not feasible to the project as there will be no significant impact variation due to scheduling. The only scheduling alternatives that are considered is to plan the construction activities for the dry season to reduce erosion and runoff impacts, and to avoid sensitive biodiversity periods such as breeding and nesting seasons.

- Process Alternatives: The chrome beneficiation process was reviewed. The current process was retained due to its efficiency, compliance, and minimal environmental footprint. Alternatives were not viable due to technical and economic constraints.

- Technology Alternatives: Best practicable environmental technologies were selected, including lined Pollution Control Dams (PCDs), water sprays for dust suppression, and leak detection systems. More advanced technologies were considered excessive for the scale of the project.

- Activity Alternatives: The expansion of infrastructure was necessary to ensure operational viability and compliance with the issued compliance notice. Maintaining the status quo was not feasible.

- No-Go Alternative: While this option would avoid new impacts, it would not address existing non-compliance and would result in cessation of operations, leading to negative socio-economic consequences such as job losses and reduced economic activity.

The preferred alternative—expansion at the existing site with enhanced mitigation measures—was found to best balance environmental, social, and economic considerations. It ensures compliance with Section 24G of NEMA.

Specialist studies informed the alternatives assessment, including biodiversity, wetlands, heritage, air quality, noise, and soils. The selected alternative incorporates robust mitigation strategies and aligns with principles of sustainable development and legal obligations.

10.4 ENVIRONMENTAL IMPACT STATEMENT

The findings of the assessment and associated specialist studies conclude that there are no environmental fatal flaws that should prevent the retrospective licensing of the Rietfontein plant, provided that the recommended mitigation and management measures are implemented. Furthermore, it is recommended that the additional infrastructure be approved as for the most part the additional infrastructure serve to enhance the environmental sustainability in the operation of the site. Based on the nature and extent of the project, the local level of disturbance predicted, the findings of the specialist studies, and the understanding of the significance level of potential environmental impacts, it is the opinion of the retrospective environmental assessment project team and the EAP that the significance levels of the majority of identified negative impacts can generally be reduced to an acceptable level by implementing the recommended mitigation measures and the project should be authorized.

The following impacts were determined to have a potentially moderate negative final significance after mitigation:

- Impacts on Biodiversity & Habitat Loss; and
- Impacts on land and soil degradation.

The impact that the Rietfontein Plant has already had on the heritage features on site can not be overlooked. In consultation with the heritage specialist, should the EA be granted, the mitigation recommended should be implemented prior to any further developments at the site.

11 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations relating to this assessment should be considered in evaluating and decision-making on this assessment:

- Unless specifically noted, the environmental attributes for the receiving environment have been obtained from best available spatial and scientific data sources. Whilst reasonable effort has been taken to obtain the most recent and relevant data, there may be gaps in baseline data, leading to uncertainties in impact predictions. Where uncertainty exists efforts are made to indicate this in the assessment.
- This study is based on activity information provided by the applicant (including engineering designs, specifications, services reports, etc). The accuracy of this information has not been verified, and it is assumed that no significant changes or deviations to the final designs will occur. Should such occur the significance of the potential impacts may require reassessment and where relevant formal amendment processes.
- The information presented in this report is based on the information available at the time of compilation of the report.
- Whilst reasonable effort has been made to identify all potential environmental impacts, some impacts may not be reasonably foreseeable or may emerge only after project implementation.
- 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.

The remaining sub-sections present the assumptions and limitations applicable to the respective specialist assessments.

11.1 AIR QUALITY

- Meteorological data: no onsite meteorological data was available and simulated Weather Research and Forecasting (WRF)1 data for the study site was obtained for the period January 2022 – December 2024.
- RCM has a dustfall network comprising of 10 dustfall units in place. No recent data was provided for inclusion into the study.
- Ambient air quality monitoring data from the Rustenburg Local Municipality's Marikana Air Quality Monitoring Station (AQMS) for the period January 2021 to December 2023 was used to analyse background PM10 and PM2.5 concentrations in the study region.
- Operational hours for the mine were assumed to be 24-hours a day, 7-days per week.
- Emissions:

- The quantification of sources of emission was for project activities only. Background sources were not included.
- Only routine emissions were estimated and modelled. This was done for the provided operational hours as per above.
- Gaseous emissions from vehicle exhaust and other auxiliary equipment were analysed qualitatively as the impacts from these sources are usually localized and unlikely to exceed health screening limits outside the project area. The main pollutant of concern from the operations at the study site is particulate matter and hence formed the focus of the study.

- Impact assessment:
  - Impacts due to unmitigated and mitigated operations were assessed quantitatively, whilst the construction, closure and decommissioning phases were assessed qualitatively due to the limited information available.
  - The impact assessment was limited to airborne particulate (including TSP2, PM10 and PM2.54).
  - There will always be some degree of uncertainty in any geophysical model, but it is desirable to structure the model in such a way to minimize the total error. A model represents the most likely outcome of an ensemble of experimental results. The total uncertainty can be thought of as the sum of three components: the uncertainty due to errors in the model physics; the uncertainty due to data errors; and the uncertainty due to stochastic processes (turbulence) in the atmosphere. Nevertheless, dispersion modelling is generally accepted as a necessary and valuable tool in air quality management and typically provides a conservative prediction of emission concentrations.

11.2 NOISE

- The quantification of sources of noise was limited to the current operational phase of the Rietfontein Plant. Closure phase activities are expected to be similar or less significant and its impacts only assessed qualitatively. Noise impacts will cease post-closure.
- The mitigating effect of buildings acting as acoustic barriers were not taken into account providing a conservative assessment of the noise impacts off-site.
- All project activities were assumed for a 24-hour period.
- The haul trips from the mine to the plant was based on ROM throughput provided and an assumed truck capacity of 30 tonnes. The average vehicle speed of the trucks was assumed to be 40 km/hr.
- Although other existing sources of noise within the area were identified, such sources were not quantified but were taken into account during the survey.
- Although the noise impact due to sirens and reverse signals is recognised, it is not considered as part of the environmental noise impact assessmenta as these signals are used for warning purposes which are excluded in impact assessments.
- The environmental noise assessment focussed on the evaluation of impacts for humans.

11.3 GEOHYDROLOGY

- The activation and concentrations of source terms were based on monitoring data and historic Google Earth images.

- The geology was based on the 1:250 000 published geological maps as well as 1:50 000 topographical maps.
- QGIS online aerial imagery was used in the layout of the various maps compiled for the current report. The imagery may well be dated and has been used for reference only.
- The model is used for decision making and should be applied accordingly. Modelled impacts may vary at any point and on-going monitoring is required to actively manage the proposed mining activities and possible impacts.
- No site characterization boreholes were drilled for this investigation; aquifer parameters and hydro stratigraphic units were assumed based on historical data and similar studies.
- The investigation utilized data from field surveys and existing monitoring as a snapshot, with further trends to be verified through ongoing monitoring as outlined in the monitoring program
- The numerical groundwater flow model was developed using site-specific information, excluding influences from neighbouring mining developments.

11.4 HERITAGE

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and existing vegetation cover. It should be noted that most of the study area was accessible for the fieldwork survey. However, access was restricted in the already existing mine, notably in the northernmost part of the proposed pipeline alignment.

Therefore, should any heritage features and/or objects be located or observed outside the identified heritage sensitive areas during the construction activities, a heritage specialist must be contacted immediately. Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. If any Burial Grounds and Graves (BGG) are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out in the Heritage Impact Assessment (Appendix D).

11.5 PALAEONTOLOGY

The geology of the area is the focal point of geological maps, and the sheet explanations of the Geological Maps were not intended to focus on palaeontological heritage. Many inaccessible areas of South Africa have never been examined by palaeontologists, and data is typically dependent solely on aerial pictures. Locality and geological information in museums and university databases is out of date, and data acquired in the past is not always adequately documented.

Comparable Assemblage Zones in other places are also used to provide information on the existence of fossils in areas that have not before been recorded. When similar Assemblage Zones and geological formations are used for Desktop studies, it is commonly assumed that exposed fossil exists within the footprint.

11.6 HYDROPEDOLOGY

The following aspects were considered as limitations;

- Only the slopes affected by the proposed development have been assessed;
- It has been assumed that the extent of the development area provided by the responsible party is accurate; and

- The GPS used for ground truthing is accurate to within five meters. Therefore, the wetland and the observation site's delineation plotted digitally may be offset by at up to five meters to either side.

11.7 SOILS AND AGRICULTURE

The following aspects were considered as limitations;

- Only the slopes affected by the proposed development have been assessed;
- It has been assumed that the extent of the development area provided by the responsible party is accurate;
- The GPS used for ground truthing is accurate to within five meters. Therefore, the soil and the observation site's delineation plotted digitally may be offset by up to five meters to either side; and
- No heavy metals have been assessed, nor fertility been analysed for the relevant classified soils.

11.8 TERRESTRIAL AND BIODIVERSITY

The following assumptions and limitations are applicable for this assessment:

- The Global Positioning System (GPS) used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by up to 5 m;
- Information relating to project activities, spatial data and infrastructure locations for the proposed development was obtained from information provided by the client. The potential impacts and recommendations described in this report apply specifically to the provided information;
- The PAOI has been modified from its original state due to the nature of the development. Field data collected is thus considered to be distorted and the specialist may only make educated assumptions as to the pre-developmental ecological conditions;
- Assumptions were guided in part by the current habitat surrounding the PAOI;
- Although considerable time has been spent to ensure that information utilised in this report is verified. It is assumed that all third-party information utilised in the compilation of this report is correct at the time of compilation (e.g., spatial data, online databases, and species lists);
- This assessment was conducted from a terrestrial perspective only and must be considered in conjunction with the accompanying freshwater and soil reports (TBC, 2025); and
- The TBC fieldwork component of the assessment comprised a one-day survey in the early dry season (14th of April 2025), which is considered sufficient under the circumstances.

11.9 WETLANDS

The following aspects were considered as limitations:

- It has been assumed that all information provided to the specialist is accurate;
- The Project Area has been modified from its original state due to the nature of the development. Field data collected is thus considered to be distorted and the specialist may only make educated assumptions as to the pre-developmental ecological conditions
- Assumptions were guided in part by the current habitat surrounding the Project Area;
- Where inaccessible, freshwater features within the larger 500m PAOI were delineated and assessed via desktop;

- Areas characterised by external wetland attributes were the focus for this assessment;
- Only natural features were considered for the delineation and ecological components of this assessment; and
- The GPS used for water resource delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by a maximum of five meters to either side.

12 AFFIRMATION REGARDING CORRECTNESS OF INFORMATION

EAP

I Monica Niehof, declare that:

General declaration:

- I act as the independent environmental practitioner in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not all the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and

- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014.

Signature of the EAP

Name of company: Environmental Impact Management Services (Pty) Ltd

Date:

Candidate EAP

I Andre van Rooyen, declare that:

General declaration:

- I act as the independent environmental practitioner in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;

- I will keep a register of all interested and affected parties that participated in a public participation process; and I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not all the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014.

Signature of the Candidate EAP

Name of company: Environmental Impact Management Services (Pty) Ltd

Date: 2026/03/03

13 REFERENCES

Aller, L., Bennet, T., Lehr, J. H., & Petty, R. J. (1985). DRASTIC: a standardized system for evaluating groundwater pollution potential using hydrogeologic settings. U.S Environmental Protection Agency, USA.

Almond, J., Pether, J, and Groenewald, G. 2013. South African National Fossil Sensitivity Map. SAHRA and Council for Geosciences. Schweitzer et al. (1995) pp p288.

Anderson, M.S. 2009. Marothodi: The Historical Archaeology of an African Capital. Atikkam Media, Woodford.

Andreae, M. A. E. C. H. C. W. H. G. H. G. K. R. L. J.-P. W. D., 1996. Trace gas and aerosol emissions from savanna fires.. In: Biomass Burning and Global Change. Remote sensing, modelling and inventory development, and biomass burning in Africa, Volume 1. Cambridge: MIT Press, pp. 278-295.

Anthropology, 14(4), pp.485-487.

Apps, P. 2000. Smither's Mammals of Southern Africa – A Field Guide. Struik Nature, Cape Town.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J & de Villiers, M.S. (Eds). 2014. Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. South African Biodiversity Institute, Pretoria.

Beck, H. E., Zimmerman, N. E., McVicar, T. R., Vergepolan, N., Berg, A., & Wood, E. F. (2018). Present and Future Koppen-Geiger climate classification maps at 1km resolution. Scientific Dara.

Bergh, J.S. 1999. Geskiedenisatlas van die Vier Noordelike Provinsies. Van Schaik, Pretoria.

Bergh, J.S. 2005. We Must Never Forget Where We Come From: The Bafokeng and Their

Blue Crane Environmental, (2024). Technical Project Information and Terms of Reference: The Proposed Izimvu Battery Energy Storage System (BESS) and Associated Infrastructure near Rustenburg, North-West Province.

Branch, B. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa. Struik Nature, Cape Town.

Bredenkamp, D. B., Botha, L. J., Van Tonder, G. J., & van Rensburg, H. J. (1995). Manual Quanti-tative Estimation of Groundwater Recharge and Aquifer Storativity . Water Research Commission.

Breutz, P.J. 1953. The Tribes of the Rustenburg and Pilanesberg Districts. Department of Native Affairs. Ethnological Publications No. 28.

Breutz, P.J. 1957. Die Stamme van die Distrikte Lichtenburg en Delareyville. Departement van Naturellesake. Etnologiese Reeks Nr. 37.

Brüel & Kjær Sound & Vibration Measurement A/S. (2000). www.bksv.com. Retrieved October 14, 2011, from Brüel & Kjær: http://www.bksv.com

BSI. (2014). Code of practice for noise and vibration control on construction and open sites - Part 1: Noise. BS 5228-1:2009.

Burgoyne, P.M. & Daniels, F. 2005. Dinteranthus pole-evansii (N.E.Br.) Schwantes. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2024/01/19

Carruthers, J. 2011. Pilanesberg National Park, North West Province, South Africa: Uniting economic development with ecological design - A history, 1960s to 1984. Koedoe. Vol. 53 No. 1.

Carruthers , V. 2007. The Magaliesberg. Protea Book House, Pretoria.

Caruana, M.V., VAN DER WALT, J. and LOMBARD, M., 2020. Evidence of earlier stone age occurrences at Barberspan in the North West Grassland Biome, South Africa. South African Archaeological Bulletin, 75(212), pp.49-57.

Cawthorn, R.G., Eales, H.V., Walraven, F., Uken, R and Watkeys, M.K. 2006. The Bushveld Complex. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp. 261-281. Geological Society of South Africa, Marshalltown.

Cawthorn, R.G., Meyer, S.P. and Kruger, F.J. (1991). Major addition of magma at the Pyroxenite Marker in the western Bushveld Complex, South Africa. J. Petrol., 32, 739–763.

Central Transvaal: AD 350 – 1880. Occasional Paper No. 16 of the Archaeological Research Unit, University of the Witwatersrand.

Climate Data. (2024, 05 27). Retrieved from Climate Data: https://en.climate-data.org/africa/south-africa/north-west/lichtenburg-27134/

Cooney, R. 2004. The Precautionary Principle in Biodiversity Conservation and Natural Resource Management: An Issues Paper for Policy-Makers, Researchers and Practitioners. IUCN, Gland, Switzerland and Cambridge, UK.

Cowan, R., 1995. History of Life. 2nd Edition. Blackwell Scientific Publications, Boston. 462pp.

Creswicke, L. 1902. South Africa and the Transvaal War. Vol. VII. Kenneth Maclennan, Manchester.

DEA, 2014. Regulations regarding Air Dispersion Modelling, s.l.: Department of Environmental Affairs, Government Gazette No. 37804, 11 July 2014.

DEA, 2014. Regulations regarding Air Dispersion Modelling, s.l.: Department of Environmental Affairs, Government Gazette No. 37804, 11 July 2014.

DEAT. (1998). Environmental Impact Assessment Guidelines. Pretoria: Department of Environmen-tal Affairs and Tourism.

DEAT. (2002). Impact significance, Integrated Environmental Management, Information series 5. Pretoria: Department of Environmental Affairs and Tourism.

Department of Agriculture, Forestry and Fisheries, 2017. *National land capability evaluation raster data: Land capability data layer*, 2017. Pretoria.

Department of Forestry, Fisheries and the Environment (DFFE). 2023. SACAD (South Africa Conservation Areas Database) and SAPAD (South Africa Protected Areas Database). http://egis.environment.gov.za.

Department of Forestry, Fisheries and the Environment (DFFE). 2022. National Protected Areas Expansion Strategyhttp://egis.environment.gov.za.

Department of Water Affairs and Forestry (DWAF). 2005a. A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas.

Department of Water and Sanitation (DWS). 2005b. River Ecoclassification: Manual for Ecostatus Determination. First Draft for Training Purposes. Department of Water Affairs and Forestry.

Department of Water and Sanitation (DWS). 2023. General Authorisation in Terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses as defined in Section 21(c) or section 21(i). Government Gazette Notice: 4167 in Government Gazette 49833 of 08 December 2023.

Du Preez, L.H. & Carruthers, V. 2009. A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.

Du Toit, A. 1954. The geology of South Africa. xii + 611pp, 41 pls. Oliver & Boyd, Edinburgh.

Du Toit, A.L., 1918. The zones of the Karroo System and their distribution. Proceedings of the Geological Society of South Africa, 21, 17-37.

DWS. (2007). Best Practice Guideline G3: Monitoring Systems.

EC WG-AEN. (2003). Good Practice Guide for Strategic Noise Mapping and the Production of Associated Data on Noise Exposure.

Farmer, A. M., 1993. The Effects of Dust on Vegetation – A Review. Environmental Pollution, Volume 79, pp. 63-75.

Fish, L., Mashau, A.C., Moeaha, M.J. & Nembudani, M.T. 2015. Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions. SANBI, Pretoria.

FitzPatrick Institute of African Ornithology. 2024a. MammalMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=MammalMAP

FitzPatrick Institute of African Ornithology. 2024b. ReptileMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=ReptileMAP

FitzPatrick Institute of African Ornithology. 2024c. FrogMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=FrogMAP

Garstang, M.T.P.S.R.E.M.K.P.&.L.J.,1996. Horizontal and vertical transport of air over southern Africa. Journal of Geophysical Research, 101 (D19), p. 23721 – 23736.

GCS. (2022). ABO Wind Lichtenburg 1, Lichtenburg 2, and Lichtenburg 3 Solat Photovoltaic (PV) Facilities - Hydrogeological Assessment Report .

Groenewald G.H., Groenewald D.P. and Groenewald S.M., 2014. Palaeontological Heritage of North West Province. Internal Palaeotechnical Reports, SAHRA.

Hall, S., Anderson, M, Boeyens, J. & F. Coetzee. 2008. Towards an outline of the oral geography, historical identity and political economy of the Late Precolonial Tswana in the Rustenburg region in Swanepoel, N., Esterhuizen, A. & P. Bonner. 2008. Five Hundred Years Rediscovered: Southern African Precedents and Prospects. Wits University Press, Johannesburg.

Hanna, S. R., Egan, B. A., Purdum, J. & Wagler, J., 1999. Evaluation of ISC3, AERMOD, and ADMS Dispersion Models with Observations from Five Field Sites, s.l.: s.n.

Hattingh, P.J. (1991). The magnetic susceptibility of the mafic rocks of the Bushveld Complex. S. Afr. J. Geol., 94, 132–136.

Hatton, C.J. and Schweitzer, J.K. (1995). Evidence for synchronous extrusive and intrusive Bushveld magmatism. J.Afr. Earth Sci., 21, 579–594.

Hess, H.H. (1960). Stillwater Igneous Complex, Montana: a quantitative mineralogical study. Mem. Geol. Soc. Amer., 80, 230 pp. Hiemstra, S.A.

Higginson, J. 2014. Collective Violence and the Agrarian Origins of South African Apartheid. Cambridge University Press, Cambridge.

Historia, 2000. Vol. 45.

Huffman, T.N. 2007. Handbook to the Iron Age: The archaeology of Pre-Colonial Farming Societies in Southern Africa. University of KwaZulu-Natal Press, Scottsville.

IFC. (2007). Environmental, Health, and Safety Guidelines for Noise Management. International Finance Corporation. World Bank Group.

Kafri U, & Foster, M. (1985). The Hydrogeology of the dolomite aquifer in the Kliprivier-Natalspruit Basin. Directorate Geohydrology, DWAF.

Kent, L. E., 1980. Part 1: Lithostratigraphy of the Republic of South Africa, South West Africa/Namibia and the Republics of Bophuthatswana, Transkei, and Venda. SACS, Council for Geosciences.

Kotze, D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.C., and Collins, N.B. 2009. A Technique for rapidly assessing ecosystem services supplied by wetlands, Mondi Wetland Project.

Kruseman, G., & de Ridder, N. A. (1994). Analysis and Evaluation of Pumping Test Data.

Land in 19th Century Transvaal. History in Africa, Vol. 32 (2005), pp. 95 – 115.

Land Type Survey Staff. 1972 - 2006. Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Liebenberg-Enslin, H., 2014. A Functional Dependence Analysis of Wind Erosion Modelling System Parameters to Determine a Practical Approach f or Wind Erosion Assessments, Johannesburg: Faculty of Science, University of Johannesburg.

Lotter, M.C., Le Maitre, D. 2021. Fine-scale delineation of Strategic Water Source Areas for surface water in South Africa using Empirical Bayesian Kriging Regression Prediction: Technical report. Prepared for the South African National Biodiversity Institute (SANBI), Pretoria. 33p.

Mac Rae C. 1999. Life etched in stone: fossils of South Africa. The Geological Society of South Africa, Johannesburg, pp 305.

Macfarlane, D.M., Bredin, I.P., Adams, J.B., Zungu, M.M., Bate, G.C. and Dickens, C.W.S. 2014. Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries. Final Consolidated Report. WRC Report No TT 610/14, Water Research Commission, Pretoria.

Macfarlane, D.M., Kotze, D.C., Ellery, W.N., Walters, D., Koopman, V., Goodman, P. and Goge, C. 2007. A technique for rapidly assessing wetland health: WET-Health. WRC Report TT 340/08.

MACHENS, E.W. 2009. Platinum, Gold and Diamonds: The adventure of Hans Merensky's discoveries. Protea Book House, Pretoria

Macrae, C. 1999. Life etched in stone. Fossils of South Africa. 305 pp. The Geological Society of South Africa, Johannesburg.

Mason, R. 1962. Prehistory of the Transvaal. Johannesburg: Witwatersrand University Press.

Mason, R., 1988. Kruger Cave: Late Stone Age, Magaliesberg. Occasional Paper no. 17 of the Archaeological Research Unit. Johannesburg: University of the Witwatersrand.

Mason, R.J. 1973. Iron Age research in the western Transvaal, South Africa, 1971-72. Current

Mason, R.J. 1986. Origins of the Black People of Johannesburg and the Southern Western

Mbenga, B. & A. MANSON. 2010. People of the Dew: A History of the Bafokeng of Rustenburg District, South Africa from Early Times to 2000. Jacana Media (Pty) Ltd, Johannesburg.

Mbenga, B.K. 1997. Forced Labour in the Pilanesberg: The Flogging of Chief Kgamanyane by Commandant Paul Kruger, Saulspoort, April 1870. Journal of Southern African Studies. Vol. 23 (1997), pp. 127 – 140.

McCarthy, T. & Rubidge, B. 2005. The story of Earth and life: a southern African perspective on a 4.6-billion-year journey. 334pp. Struik, Cape Town

Morton, F. 1992. Slave-Raiding and Slavery in the Western Transvaal after the Sand River Convention. African Economic History. No. 20 (1992), pp. 99 – 118.

Mucina, L. & Rutherford, M.C. (eds) (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Mucina, L. & Rutherford, M.C. (Eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria, South African.

Mucina, L., & Rutherford, M. C. 2006. The Vegetation of South Africa, Lesotho, and Swaziland. Strelitzia 19. Pretoria: National Biodiversity Institute.

Mucina, L., Rutherford, M.C. & Powrie, L.W. (Eds.). 2007. Vegetation map of South Africa, Lesotho and Swaziland. 1:1 000 000 scale sheet maps. 2nd ed. South African National Biodiversity Institute, Pretoria.

Mucina, L., Scott-Shaw, CR., Rutherford, MC., Camp., KGT., Matthews, WS., Powrie, LW and Hoare, DB. Indian Ocean Coastal Belt. IN Mucina, L. & Rutherford, M.C. (Eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria, South African.

National Biodiversity Assessment spatial data. 2018. http://bgis.sanbi.org/. Accessed January 2022.

National Environmental Screening Tool. 2025. National Environmental Screening Tool, 2025. Available from the Department of Forestry, Fisheries and the Environmental website: https://screening.environment.gov.za/screeningtool/index.html#/pages/welcome.

Nel JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Nel JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Nel, J. L., Driver, A., Strydom, W. F., Maherry, A. M., Petersen, C. P., Hill, L., Roux, D. J., Nienaber, S., van Deventer, H., Swartz, E. R. & Smith-Adao, L. B. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources, WRC Report No. TT 500/11. Water Research Commission, Pretoria.

NEMBA. 2014. Government Gazette, Volume 584. No 37320. www.gpwonline.co.za. Accessed January 2022.

Nixon, N., Eriksson, P.G., Jacobs, R. And Snyman, C.P. 1988. Early Proterozoic micro-algal structures in carbonaceous shales of the Pretoria Group, south-west of Potchefstroom. South African Journal of Science, 84: 592-595.

Norman, N. And Whitfield, G., 2006. Geological Journeys. De Beers, Struik, P 1-320. RUBIDGE, B. S. (ed.), 1995. Biostratigraphy of the Beaufort Group (Karoo Supergroup). South African Committee for Biostratigraphy, Biostratigraphic Series No. 1, 46pp. Council for Geoscience, Pretoria.

NPI, 2012. Emission Estimation Technique Manual for Mining. Version 3.1. s.l.:Australian Government Department of Sustainability, Environment, Water, Population and Communities.

OFFICIAL YEARBOOK OF THE UNION, 1938.

Ollis DJ, Snaddon CD, Job NM, and Mbona N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria.

Parsons, R. (1995). A South African Aquifer System Management Classification. Water Research Commission and Department of Water Affairs and Forestry.

Piketh, S., Annegarn, H. & Kneen, M., 1996. Regional scale impacts of biomass burning emissions over southern Africa. In: Biomass Burning and Global Change. Cambridge: MIT Press.

Pistorius, J. C. C. 1992. Molokwane: an Iron Age Bakwena village. Johannesburg: Perskor Printers.

Pistorius, J.C., 1996. Spatial expressions in the kgosing of Molokwane. South African Journal of Ethnology, 19(4), pp.143-164.

POSA. 2016. Plants of South Africa - an online checklist. POSA ver. 3.0. http://newposa.sanbi.org/. (Accessed: August 2023).

Prime Resources Pty Ltd. (2013). Amendment of the Environmental Management Programme in terms of Section 102 of the MPRDA for the Proposed Reclamation of the Lindum Tailings Storage Facility, Randfontein, Gauteng.

Kaath, A. (2007) "Human personhood and social benevolence - reformational reflections on the right to human dignity : research article."

Raffensperger, C. and Tickner, J. 1999. Protecting Public Health and the Environment: Implementing The Precautionary Principle. Island Press, Washington, DC.

Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute, Pretoria.

S.A.C.S. (South African Committee for Stratigraphy), 1980. Stratigraphy of South Africa. Part 1. Lithostratigraphy of the Republic of South Africa, South West Africa/Namibia, and the Republics of Bophuthatswana, Transkei, and Venda. Handbook of the Geological Survey of South Africa, 8, 690pp

SADR, K. & RODIER, X., 2012. Google Earth, GIS and stone-walled structures in southern Gauteng, South Africa. Journal of Archaeological Science, 39(4), pp.1034-1042.

SAHRA 2012. Minimum standards: palaeontological component of heritage impact assessment reports, 15 pp. South African Heritage Resources Agency, Cape Town.

SANBI. 2022. Red List of South African Plants version 2020. redlist.sanbi.org (Accessed: May 2023)

SANBI-BGIS. 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning.

SANS 10103. (2008). The measurement and rating of environmental noise with respect to annoyance and to speech communication. Pretoria: Standards South Africa.

SAPAD (South Africa Protected Areas Database) and SACAD (South Africa Conservation Areas Database) (2023). http://egis.environment.gov.za

Schapera, I. 1965. Praise-poems of Tswana Chiefs. Clarendon Press.

Schoeman, P.S. 2018. Relative seasonal occurrence of economically significant heteropterans (Pentatomidae and Coreidae) on macadamias in South Africa: implications for management. Afr Entomol 26:543-549

Scott, G., 2012. The Wateberg-Bojanala Priority Area AQMP and Threat Assessment Project Approach. Rustenburg, Department of Environmental Affairs.

Skinner, J.D. & Chimimba, C.T. 2005. The Mammals of the Southern African Sub-region. Cambridge University Press, Cape Town.

Skowno, A.L. & Monyeki, M.S. 2021. South Africa’s Red List of Terrestrial Ecosystems (RLEs). Land, 10, 1048, 1-14.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Smith, B. 2006. The Farming Handbook. Netherlands & South Africa: University of KwaZulu-Natal Press & CTA.

Soil Classification Working Group. 1991. Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Soil Classification Working Group. 2018. Soil Classification a Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

SOUTH AFRICAN MINING YEARBOOK, 1941/2. The South African Mining Journal Syndicate, Johannesburg.

Steel, R.H., 1987. Ifafi 25/85C West: An Iron Age Copper Smelting Site East of Hartbeespoort Dam, Central Transvaal. The South African Archaeological Bulletin, pp.136-139.

Stuart, C & Stuart, M. A. 2013. Field guide to the tracks & signs of Southern, Central & East African Wildlife. Penguin Random House, Cape Town.

Stuart, C & Stuart, M. A. 2015. Stuarts’ Field Guide to Mammals of Southern Africa including Angola, Zambia & Malawi. Struik Nature, Cape Town.

Taylor A, Cowell C, Drouilly M, Schulze E, Avenant N, Birss C, Child MF. 2016. A conservation assessment of Pelea capreolus. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds). 2015. The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Taylor, P.J., Grass, I., Alberts, A.J., Joubert, E. and Tscharntke, T. 2018. Economic value of bat predation services – A review and new estimates from macadamia orchards. Ecosystem Services. 30: 372-381.

Tilman, D., Fargione, J., Wolff, B. et al. 2001. Forecasting agriculturally driven global environmental change. Science 292:281-284.

TLOU, T. & A. CAMPBELL. 1997. History of Botswana. Macmillan, Gaborone.

Tscharntke, T., Clough, Y., Wanger, T.C. et al. 2012. Global food security, biodiversity conservation and the future of agricultural intensification. Biol Conserv 151:53-59.

U.S. EPA, 2006. Compilation of Air Pollution Emission Factors (AP-42) - Unpaved Roads, s.l.: U.S. Environmental Protection Agency.

US EPA, 2006. AP42, 5th Edition, Volume I, Chapter 13: Miscellaneous Sources, 13.2.2 Introduction to Fugitive Dust Sources, Unpaved Roads. [Online] Available at: https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf

US EPA, 2006. Emission Factor Documentation for AP-42 Section 11.12.. [Online] Available at: http://www.epa.gov/ttnchief/ap42/

Van Deventer H, Smith-Adao L, Collins NB, Grenfell M, Grundling A, Grundling P-L, Impson D, Job N, Lötter M, Ollis D, Petersen C, Scherman P, Sieben E, Snaddon K, Tererai F. and Van der Colff D. 2019. South African National Biodiversity Assessment 2018: Technical Report. Volume 2b: Inland Aquatic (Freshwater) Realm. CSIR report number CSIR/NRE/ECOS/IR/2019/0004/A. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6230.

Van Deventer, H.; Smith-Adao, L.; Mbona, N.; Petersen, C.; Skowno, A.; Collins, N.B.; Grenfell, M.; Job, N.; Lötter, M.; Ollis, D.; Scherman, P.; Sieben, E.; Snaddon, K. 2018. South African Inventory of Inland Aquatic Ecosystems. South African National Biodiversity Institute, Pretoria. Report Number: CSIR report number CSIR/NRE/ECOS/IR/2018/0001/A; SANBI report number http://hdl.handle.net/20.500.12143/5847.

Visser, D.J.L. (ed) 1984. Geological Map of South Africa 1:100 000. South African Committee for Stratigraphy, Council for Geoscience, Pretoria.

Visser, D.J.L. (ed) 1989. Toeligting: Geologiese kaart (1:100 000). Die Geologie van die Republieke van Suid Afrika, Transkei, Bophuthatswana, Venda, Ciskei en die Koningkryke van Lesotho en Swaziland. South African Committee for Stratigraphy. Council for Geoscience, Pretoria, Pp 494.

WADLEY, L., 1996. Changes in the Social Relations of Precolonial Hunter–Gatherers after Agropastoralist Contact: An Example from the Magaliesberg, South Africa. Journal of AnthropologicalArchaeology 15 pp. 205-217.

Weier S.M., Grass I, Linden V.M.G., Tscharntke T., Taylor P.J. 2018. Natural vegetation and bug abundance promote insectivorous bat activity in macadamia orchards, South Africa. Biological Conservation 226:16-23.

Weier S.M., Grass I, Linden V.M.G., Tscharntke T., Taylor P.J. 2019. The use of bat houses as day roosts in macadamia orchards, South Africa. PeerJ 7:e6954 http://doi.org/10.7717/peerj.6954

WHO. (1999). Guidelines to Community Noise. (B. Berglund, T. Lindvall, & D. Schwela, Eds.) Geneva: WHO.

Wulfsohn, L. 1989. Piet Botha: A South African patriot. Military History Journal Vol. 8 No. 2.

Wulfsohn, L. 1992. Rustenburg at War: The Story of Rustenburg and its Citizens in the First

14 APPENDICES

Appendix A: EAP CVs

Appendix B: Screening tool Report and SSVR

Appendix C: Public Participation

Appendix D: Specialist Reports

Appendix E: Impact Assessment Matrix

Appendix F: Environmental Management Programme

Appendix G: Engineering Design Report

Appendix H: Additional Information