ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR SAMANCOR CHROME (EASTERN CHROME MINES) MINING RIGHT, ENVIRONMENTAL AUTHORISATION AND WASTE MANAGEMENT LICENCE APPLICATION FOR THE PROPOSED MAREESBURG MINE, LIMPOPO PROVINCE
REF: LP 30/5/1/2/3/2/1(10219) EM

PART B

DMR REF. NO: LP 30/5/1/2/3/2/1(10219) EM
ENVASS REF. NO: EIA-EMPR-REP-32220_21

Submitted to:
Department of Mineral Resources
Limpopo Province Region

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mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

PART B- ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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EXECUTIVE SUMMARY

An Environmental Management Programme Report (EMPr) was compiled for the proposed Mareesburg Mine located in the Limpopo province taking into consideration the requirements from Department of Minerals Resources and Energy (DMRE), Limpopo Province Region.

It is the intention of ECM to apply for the necessary environmental, waste and water use licence authorisations for the proposed Mareesburg Mine/project.

Before ECM may commence with the development of mining related activities, as detailed in this report, the following environmental authorisations processes and licence applications need to be undertaken in accordance with the relevant national legislation:

- A Scoping and Environmental Impact Assessment (EIA) for any project related Listed Activities stipulated in the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA. Mareesburg Mine's new EMPr will be compiled in accordance with the National Environmental Management Act (Act No. 107 of 1998) EIA Regulations of 2014.
- An Integrated Water Use Licence (IWUL) for any project related water uses and accompanying Integrated Water and Waste Management Plan (IWWMP) under the National Water Act (Act No. 36 of 1998) (NWA), for submission and approval from the Department of Water and Sanitation (DWS).

The assessment of the biophysical environment revealed that the project area is located within the Sekhukhune Centre of Plant Endemism. Significant habitat loss has already occurred within this centre of endemism, largely attributable to the expansion of local communities and mines and associated mining exploration. Although the proposed project will result in the long-term loss of habitat and species in the region, appropriate mitigation measures have been developed for this project to minimise these anticipated impacts.

Assuming all phases of the project adhere to the mitigation and management commitments stipulated in this EIA/EMPr, it is believed that all of the negative impacts identified for the proposed project can be mitigated and managed to such an extent to either avoid or where not possible, at least minimise and remediate the impact that may occur.

Purpose of the EMPr

Part B of this report, presents the Environmental Management Programme (EMPr) of the Mareesburg Mine/ Project which has been compiled in accordance with Appendix 4 of the NEMA 2014 EIA Regulations, as amended (GNR 326) as well as the requirements of an EMPr report template issued by the DMR for listed activities associated with mining right and/or bulk sampling activities. A summary of the requirements of an EMPr is outlined in **Table 1**, including cross-references to sections in this report where the legislated requirements have been fully addressed.

Framework of the report

The report is based on the template provided by the Department of Mineral Resources for Environmental Management Programmes (EMPRs). The report includes all the Requirements for EMPRs listed in Appendix 4 of the EIA Regulations, 2014, Government Notice Regulation (GNR) 326, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 1998) [as amended] (NEMA).

Table 1: Regulatory EMPR requirements stipulated in Appendix 4 of the NEMA 2014 Regulations

Content of Environmental Management Programme		
(a) details of (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Section 1 of the EMPr makes reference to the details available in the Final EIAR (under Part 1-Section 1)	Refer to Final EIA Report (EIAR: page 1-2)
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 1 of the EMPr makes reference to the details available in the Final EIAR (under Part 1-Section 4)	Refer to Final EIA Report (EIAR page 1-2)
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers.	Section 1.4: Figure 1-5	Page 2-7
(d) a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including- (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities.	Section 2 Section 4	Page 8 – 14 Page 20-59
(e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d).	Section 2 Section 4	Page 8 – 14 Page 20-59

Content of Environmental Management Programme		
(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to – (a) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (i) comply with any prescribed environmental management standards or practices; (ii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iii) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Section 2 *Requirement for (f)(iv) for financial provision has been removed from the requirements of the EMPr and has been included in Appendix 10.* Section 4	Page 8 – 14 Page 20-59
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Section 2 Section 3	Page 8 - 14 Page 14 - 19
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f); management actions.	Section 2 Section 3 Section 4	Page 8- 14 Page 14 – 19 Page 20- 59
(i) an indication of the persons who will be responsible for the implementation of the impact.		
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented.		
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).		
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 5 Section 6	Page 60 Page 61
(m) an environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.	Section 7	Page 61-63

Content of Environmental Management Programme		
(n) any specific information that may be required by the competent authority.	Section 6	Page 63

Details of the aspects of the activity that are covered by the EMPR as identified by the project description is included in the following sections in the EIR.

Table 2: Details of the acpects of the activity covered by the EMPR which are included in the EIR

Requirement:	Relevant Sections	Page Number
(h) a full description of the process followed to reach the proposed development footprint within the approved site, including:	Section 7	Page 85-88
(i) details of the development footprint alternatives considered;	Section 7.1, Table 14	Page 86 - 87
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 8	Page 88 – 130
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 8.2, Table 15and Table 16	Page 97 – 130
(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 9, 10 and 11, Appendix 5	Page 131 – 189
(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-	Section 12 and Section 13	Page 189 – 234
(aa) can be reversed;		
(bb) may cause irreplaceable loss of resources; and		
(cc) can be avoided, managed or mitigated;		
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 14	Page 234 – 257
(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 14.3, Table 41	Page 234 – 257
(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 14.3, Table 41 and Appendix 10	Page 240 – 257
(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and	Section 15	Page 258
(x) a concluding statement indicating the preferred alternative development location within the approved site.	Section 16	Page 258 - 259

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LIST OF ABBREVIATIONS

BPG	Best Practice Guidelines
CBA	Critical Biodiversity Area
COM	Chamber of Mines
CSIR	Council of Scientific and Industrial Research
DEA	Department of Environmental Affairs
DEMC	Default Ecological Management Class
DESC	Default Ecological Status Class
DMR	Department of Minerals and Resources
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
ENVASS	Environmental Assurance (Pty) Ltd
ESAs	Ecological Support Areas
FEL	Front End Loader
FFP	Fossil Finds Procedure"
GCFR	Greater Cape Floristic Region
GN 704	Government Notice No. 704 of 4 June 1999
GN	Government Notice
GPS	Global Positioning System
GQM	Groundwater Quality Management
Ha	Hectares
I&APs	Interested and Affected Parties
IUCN	International Union for the Conservation of Nature
IWUL	Integrated Water Use License
IWULA	Integrated Water Use License Application
IWWMP	Integrated Water and Waste Management Plan
LHD	Load Haul Dump
LM	Local Municipality
LOM	Life of Mine
MPRDA	Mineral Petroleum Resources Development Act (No. 28 of 2002) [as amended]
MRA	Mining Right Area
MSP	Mineral Separation Plant
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act (No. 107 of 1998) [as amended]

NEMWA	National Environmental Management: Waste Act (No. 59 of 2008) [as amended]
NORM	Naturally Occurring Radioactive Material
NWA	National Water Act (No. 36 of 1998)
PCD	Pollution Control Dam
ROM	Run of Mine
RSIP	Rehabilitation, Strategy and Implementation Plan
SAHRA	South African Heritage Resources
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SANS	South African National Standard
SLP	Social and Labour Plan
SoCC	Species of Conservation Concern
TMM	Trackless Mobile Machine
TSF	Tailings Storage Facility
UMM	Plant Unattritioned Magnetic Material Upgrade Plant
WHIMS	Wet High Intensity Magnetic Separators
WMA	Water Management Area
WQM	Water Quality Management
WRC	Water Research Commission
WUL	Water Use Licence
WULA	Water Use Licence Application

GLOSSARY OF TERMS

Applicant / Developer: Any person who applies for an authorisation to undertake an activity or undertake an Environmental Process in terms of the Environmental Impact Assessment Regulations – National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA) as contemplated in the scheduled activities listed in Government Notice (GN) No R. 544, 545 and 546.

Archaeological resources: This includes:

- Material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- Rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- Wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Aspect: An element of an organisation's activities, products, or services that can interact with the environment. The element may cause a significant environmental impact, either beneficial or harmful. For example: Refrigerant use, wash water discharge, it could involve a discharge, an emission, or consumption or reuse of a material.

Biodiversity: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

Catchment: The area from which any rainfall will drain into the watercourse or watercourses or part of the water course, through surface flow to a common point or common points.

Clean water: Clean water is any water that has not been in contact with carbonaceous material or other potential contaminants and includes run-off from areas unaffected by mining activities, as well as areas that have been rehabilitated.

Construction activities: Activities associated with physical disturbance to the land, including the storage of machinery, equipment and materials.

Construction phase: The construction phase is the period of commencement of physical disturbance to the land, excluding rehabilitation activities, such as re-vegetation and replacing of topsoil.

Container: Disposable or re-usable vessel in which waste is placed for the purposes of storing, accumulating, handling, transporting, treating, or disposing of that waste and include bins, bin liners and skips.

Contaminated water: Means any water contamination by the activities, e.g. run-off from plant or personnel wash areas.

Contractor: Persons/organisations contracted by the Applicant to provide a service. The Contractor shall ensure compliance with this EMPr and shall request advice from the Environmental Assessment Practitioner where considered necessary and appropriate.

Corrective (remedial) action: Response required to addressing an environmental problem that is in conflict with the requirements of the EMPr. The need for corrective action may be determined through monitoring, audits or management review.

Degradation: The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Dirty water: Dirty water is any water that has been in contact with carbonaceous material or other contaminants (i.e. water containing waste), and of which the water quality has been affected and therefore has the potential to cause pollution of a water resource.

Disposal: The burial, deposit, discharge, abandoning, dumping, placing or release of waste into or onto any land.

Domestic waste: Waste (excluding hazardous waste) that emanates from premises that are used wholly or mainly for residential, educational, health care, sport, or recreation purposes (including garden and park wastes as well as municipal and food waste.

Ecology: The study of the interrelationships between organisms and their environments.

Emergency: An unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

Environment: The surroundings within which humans live and that consist of:

(i) The land, water an atmosphere of the earth;

(ii) Micro-organisms, plant and animal life;

(iii) Any part or combination of (i) and (ii) and the interrelationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

General waste: Waste that does not pose an immediate threat or hazard to health or to the environment, and includes:

(a) Domestic waste;

(b) Building and demolition waste;

(c) Business waste;

(d) Inert waste; and

(e) Any waste classified as non-hazardous waste in terms of the regulations made under section 69.

Groundwater: Water that occurs in the voids of saturated rock and soil material beneath the ground surface is referred to as groundwater and the body within which the groundwater is found is referred to as an aquifer.

Hazardous waste: Waste that contains organic or inorganic elements or compound that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or object within business waste, residue deposits and residue stockpiles.

Holder of waste: Any person who imports, generates, stores, accumulates, transports, processes, treats or exports waste or dispose of waste.

Hydrogeological: The study of distribution and movement of groundwater.

Hydrological: The study of movement, distribution and quality of surface water and groundwater.

Impact: Any change to the environment, whether adverse or beneficial, wholly, or partly resulting from an organization's activities, products, or services. For example: Ozone depletion, surface water quality degradation, impacts might include contamination of air or water, depletion of a natural resource or harm to human health.

Inert waste: waste that:

(a) Does not undergo significant physical, chemical or biological transformation after disposal;

(b) Does not burn, react physically or chemically, biodegrade, or otherwise adversely affect any other matter or environment with which it may come into contact; and

(c) Does not impact negatively on the environment because of its pollutant content and because the toxicity of its leachate is insignificant and which include discarded concrete, bricks, tiles and ceramics; discarded glass as well as discarded soil, stones and dredging spoil.

Infrastructure: The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.

Integrated: Mixing or combining all useful information and factors into a joint or unified whole. See Integrated Environmental Management.

Integrated Environmental Management (IEM): A way of managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural, and economic factors and consulting with all the people affected by the proposed developments.

Interested and/or Affected Parties: Those individuals or organisations that have an interest in the proposed development or will be directly affected by the activities of the development, as identified in the Environmental Impact Assessment (EIA) process.

Mitigation measures: Measures designed to avoid, reduce, or remedy adverse impacts.

Monitoring program: A program for taking regular measurements of the quantity and/or quality of a water resource, waste or wastewater discharge, air space or soil resource at specified intervals and at specific locations to determine the chemical, physical and biological nature of the resource, waste or wastewater discharge.

Pollutant: A contaminant at a concentration high enough to endanger the environment or the public health.

Pollution:

- National Water Act, 36 of 1998: *"Water pollution means the direct or indirect alteration of the physical, chemi-cal or biological properties of a water resource to make it –*

(1)(1)(xv) *(a)* *less fit for any beneficial purpose for which it may reasonably be expected to be used; or*

(b) *harmful or potentially harmful –*

(aa) *to the welfare, health or safety of human beings;*

(bb) *to any aquatic or non-aquatic organisms;*

(cc) *to the resource quality; or*

(dd) *to property".*

- National Environmental Management Act, No. 107 of 1998:- *"pollution means any change in the environment caused by –*

(1)(1) *(i)* *substances;*

(ii) radioactive or other waves; or

(iii) noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future."

Protection: National Water Act, 36 of 1998: *"In relation to a water resource, means –*

1(1)(xvii) (a) maintenance of the quality of the water resource to the extent that the water resource may be used in an ecologically sustainable way;

(b) prevention of the degradation of the water resource; and

(c) the rehabilitation of the water resource"

Public Participation Process: A process of involving the public to identify issues and concerns and obtain feedback on options and impacts associated with a proposed project, program or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on or raise issues relevant to specific matters.

Recycle: A process where waste is reclaimed for further use, this process involves the separation of waste from a waste stream for further use and the processing of that separated materials as a product or raw material.

Rehabilitation: Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (wherever possible) in which it was before disruption.

Reserve: National Water Act, 36 of 1998: *"the quantity and quality of water required:*

(1)(1)(xviii)(a) To satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be -

(i) Relying upon;

(ii) Taking water from; or

(iii) Being supplied from, the relevant water resource; and

(b) To protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource."

Re-use: To utilise articles from the waste stream again for a similar or different purpose without changing the form or properties of the articles.

Runoff: Surface runoff is water that finds its way into a surface water body without infiltration into the soil and may include overland flow, return flow, interflow, and base flow.

SANS 10234: Latest edition of the South African National Standard Globally Harmonised System of the Classification and Labelling of Chemicals (GHS).

Significant Impact: The activity that results in substantial breach of statutory regulations under abnormal conditions.

Surface water: All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.); also refers to springs, wells, or other collectors that are directly influenced by surface water.

Storage: The accumulation of waste in a manner that does not constitute a treatment or disposal of that waste.

Storm water: Water that accumulates on land because of precipitation events and includes runoff from areas such as roads and roofs.

Waste: National Environmental Management Waste Amendment Act (Act 59 of 2008)

"(1) (a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of NEMWA [as amended]; or

(b) any other substance, material or object that is not included in Schedule 3 of NEM:WA [as amended] that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste-

(i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;

(ii) where approval is not required, once a waste is, or has been re-used, recycled or recovered;

(iii) where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or

(iv) where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste."

Waste generator: Any person whose actions, production processes or activities including waste management activities, results in the generation of waste.

Waste management: Classifying, recycling, treatment and disposal of waste generated during operational activities.

Watercourse is: National Water Act, 36 of 1998: *"Watercourse means: -*

(1)(xxiv) (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."

Water quality: the physical, chemical, toxicological, biological (including microbiological) and aesthetic properties of water that determine sustained (1) healthy functioning of aquatic ecosystems and (2) fitness for use (e.g. domestic, recreational, agricultural, and industrial). Water quality is therefore reflected in (a) concentrations or loads of substances (either dissolved or suspended) or micro-organisms, (b) physicochemical attributes (e.g. temperature) and (c) certain biological responses to those concentrations, loads or physicochemical attributes.

Water resource: A water resource includes any watercourse, surface water, estuary, or aquifer. Watercourses include rivers, springs, and natural perennial and non-perennial channels. Wetlands, lakes, dams, or any collection identified as such by the Minister in the Government Gazette.

Water Use Licence: An authorisation from the Department to a designated water user to use water. The authorisation will provide details on the timeframes and conditions for the designated water use.

1. FINAL EMPR REPORT

1.1. Details of the EAP

Refer to Section 1 of the EIA Doument (under Part A of this report) for the details of the EAP.

1.2. Purpose of the EMPR

The EMPR is structured to take account of requirements stipulated in the MPRDA, notably Section 39 (3) (d) of the Act, read together with Regulation 50 (e), (f) and (i) and Regulation 51 (b)(i), (ii) and (iii) and Section 39 (4)(a)(iii) of the Act, as well as the requirements of Section 23 and Appendix 4 of the EIA Regulations 2014. The EMPR has also been structured to link directly to the EIR with respect to the activities and impacts associated with the project.

The primary purpose of the EMPR is to describe existing management measures at the ECM Mareesburg Mine pertaining specifically to the proposed mining activities and containing all relevant information that acts as a comprehensive management tool for the mine, by providing an easy-to-use system in which to administer Mareesburg Mine's commitments and generate a constructive process to monitor and audit commitments. The EMPR also aims to ensure that the mitigation (and optimisation) measures specified in this EIA process can effectively be integrated into existing management procedures and practices at the Mine to be implemented. This EMPR also ensures that any unforeseen or unidentified impacts of activities in proposed mining operations are detected and addressed.

By formally documenting environmental management measures and commitments, the EMPR serves a vital role in ensuring that potential negative impacts of the proposed activities are reduced, or minimised and positive impacts maximised. The EMPR, therefore, is a tool that guides the management and monitoring of impacts. If impacts are found to be higher than initially predicted in the EIA, additional mitigation measures will need to be implemented to control, reduce, or prevent an impact from occurring.
This EMPR is intended to provide an overview of the on-site environmental management philosophy and organisational structure at the Mine. In addition, it specifies common environmental management and monitoring principles that are applied and recommends additional management and monitoring where necessary.

<u>EMPR Implementation:</u>

ECM Mareesburg, its employees and Contractors are required to comply with relevant local and national legislation. ECM Mareesburg must be familiar with all legislated requirements and permit and licence conditions and agreements and be able to communicate these to the relevant persons and to monitor compliance with it. Failure to meet legal environmental requirements could result in various licences/authorisations for activities at the Mine being withdrawn and effectively result in operations having to cease until such non-compliances are addressed.

Although ECM Mareesburg will take ultimate responsibility for the implementation of the environmental management measures during all phases of the project, there are a number of key role players who will take responsibility for the implementation of the EMP, these include:

- SHE Environmental Department – communication, implementation and compliance monitoring;

- Site Manager with guidance and assisstance of SHE Environmental Department - communication and implementation of the EMPR; and
- Contracting companies working at the Mine (some semi-permanently) - communication and implementation.

ECM Mareesburg will ensure that all personnel working at the mine are made aware of the EMPR, sensitive and restricted areas and understand their responsibility to operate within the framework of the measures defined in the EMPR.

Contractor SHE inductions are conducted for all personnel working in proposed mining areas. Inductions include environmental and social awareness training to build capacity.

Lastly, the EMPR addresses all the activities that impact on the environment during planning, construction, mining, rehabilitation, and closure.

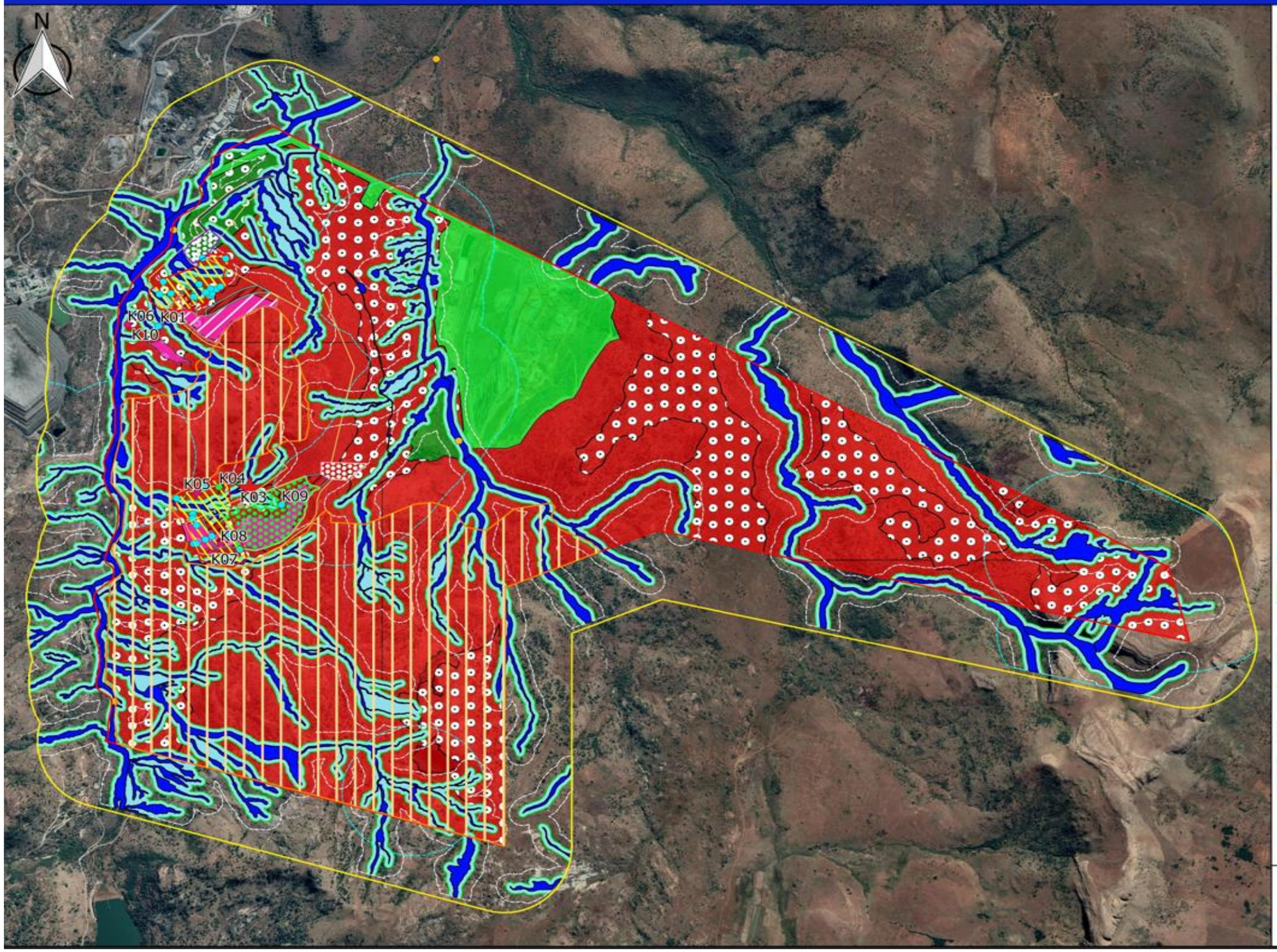
1.3. Description of the Aspects of the Activity

Refer to Section 4 of the EIA Doument (under Part A of this report) for the details of the description.

1.4. Composite Map Superimposes Activities Sensitive Areas

Note the following maps shows the sensitivities on the proposed site. Refer to **Figure 1-5** below.

PROPOSED MAREESBURG MINE: OVERALL SENSITIVITY MAP WITH INFRASTRUCTURE



Legend

- Mareesburg Mining Right Area
- 500m Assessment Radius

Preferred Alternative 1- Infrastructure

- Access Road
- Office Block

Preferred Alternative 1- Open Cast

- Preferred Opencast 1
- Preferred Opencast 2
- Waste Dump Area
- Opencast Alternative 2
- Preferred Alternative 1- Underground

Heritage Sites

- Potential Grave
- Early Stone Age
- Middle Stone Age
- Late Iron Age
- Stone Cairn
- Historic
- EIA Sites
- Sensitive Heritage Areas

Watercourse Sensitivity

- Watercourse Delineation
- Aquatic Biomonitoring Sites
- 500 m GN 509 Zone of Regulation
- 100 m GN 704 Zone of Regulation
- 32 m NEMA Zone of Regulation

Floral Sensitivity

- High
- Low
- Moderately Low

Faunal Sensitivity

- High
- Moderately High
- Low
- Moderately Low

Project: AUTH-REP-322-20_21
Mapped by: Wayne Westcott
Projection: Pseudo Mercator
Datum: WGS84
info@envass.co.za

Figure 1: Overall Sensitivity Map with proposed infrastructure

PROPOSED MAREESBURG MINE: FAUNAL SENSITIVITY MAP

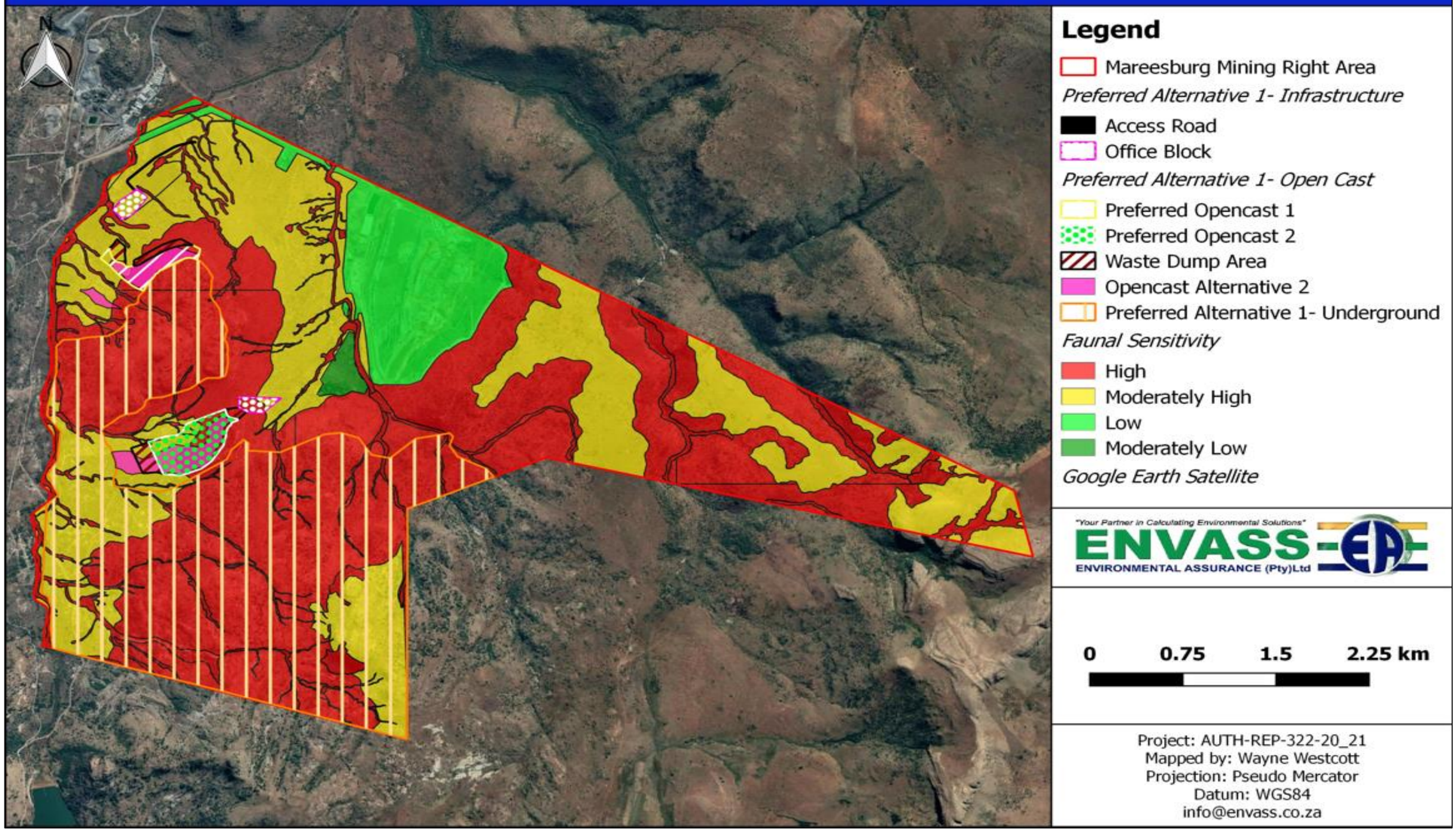


Figure 2: Fauna Sensitivites in relation to the proposed Mine

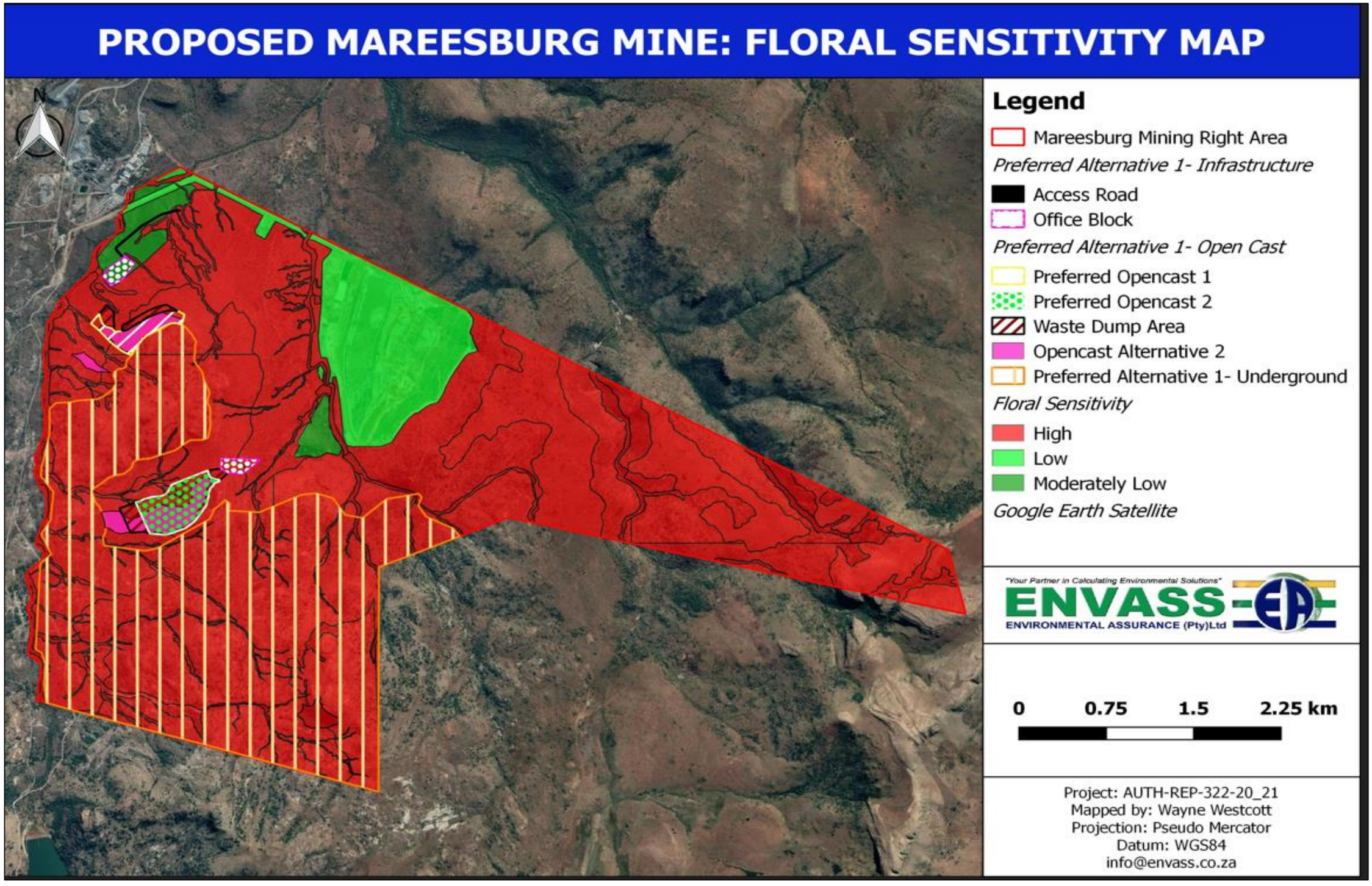
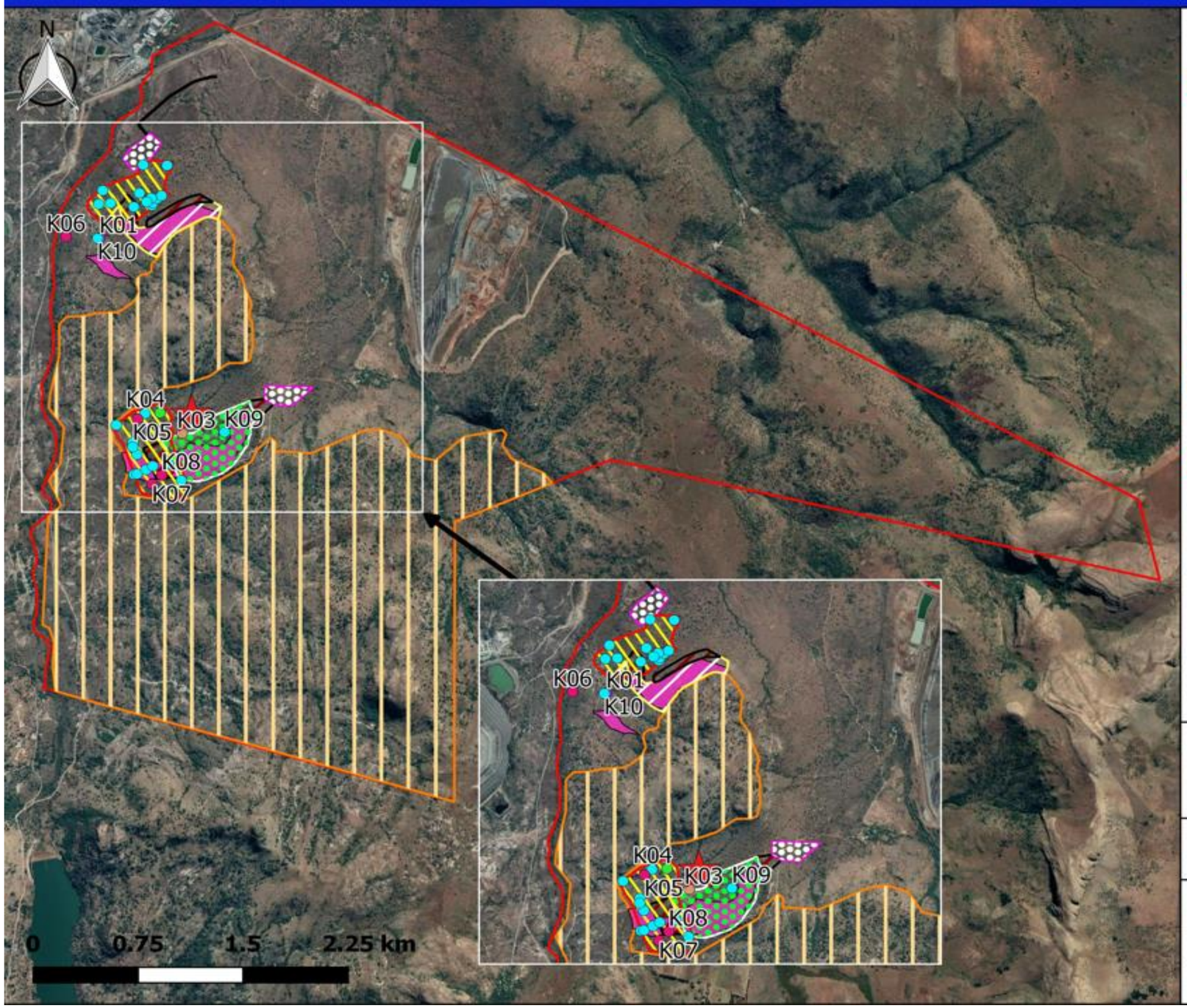


Figure 3: Floral Sensitivites in relation to the proposed Mine

PROPOSED MAREESBURG MINE: HERITAGE SENSITIVITY MAP



Legend

- Mareesburg Mining Right Area

Preferred Alternative 1- Infrastructure

- Access Road
- Office Block

Preferred Alternative 1- Open Cast

- Preferred Opencast 1
- Preferred Opencast 2
- Waste Dump Area
- Opencast Alternative 2
- Preferred Alternative 1- Underground
- Potential Grave Site
- Sensitive Heritage Areas

Heritage Sites

- Early Stone Age
- Middle Stone Age
- Late Iron Age
- Stone Cairn
- Historic

Google Earth Satellite

"Your Partner in Calculating Environmental Solutions"
ENVASS
ENVIRONMENTAL ASSURANCE (Pty)Ltd

Project: AUTH-REP-322-20_21
Mapped by: Wayne Westcott
Projection: Pseudo Mercator
Datum: WGS84
info@envass.co.za

Figure 4: Heritage Sensitivites in relation to the proposed Mine

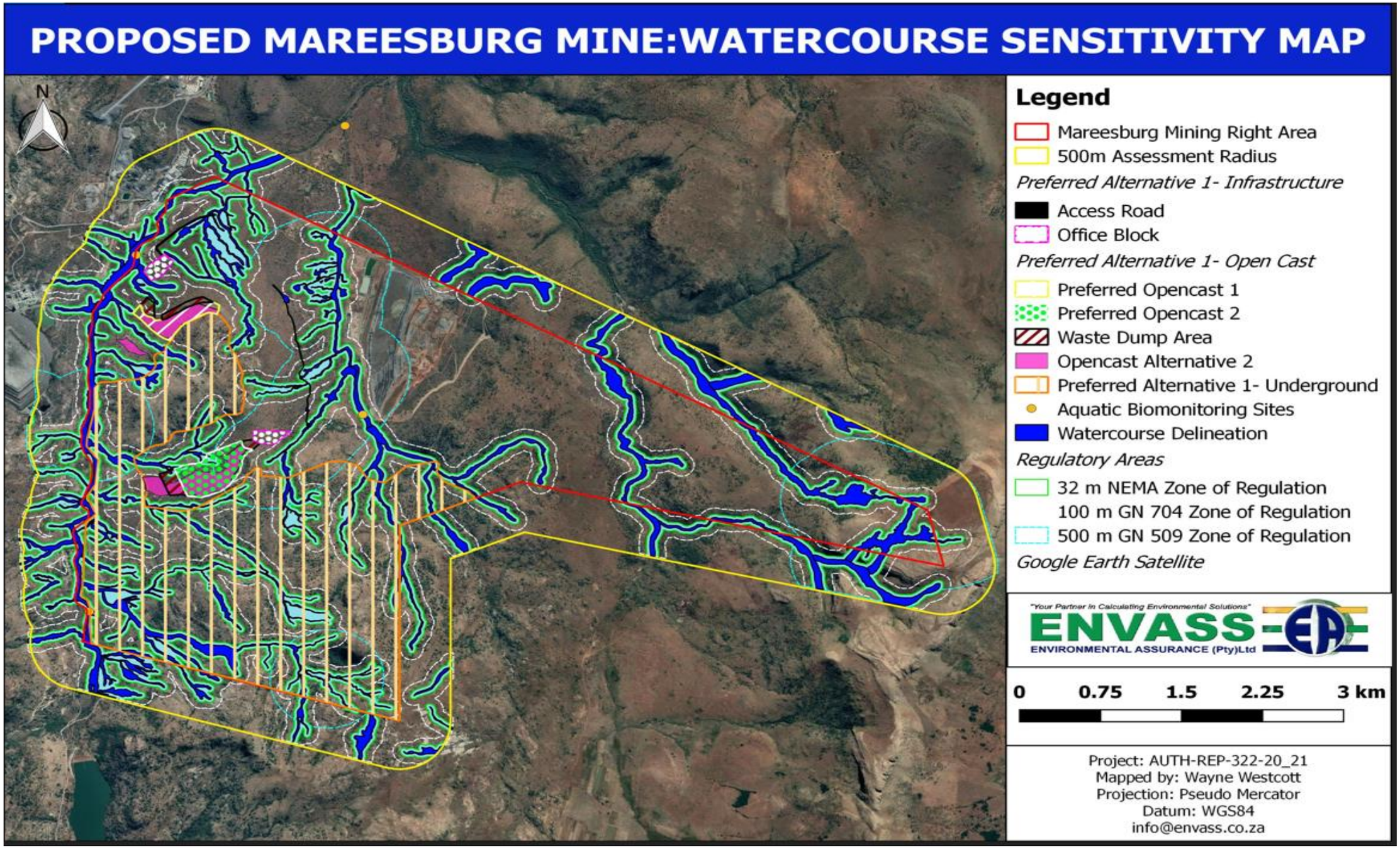


Figure 5: Watercourse Sensitivites in relation to the proposed Mine

As per **Figure 1-5** presented previously, the overall placement of required surface and axiliary infrastructure was informed by mapping the environmental sensitivities as identified by the Environmnetal Specialist studies. These can be summarised in below table as follows:

Table 3: Environmental Sensitivities

Environmental sensitivities	Description
Flora species of conservation concern	• Various flora species of conservation concern have been identified within and around the proposed project area, some of which will need to be removed to accommodate the development of the project related infrastructure after the necessary permits have been obtained from the relevant authorities. • An offset initiative would be required due to the loss of CBA habitat, EN ecosystem and the residual loss of habitat that will occur.
Mareesburg Stream (including Associated tributaries)	For the purpose of determining sensitive areas, a 100 m buffer was included for all watercourses.
Cultural heritage sites	Some of the identified cultural heritage sites will be required to be relocated, after the necessary permits have been applied for and obtained from the relevant authorities.

2. DESCRIPTION OF IMPACT MANAGEMENT OUTCOMES INCLUDING MANAGEMENT STATEMENTS

2.1. Determination of closure objectives

The current vision for closure for Mareesburg Section is:

> "To render a safe, stable and non-polluting environment aligned to regulatory and regional requirements, and ultimately provides a sustained post-closure ecosystem service or livelihood, leaving behind a positive post-mining legacy for the receiving community and our shareholders"

Underpinned by the closure vision, Mareesburg Section aims to achieve the following closure targets:

- Mine closure should be efficient and cost effective.
- Mine closure should be conducted peacefully.
- Closure actions should ensure an ELU with positive socio-economic benefits and no long-term liabilities.

The closure targets, as set out above are supported by the closure principles, which in turn is used to define specific physical, biophysical and social closure objectives. Closure principles should be used to guide the closure plan to ultimately realise the closure vision. Closure principles should typically aim to promote physical and chemical stability, compliance with legislative and regulatory obligation and facilitate social transition from an operational mine to the closure phase. The Clsoure principles for Mareesburg Section are as follows:

- Integration of land use: Rehabilitation initiatives should aim to integrate the post-mining landscape back into the regional land use.

- Protection of biodiversity value: The post-closure landscape should ensure the protection of biodiversity value by aiming to minimise degradation and maximise improvement of biodiversity indicators.
- Economic Sustainability: The operational costs associated with post closure opportunities should have no reliance on mine-provided funding in order to be sustainable. Where relevant, this excludes capital costs required for the initiation of potential opportunities.
- Socio-economic value creation: Long-term social performance objectives should be anchored around the objective of building sustainable communities. The post closure landscape should aim to reduce community dependence on the Mine.

The vision and principals are underpinned by the current objectives for closure, which may also be refined as the end of LOM approaches and this plan matures. These include:

- Legislative compliance, including industry good practices, must be ensured during Decommissioning, Rehabilitation, and Mine Closure planning;
- Mitigate all environmental impacts and aspects according to the provisions and actions of the draft EMPr(s) and this plan;
- Identify post-closure uses of land occupied by mine infrastructure in consultation with the local authorities and surrounding landowners. Should a suitable use for any mine infrastructure not be found, it will be removed;
- Undertake stakeholder engagement and ensure this closure plan is updated based on their views and concerns. This to ensure that the local workforce and communities are left with sustainable land utilisation options, ensuring post-closure
- land uses are economically sustainable; Ensure no adverse health and safety risk to humans and animals, by sealing and cordoning Shafts and/or Voids to limit access;
- Authorities are satisfied with the extent of rehabilitation and closure criteria;
- Rehabilitate all disturbed land to a condition that facilitates compliance with applicable environmental quality objectives. These environmental quality objectives include:
    - Topography and Visual: Ensure that all residue and waste stockpiles are shaped to be free draining and to resemble the natural topography. Ensure that all voids are backfilled and rehabilitated to avoid ponding and erosion and to resemble the natural topography.
    - Soil and Land Capability: Topsoil preservation for rehabilitation.
    - Revegetation of all disturbed areas to avoid erosion. Ongoing soil and erosion control monitoring. Restoring the land to the desired pre-mining land capability.
    - Terrestrial and Aquatic Ecology: Revegetation to enhance the settlement of the Sekhukhune vegetation, vegetation communities and habitat types to its pre-mining floral character. Ensuring the restoration of wetlands and watercourses if impacted. Continuous post-closure monitoring for a period of five years. Prevent the settlement of weeds, alien and invasive vegetation. To ensure that the rehabilitated habitat will promote the settlement of fauna that migrated out of the area and that pre-mining fauna numbers and diversity is achieved.

- Surface Water Resources: To ensure that there are no sources of surface water contamination clean water runoff emanates from rehabilitated footprints. To ensure that drainage patterns and flow is reinstated and that free drainage off all areas is achieved. To ensure that surface water monitoring continues post-closure until a steady state is reached as required by the legislation at the time.
- Groundwater: To ensure that there are no sources of groundwater contamination. Post-closure monitoring of groundwater until a steady state is reached.
- Socio-economic: The final rehabilitation and closure of operations must consider the impacts on local communities and local workforce by:
    - Following a comprehensive and transparent consultation and communication process with all stakeholders; and
    - Managing final closure of operations in accordance with the approved Social & Labour Plan ("SLP").

2.2. The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

Existing environmental impacts will be mitigated and managed through the implementation of the EMP. These mitigation measures have been informed by associated specialist studies. The Implementation of Environmental Management System (EMS/ISO 14001), which will also aid with managing any environmental related impacts. The EMS provides suitable mitigation measures which aim to:

- protecting the environment by preventing or mitigating adverse environmental impacts;
- mitigatigating the potential adverse effect of environmental conditions on the organization;
- assisting the organization in the fulfilment of compliance obligations;
- enhancing environmental performance;
- controlling or influence the way the organization's products and services are designed, manufactured, distributed, consumed and disposed by using a life cycle perspective that can prevent environmental impacts from being unintentionally shifted elsewhere within the life cycle;
- achieving financial and operational benefits that can result from implementing environmentally sound alternatives that strengthen the organization's market position;
- communicating environmental information to relevant interested parties.

2.3. Potential risk of Acid Mine Drainage

2.3.1. Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Due to lack of a tailings sample from Mareesburg Mine, a generic description of the Acid Mine Drainage risk associated with the Chrome tailings produced from the beneficiation of the Chromitite seams is briefly described. The Mareesburg Mine is adjacent to north AngloPlat's Der Brochen project and Northam's Everest North Project. To the north of the Mareesburg area is Glencores' Helena TSF, Magareng and Thorncliffe chrome mines. The high mining activity in the area poses an undeniable risk to the surface

and groundwater quality. Existing infrastructure on the farm includes the Mareesburg TSF (AngloPlat). In addition to the existing infrastructure, proposed surface infrastructure includes a waste rock dump, return water dams and a tailings storage facility.
A study conducted by Anglo Platinum suggests that although the mining of the Merensky and UG2 reefs resultant tailings, have relatively low acid mine drainage potential the drainage will still be high in sulphate concentration (Mudd, G.M & Glaister, B.J, 2009). Tailings are usually found to be non-acid generating, although with a potential to generate alkaline, salt-rich drainage dominated by Ca, Mg, Na, K in some cases containing NO_3, SO_4 and Cl. With tailings produced from the beneficiation of UG2, mobility of Cr is an environmental risk often associated with the leachate. At alkaline pH which is often the condition dominating the leachate from platinum tailings, Cr usually tend to form hydroxy complexes which are insoluble and not likely to mobilise. Whilst Cr(VI) will often dominate under reducing conditions and likely to mobilise under alkaline pH conditions, this need to be considered as potential risk in the mine waste management plan. The tailings will need to be classified using the protocols described in the Regulations Regarding the Planning and Management of Residue Stockpiles from a Prospecting, Mining, Exploration or Production Operation (GN No. R. 632, July 2015) for Waste Classification. It is expected that the tailings would classify as Type 3 waste requiring disposal in a Class C landfill. This can however only be confirmed once a representative sample is available for testing.

Where Nitrate-based explosives have been extensively used for mining and quarrying, residues of explosives may be oxidized to nitrates and mobilized in groundwater (Banks et al.,1996).

A geochemical characterisation including the evaluation of potential Acid Rock Drainage (ARD) study conducted at Tweefontein mine with similar geology as Mareesburg will be referenced.

2.3.2. Potential Groundwater Contamination

Seepage from the waste rock dumps and tailings dam could result in contamination of ground water resources. Acid Mine Drainage (AMD) testing has not been undertaken as part of this study and samples from similar mines cannot be considered as representative.

In the absence of AMD/ Waste Classification test results, **Table 4** below provides a summary of potential contaminants from each of these diffuse sources. This table should be amended subject to the completion of AMD/ Waste Classification testing and assessment.

Table 4: Summary of diffuse sources and potential contaminants

Source	Contaminants
Waste rock dumps	High salinity, high hardness, heavy metals, sulphate, nitrates
Tailings dam	High salinity, low levels of metals (depending on pH), nitrates, suspended solids, calcium, sulphate, sodium and chloride

The results of the Numerical Groundwater Modelling indicate that the seepage from the TSF and waste rock dumps, is not expected to impact the baseflow of any streams. The opencast pit will act as a sink and the contamination from the facilities are likely to be directed towards the opencast areas. It is also expected that contaminated seepage from the flooded mines is likely to affect baseflow of the Groot-Dwars River and the unnamed tributary of the Dwars River as well as boreholes MBH1, MBH2 and MBH3 with contaminant loads ranging between 5 and 100 mg/L. However, it is important to note that no geochemical data was made available during the study and model updates are imperative to accurately estimate the potential impacts from the mine. It is anticipated that both the Return Water Dam and Tailing Storage Facility will be lined, which will decreases the potential for seepage to ground water.

2.3.3. Summary of ARD Test Results

In summary, Delta H assessed the acid production and neutralisation potential of the Tweefontein Mine samples based on the classical ABA and NAG methods as well as under consideration of the sulphur speciation in the samples. All the samples of tested Tweefontein Mine samples were classified as non-acid generating (NAG).

A geochemistry study in terms of Waste Rock and Tailings Classification and Assessment at Tweefontein Mine report (SRK Project Number 537819) concluded that acid base accounting and NAG tests indicated that the waste rock and tailings are currently alkaline and will stay NAF in the long term. SANS 10234 classification indicates that the waste rock and tailings are non-hazardous.

2.3.4. Acid Base Accounting

Acid-Base Accounting is a first-order classification procedure whereby the acid neutralizing potential and acid generating potential of rock sample are determined and the difference (net neutralizing potential) is calculated (ABA, 2000). This assessment is a valuable predictive tool used to divide samples into categories that either require, or do not require, further determinative acid potential generation test work.

The method involves the combined measurements of sulphur species, neutralization potential (NP) and pH, accompanied by the calculation of acid potential (AP), net neutralization potential (NNP) and neutralization potential ratio (NPR) (ABA, 2000).

Table 5 : Rock Type Classification (Menco, 2013)

Rock Tyoe	Classification	Leco Test and Neutralization Potential Ratio (NP:AP)
Type I	Potentially Acid Forming	Total S(%) > 0.25% AP:NP or less
Type II	Intermediate	Total S(%) > 0.25% and AP:NP ratio 1:3 or less
Type III	Non-Acid Forming	Total S(%) < 0.25 % and AP:NP ratio 1:3 or greater

2.4. Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Not applicable.

2.5. Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage

Acid mine drainage is not anticipated, although there was no geochemical data available during the study, the following specific management measures are recommended to be implemented:

- Surface sources be lined, and that necessary water management infrastructure is considered to cater for storm and overflow events.
- A regional approach is followed in conjunction with the existing mines to manage and reduce the collective impact on the catchment.
- Broaden the groundwater quality baseline. This will be achieved through the drilling of groundwater monitoring boreholes, prior to the commencement of mining
- The hydro-census should also be repeated every 5 years to update the groundwater user and potential receptor database.

2.6. Volumes and rate of water use required for the mining, trenching or bulk sampling operation

A water use licence application is is being applied for as part of the integrated environmental authorisation process for the Mareesburg Mine Project. Final volumes required has not been determined at this stage. Based on preliminary investigations it is anticipated the following volumes are relevant:

- At a mining rate of 3 Mt / annum and a water demand ratio of 1.68 the water demand will be as follows:
  - ✓ 5 040 000 m^3 / annum.
  - ✓ 13 808 m^3 / day or 13.8 Megalitres per day (Mℓ/d).

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

Breakdown of the water uses that will be triggered by the Mareesburg Mine Project includes:

- *Section 21 (a) Taking water from a water resource;*
- *Section 21 (b) Storing water;*
- *Section 21 (c) Impeding or diverting the flow of water in a watercourse;*
- *Section 21 (e): Engaging in a controlled activity;*
- *Section 21 (i) Altering the bed, banks, course, or characteristics of a watercourse;*
- *Section 21 (g) Disposing of waste in a manner which may detrimentally impact on a water resource; and*
- *Section 21 (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.*

The appropriate application process for a WUL is being applied for. Regulation 704 also sets out measures to be adopted by mines to protect and minimise impact of water resources.

2.8. Impacts to be mitigated in their respective phases

The impact assessment in Section 12 of the Final EIA Report details the potential impacts associated with the proposed Project during the pre-construction, construction, operational, closure and rehabilitation and post closure phases. **Table 8-9** within this EMPr can also be referred.

2.9. Impact Management Outcomes and Actions

The main outcomes of the implementation of the management measures, detailed within Section 2 of this report, are to avoid and minimise the impacts that may be associated with the Mareesburg Mine Project throughout all phases of the project as well as achieve compliance with certain applicable standards as summarised in **Table 8-9**.

3. FINANCIAL PROVISION

3.1. Determination of the amount of financial provision determination of the amount of financial provision

3.1.1 Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under regulation 22 (2) (d) as described in 2.4 herein.

The objective for closure of the mining operations of the Mareesburg mining right area is to create a free draining post mining landscape that has been returned to a productive post mining land use. The proposed final land use is likely to be primarily wilderness. The possibility of alternative land uses such as low-intensity grazing and arable land can be investigated. Rehabilitation should ensure that there are no remnants of structures with no beneficial post-mining use or material from mining related activity on site and that the area is suitable for revegetation. The strategies identified to mitigate potential risk during the risk assessment undertaken developed to align with the requirements of the objectives identified.

Closure Vision, Principles, Objectives and Targets

The current vision for closure for Mareesburg Section is:

> "To render a safe, stable and non-polluting environment aligned to regulatory and regional requirements, and ultimately provides a sustained post-closure ecosystemservice or livelihood, leaving behind a positive post-mining legacy for the receivingcommunity and our shareholders."

Underpinned by the closure vision, Mareesburg Section aims to achieve the following closure targets:

- Mine closure should be efficient and cost effective.
- Mine closure should be conducted peacefully.
- Closure actions should ensure an ELU with positive socio-economic benefits and no long-term liabilities.

The closure targets, as set out above are supported by the closure principles, which in turn is used to define specific physical, biophysical and social closure objectives. Closure principles should be used to guide the closure plan to ultimately realise the closure vision. Closure principles should typically aim to promote physical and chemical stability, compliance with legislative and regulatory obligation and facilitate social transition from an operational mine to the closure phase.

Closure principles should be used to guide the closure plan to ultimately realise the closure vision. Closure principles should typically aim to promote physical and chemical stability, compliance with legislative and regulatory obligation and facilitate social transition from an operational mine to the closure phase. **Table 6** defines the overreaching mine closure principles for Mareesburg Section.

Table 6: Mine Closure Principles

Closure Aspect	Closure Principle
Integration of land use	Rehabilitation initiatives should aim to integrate the post-mining landscape back into the regional land use.
Protection of biodiversity value	The post-closure landscape should ensure the protection of biodiversity value by aiming to minimise degradation and maximise improvement of biodiversity indicators.
Economic sustainability	The operational costs associated with post closure opportunities should have no reliance on mine-provided funding in order to be sustainable. Where relevant, this excludes capital costs required for the initiation of potential opportunities.
Socio-economic value creation	Long-term social performance objectives should be anchored around the objective of building sustainable communities. The post closure landscape should aim to reduce community dependence on the Mine.

The vision and principals are underpinned by the current objectives for closure, which may also be refined as the end of LOM approaches and this plan matures. These include:

- Legislative compliance, including industry good practices, must be ensured during Decommissioning, Rehabilitation, and Mine Closure planning;
- Mitigate all environmental impacts and aspects according to the provisions and actions of the draft EMPr(s) and this plan;
- Identify post-closure uses of land occupied by mine infrastructure in consultation with the local authorities and surrounding landowners. Should a suitable use for any mine infrastructure not be found, it will be removed;
- Undertake stakeholder engagement and ensure this closure plan is updated based on their views and concerns. This to ensure that the local workforce and communities are left with sustainable land utilisation options, ensuring post-closure land uses are economically sustainable;
- Ensure no adverse health and safety risk to humans and animals, by sealing and cordoning Shafts and/or Voids to limit access;
- Authorities are satisfied with the extent of rehabilitation and closure criteria;
- Rehabilitate all disturbed land to a condition that facilitates compliance with applicable environmental quality objectives. These environmental quality objectives include:

- Topography and Visual: Ensure that all residue and waste stockpiles are shaped to be free draining and to resemble the natural topography. Ensure that all voids are backfilled and rehabilitated to avoid ponding and erosion and to resemble the natural topography.
- Soil and Land Capability: Topsoil preservation for rehabilitation. Revegetation of all disturbed areas to avoid erosion. Ongoing soil and erosion control monitoring. Restoring the land to the desired pre-mining land capability.
- Terrestrial and Aquatic Ecology: Revegetation to enhance the settlement of the Sekhukhune vegetation, vegetation communities and habitat types to its pre-mining floral character. Ensuring the restoration of wetlands and watercourses if impacted. Continuous post-closure monitoring for a period of five years. Prevent the settlement of weeds, alien and invasive vegetation. To ensure that the rehabilitated habitat will promote the settlement of fauna that migrated out of the area and that pre-mining fauna numbers and diversity is achieved.
- Surface Water Resources: To ensure that there are no sources of surface water contamination clean water runoff emanates from rehabilitated footprints. To ensure that drainage patterns and flow is reinstated and that free drainage off all areas is achieved. To ensure that surface water monitoring continues post-closure until a steady state is reached as required by the legislation at the time.
- Groundwater: To ensure that there are no sources of groundwater contamination. Post-closure monitoring of groundwater until a steady state is reached.
- Socio-economic: The final rehabilitation and closure of operations must consider the impacts on local communities and local workforce by:
    - Following a comprehensive and transparent consultation and communication process with all stakeholders; and
    - Managing final closure of operations in accordance with the approved Social & Labour Plan ("SLP").

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

The environmental objective in relation to closure was reported in the Draft EIA Report which was made available to all registered I&AP's for comment for a period of 30 days. All comments received and the relevant meeting minutes are appended to this report. The environmental objectives have also been released for public review and comment for a period of 30 days before the EIAR and EMPr is finalised and submitted to the DMRE for a decision.

3.1.3 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.

The rehabilitation plan will only be developed towards the decomisioning phase subject to availability of collected information during operational phase. There will also be concurrent rehabilitation during the opencast mining. The strategic intent of Mareesburg Mine's rehabilitation requirements are compatible with closure objectives and is detatiled as follows:

Waste Rock Dumps

No specific commitment has been made in the EMP as to the method of rehabilitating the waste rock dumps, therefore, the dumps will be consolidated and shaped to approximate the natural topography as it is assumed that during operation the dumps will be constructed with a sustainable slope and in a manner, which will not have a significant visual impact

As there are limited topsoil resources in the area, no placement topsoil will be undertaken, however, subsoil will be placed on the dump to create "islands" of soil into which vegetation can become established. Hardy vegetation that is likely to root into low fertility soils will be established on the dump.

Drainage infrastructure will remain in situ.

Roads

The following commitments have been made:

- lift gravel and dispose on waste rock dump.
- rip surface (gravel roads).
- regrade surface.
- soil, where available will be put back before re-vegetation is done.
- land capability will be restored, as far as reasonably practicable to its original capability.
- plant life will where practicable be established on the rehabilitated rock dumps.

Water management

Surface and groundwater provision will initially be focussed on continuous monitoring to assist in evaluating the potential associated risk. If and where site specific conditions require it, specialists' studies and modelling will be undertaken to quantify the risk and to consider related management measures. The focus remains on the implementation of the Integrated Water and Waste Management Plans (IWWMP), which are frequently updated to support continuous improvement.

Demolition assumptions

The removal of infrastructure will occur at the time of general mine closure. Special measures to protect adjacent structures which may otherwise remain operational have not been considered. It is assumed that:

- infrastructure will be removed, and sub-surface structures will be backfilled or sealed off.
- all infrastructures will be demolished with the view that the only salvage will be scrap value.
- should, at closure, any structure or item have intrinsic value other than the scrap value, it is foreseen that it could be recovered as long as the total rehabilitation cost is not increased. This option could only be evaluated at closure.
- underground workings will be sealed with shaft plugs.
- underground infrastructure will be left in place unless the resale value warrants removal.
- inert rubble will be disposed of underground.

Additionally, accoreding to the Financial Provision as per Appendix 9.12.1 of this submission. The annual rehabilitation plan must ensure:

- A review of concurrent rehabilitation and remediation activities already implemented;
- Establish rehabilitation and remediation goals and outcomes for the forthcoming 12 months, which contribute to the gradual achievement of the post-mining land use, closure vision and objectives identified in the holder's final rehabilitation, decommissioning and mine closure plan;
- Establish a plan, schedule and budget for rehabilitation for the forthcoming 12 months;
- Identify and address shortcomings experienced in the preceding 12 months of rehabilitation; and
- Evaluate and update the cost of rehabilitation for the 12-month period and for closure, for purposes of supplementing the financial provision guarantee or other financial provision instrument.

3.1.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The rehabilitation plan will be crafted following data gathered during operation and be informed by the closure objective as highlighted above.

It's estimated that actions required to complete final decommissioning and rehabilitation of each proposed project will be implemented over a period of approximately two years, assuming that concurrent rehabilitation will be done during LoM where possible in relation to the closure objectives. A highlevel mining schedule has been developed and included in the liability estimate to provide detail on proposed mine progression and implementation timeframes for each individual project. Once these actions have been completed, the operation should ensure an additional three-to-five-year post closure monitoring period for the site. This includes undertaking ongoing monitoring and implementing any required remedial actions (such as repairs of erosion, re-vegetation, surface, and groundwater monitoring etc) where required. The proposed period is considered adequate for biological processes to demonstrate sustainability and stability. During this period sufficient data will also need to be collected to prove that the relinquishment criteria have been achieved and a closure certificate can be applied for.

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

The financial liability quantum defines both the final (scheduled) and premature (unscheduled) closure estimates for the Mareesburg Section Project. The quantum includes additional allowances for contingencies at 10% and Preliminary and General ("P&G's") allowance for contractors at 6%. In accordance with the requirements of the NEMA Financial Provision Regulations, the reported quantum of financial lability is not discounted against the potential salvage value of any demolished infrastructure, even though there may be possible re-sale value associated with it.

<u>Premature Closure Liability</u>

Premature closure (unscheduled) cost generally represents the liability, should the mine close and all decommissioning and rehabilitation actions need to be undertaken immediately. The reported premature closure liability for the proposed new activities

reflects the liability expected to be realised within the 12-month period following approval. The quantum therefore only considered activities expected to commence within the 12 months following approval. The premature closure liability is estimated at R20 801 465,49 (excl. VAT).

Final Closure Liability

The Final closure (Scheduled) cost considers a planned mine closure event according to the overall mine plan. The LOM scenario for closure, referenced in this final cost assessment, is based on information provided by the Samancor Cr Mineral Resources Management Department. The life of the proposed Mareesburg Section Projects is currently estimated to be 20 years (i.e., LOM in 2042).

The final closure cost assessment shows a projected increase in liability into 2023 with a gradual decrease over the remaining LOM, considering concurrent rehabilitation initiatives at the opencast mining sections. The LOM liability is expected to be reached by 2030 and will remain relatively constant over the remaining life of the operation until planned closure in 2042. The final closure liability is estimated at R13 694 131,73 (excl. VAT).

3.1.6 Confirm that the financial provision will be provided as determined

Once the EA has been received, the applicant will review the annual rehabilitation plan as per GNR 1147, a financial provision as per regulation 7 and 8 must be provided. On 19 May 2022, the Minister of Froestry, Fisheies and the Environment, published an amendment to the Finanial Provisioning Regulations, 2015 in Government Gazette 46378, Notice Number 2087. The amendment of regulation 17B extends the deadline for compliance with the financial provisioning regulations from from 19 June 2022 to 19 September 2023 for holders of a right or permit who applied for such right or permit prior to 20 November 2015.

Please refer to Section 17 Section 39(4)(a)(ii) of the MPRDA read together with Section 41(1) stipulates that before an EMPR can be approved, an applicant must make the prescribed financial provision for the rehabilitation or management of negative environmental impacts.

ECM Mareesburg will undertake an annual closure cost assessment. This assessment informs the annual contribution made by ECM Mareesburg to a rehabilitation fund. This is the most practical method of ensuring that the actual cost of closure and the quantum of financial provision are closely aligned because of the method of continual rehabilitation that takes place at the mine, and because some areas which are currently being applied for will only be mined in the future (when prices will have changed, and rehabilitation techniques refined).

4. MECHANISMS FOR MONITORING COMPLIANCE

4.1. Mechanisms for Monitoring Compliance

Ongoing compliance monitoring is anticipated for Mareesburg Mine from respective related Environmental Authorisation conditions such as permits and licences. Details related to specific Mareesburg Mine compliance monitoring requirements were sourced from respective specialists' studies and are provided in **Table 7** below.

Table 7 : Compliance Monitoring

Monitoring of impact Management Action	Source Activity	Monitoring & Reporting Frequency	Mechanism for Monitoring Compliance	Rsponsible Persons	Time period for implementing impact Management Actions
Soils	Information in this section is sourced from: - Agriculrtural Agro-Ecosystem Speciliast Assessment (Appendix 9.2) - Terrestrial Biodiversity Assessment (Appendix 9.4.1-9.4.3)	Continuous (Daily, Weekly, Monthly and as the need arise)	Visual Site Inspections	Site Manager/ SHEQ/ ECO	Construction, Operational and Rehabilitation.
Groundwater Quality Monitoring Groundwater levels.	Information in this section is sourced from: - Geohydrological Assessment (Appendix 9.3)	Biennually Monthly	- Water Quality Analysis. - Static grounwater levels. - Groundwater inflow mechanisms. - Monitoring of boreholes. - Model Verifcation.	SHEQ Manager	Construction, Operational, Rehabilitation and Closure.
Terrestrial Biodiversity (Fauna and Flora)	Information in this section is sourced from: -Terrestrial Biodiversity Assessment (Appendix 9.4.1-9.4.3)	Continuous (Daily, Weekly, Monthly and as the need arise)	- Alien and invasive Eradication. Monitoring - Visual inspections. - Monitoring of rescued and relocated floral SCC. - Adherence to the Rehabilitation Plan - Adherence to the Biodiversity Action Plan. - Post Rehabilitation Monitoring.	SHEQ and ECO	Planning, Construction, Operational, Rehabilitation and Closure
Aquatic Biodiveristy: Construction of surface support infrastructure such as offices workshops and parking Contruction of Access Roads	Information in this section is sourced from: -Aquatic Biodiversity Assessment (Appendix 9.5)	Monthly.	- Biomonitoring to be conducted on a biannual basis (once in the summer and once in the winter) and the reports submitted to the DWS on a biannual basis	SHEQ/Mine Manager	Prior to Construction.

traversing watercourses.					
Aquatic Biodiveristy: Construction of surface support infrastructure such as offices workshops and parking:		Two weekly Monthly. Continuous.		SHEQ/Mine Manager	Construction
Aquatic Biodiveristy: Development and Operation of clean and dirty water separation systems as well as PCDs surrounding the proposed mining and infrastructure areas outside the delineated extent of the watercourses and the 100m GN704 regulated Zones		Monthly. Continuous.		SHEQ/Mine Manager	Construction and Operational
Aquatic Biodiveristy: Open cast mining activities outside the delineated extent of the watercourses and the 100m GN704 regulated Zones		Monthly. Continuous.		SHEQ/Mine Manager	Operational
Aquatic Biodiveristy: Dewatering of the open cast pits for safe mining conditions		Monthly. Continuous.		SHEQ/Mine Manager	Operational
Aquatic Biodiveristy: Rehabilitation of Mining areas (Backfilling and decanting.		Monthly. Continuous.		SHEQ/Mine Manager	Operational,Rehabilitation and Closure.
Visual	Information in this section is sourced from: - Visual Impact Assessment (Appendix 9.1)	Continous	- Visual Inspections	SHEQ/Mine Manager	Construction and Operational
Air Quality	Information in this section is sourced from: - Air quality Impact	Monthly	- The proposed Dust fallout monitoring points consisting of 9 singles dust buckets	SHEQ/ Contractor/ Mine Manager	Construction and Closure

	Assessment (Appendix 9.8)				
Noise and Vibration	Information in this section is sourced from: - Noise and Blasting Impact Assessment (Appendix 9.6)	Biannually	- Monitoring Programme	SHEQ/ Contractor/Mine Manager/Specialist	Construction, Operational and Closure
Heritage	Information in this section is sourced from: - Heritage Impact Assessment (Appendix 9.11)	Continuous	- Visual Inspections	SHEQ, ECO and Heritage Specialist.	Construction
Traffic	Information in this section is sourced from: - Traffic Impact Assessment (Appendix 9.9)	Continuous	- Visual Inspections	Mine Manager	Construction, Operational and Closure
Social (Skills developments, employment opportunities,	Information in this section is sourced from: Socio-Economic Impact Assessment (Appendix 9.10)	Continuous	- Social and Labour Plan - Social and Labour Plan Closure Report - Social and Labour Annual Report Mining Charter	HR/Transformation/Site Managers	Construction and Operational
Decommissioning and Closure cost to Samancor.Schedule Closure - Planned loss of permanent and employment opportunities, stakeholders are engaged at the earliest planning stages of closure that result in acceptability by key stakeholders.	Information in this section is sourced from: Socio-Economic Impact Assessment (Appendix 9.10)	Continuous	- Closure plan - Monitoring of the rehabilitation success will take place for at least 3 years and will include corrective follow-up action - The rehabilitation monitoring reports will be submitted to the DMR on an annual basis during the Decommissioning / Closure Phase	HR/Transformation/Site Managers	Closure and Post Closure

Table 8 and **Table 9** provide insight into the Impact Management Outcomes and Actions as well as the impact to be mitigated in their respective phases.

Table 8: Activities for Mining Phases

Phases	Activities
(C) - Construction	1. Clearing of vegetation and topsoil and excavation for the access and haul roads, pollution control dam footprint and opencast areas. 2. Stockpiling of topsoil for rehabilitation purposes. 3. Earthworks to excavate in preparation for mining and infrastructure construction. 4. Stockpiling of overburden for later rehabilitation. 5. Loading and hauling of topsoil and overburden to stockpiles respectively. 6. Construction of infrastructure required including offices, workshops, ablution facilities, pipelines, powerlines, conveyors, processing plant, powerlines. 7. Construction of Diesel Storage Tanks. 8. Drilling of abstraction and monitoring boreholes. 9. Construction of water management infrastructure (water supply dams, stormwater control berms, PCD's). 10. Construction of access and haul roads. 11. Dust Suppression. 12. Construction of waste rock dumps and tailings storage facilities.
(O) - Operational	1. Clearing of vegetation and topsoil by bulldozer/frontend-loader during opencast mining. 2. Stockpiling of topsoil and overburden for later rehabilitation. 3. Opencast mining using heavy duty earth moving equipment. 4. Blasting. 5. Stockpiling of ROM. 6. Loading, hauling and transport by truck of ROM to stockpiles and processing plant. 7. Crushing, screening and washing of ROM. 8. Deposition of waste rock onto waste rock dump. 9. Deposition of tailings onto the Tailings Storage Facility 10. Maintenance of the PCD and other stormwater infrastructure. 11. Dust Suppression
(CP) - Closure	4 Backfilling and landscaping. 5 Topsoil placement and reseeding concurrent rehabilitation. 6 Monitoring of rehabilitated areas.

Table 9: Environmental Management Specifications for Planning, Construction, Mining and Rehabilitation

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
• Activity: Opencast, Underground Mining and the Operation of Mareesburg Shafts and Auxiliary Infrastructures (Ventilation Shafts, Waste Rock Dumps, Workshops, Offices, Associated Buildings and Water Management Infrastructure)											
Soils	• Potential failure to correctly stockpile topsoil leading to: - Potential contamination of topsoil stockpiles with AIP propagules. - Potential contamination of topsoil due to incorrect on-site practices. - Compaction of stockpiled topsoil leading to loss of viable soils for rehabilitation. - Reduction in topsoil due to erosion. - Inadequately vegetating stockpiled topsoil resulting in degradation of soils.	• Loss of viable soil for rehabilitation, thus hampering the potential for plant species to successfully establish during concurrent rehabilitation activities thereby impacting the re-establishment of faunal habitat and faunal communities.	• Soil stripping should be guided by the mining plan. • All areas to be stripped firstly of topsoil and stockpiled in a designated area. • Do not mix sub-soil with topsoil and fertile soil. • Topsoil stockpiles to be protected from weathering conditions such as covering the stockpiles with indigenous, non-invasive vegetation. • Develop and implement a soil conservation and stockpile management plan. • Stockpiles must not be located within 100 m of any recognized water course. • Topsoil stockpiles will be restricted to less than 2.5 m in height. • Maintain the topsoil stockpile and ensure topsoil is not lost to erosion. • Implement soil conservation and management measures, as per National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 37603 No 331). • Place stripped topsoil directly onto re-profiled and shaped areas to minimise the volume of soil to be stockpiled. • Stockpiles must be sited upslope from any development. • Construction areas (e.g. material lay down areas), topsoil and subsoil must be protected from contamination or pollution. Stockpiling must not take place in drainage lines or areas where it will impede surface water runoff. • Stockpile box cut soils, and soils stripped from the mining infrastructure for later use in rehabilitation. • Continue to accurately demarcate all topsoil stockpiles on the rehabilitation plan (map) and monitor and record the LoM topsoil balance so as to ensure that a deficit of cover material is not present once final shaping and levelling must commence per mining area. • Mixing of cement, concrete, paints, solvent, sealants and adhesive must be done in specified areas on concrete aprons or on protected plastic linings to contain spillage or overflow onto soil to avoid contamination of underground water and environmental damage. • Soil that is contaminated by fuel or oil spills, for example from mining vehicles, will be collected and disposed of as hazardous waste.	• Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 37603 No 331). • Rehabilitation plans during all phases in line with GN R. 1147 of NEMA	Site Manager/ SHEQ/ ECO			X	X	X	

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			• Use containment and sealed surfaces to prevent soil contamination by hydrocarbons, etc. • Frequent Inspections of areas prone to contamination. • Report, record, investigate and remediate incidents related to contamination of soil resources. • Ensuring corrective and preventative actions are taken to address nonconformities such as contamination/ pollution of soil. • Develop, implement, monitor and continuously update the rehabilitation plans during all phases in line with GN R. 1147 of NEMA. • Topsoil and fertile soil to be protected from contamination (i.e., hydrocarbons or infertile material). • Implement storm water control measures on topsoil to prevent any contamination from (i.e., hydrocarbons) • Rehabilitation of areas after the completion of works as soon as possible. • Clean up any areas of soil contamination. • Sample soil underlying hazardous waste sites for residue stockpile. • Cleaned areas should be free draining							
	• Increased risk of erosion and potential inadequate stormwater management	• Loss of soil, the down-slope sedimentation of freshwater habitat and the consequent loss of habitat beyond the planned footprint	• Implement a storm water management plan that shall include: ✓ Constructed storm water diversion berms for all stockpiles to protect against erosion and dirty water contamination. ✓ Drainage channels, where applicable to minimise erosion. ✓ Preventative measures for subsequent siltation • Vehicle passages should be minimised to reduce soil breakdown. • Regular inspection of erosion prone areas for signs of erosion. • Report, record, investigate and remediate incidents related to erosion. • Ensuring corrective and preventative actions are taken to address nonconformities such as erosion. • Monitor and correct hillside slopes for movement and erosion. • Monitor and correct vegetation on flat and steep slopes to prevent erosion. • Stockpile box cut soils, and soils stripped from the mining infrastructure for later use in rehabilitation. • Consider continuous re-vegetation at the areas denuded during construction and operational phase to prevent erosion during flood events. • Cover exposed erodible surfaces and slopes with topsoil.	• Manage soil erosion in line with the requirements of the National Norms and Standards under The Conservation of Agriculture Resources Act (Act no. 107 of 1998) (GN R 2687 of 1985-12-06 and GN R 280 of 2001-03-30). Requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained.				X	X		

	Aspect	Impact	Mitigation measures/ Actions	Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
Groundwater	• Pump out of the ingress water on the workings during mining and after mining	• The reduction in the groundwater levels	• Continuous monitoring of the groundwater levels in the monitoring boreholes. • Data should be stored electronically in an acceptable database • On the completion of every sampling run a monitoring report should be written. Any changes in the groundwater levels and quality should be flagged and explained in the report. • A compliance report can be submitted to DWS as per the requirements of the licence. • Alternative sources can include a new borehole or a water supply pipeline from the mine. • The quantity of water removed from underground, opencasts/pits and boreholes shall be metered and recorded daily • A comprehensive quarterly analysis of the dedicated monitoring boreholes • It is recommended that the sampled hydro-census boreholes are monitored as need arise based on monitored boreholes data analysis. The remaining hydro-census boreholes should be re-visited (and sampled if considered necessary) every five (5) years. • Rainfall should be monitored daily. • Underground water intersections should be sealed as far as possible to reduce the inflow volumes. Water that cannot be sealed can be pumped to holding dams. • It is important to collect the following information from the start of the underground mining to improve the understanding of the groundwater inflow mechanisms: - Accurate maps indicating underground water intersections. - Record water volumes that are intersected and volumes pumped from the mine. - Collect water samples at the ingress points as the chemistry can provide information on the source of the water. - Measure and record the water pressure (if possible) at the ingress point as this will provide information on the groundwater elevation. - Model verification and a model update is recommended as soon as more detailed information is made available.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).	SHEQ/Mine Manager			X	X	X	X
	• Rainwater and groundwater seepage into the mining operations.	• Deterioration of the groundwater quality due to contaminant seepage from the mining operation	• If surface and/or groundwater pollution has occurred or may possibly occur, the ECM conduct an internal investigation, and should a need arise, the specialists to conduct the necessary investigations and implement additional monitoring, pollution prevention and remediation measures. • ECM shall continue monitor on quarterly basis the water resources at groundwater motoring points to determine the	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998). • SANS 241:2015 / 2011 / 2006 • Guidance on the design of sampling programmes and sampling techniques: SANS				X	X		
	• The likely residual impact after re-watering of the mine, on streams and monitoring boreholes.	• Rewatering of the mining void after mining has ceased.								X	X

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			impact of the facility and other mining activities on the water quality by taking samples at the monitoring points. • All dirty water conveyance and holding facilities shall be appropriately lined to prevent pollution of groundwater (As presented and approved by DWS). • Separation of unpolluted from polluted surface water and the containment of polluted water on site in impoundments. Clean and dirty water systems should be separated. • Where leachate is generated, it must be contained separately from water which is only slightly polluted through contact with the waste. • No waste disposal at sites other than that provided for in the project design. • Activities that can lead to groundwater contamination (such as refuelling areas, storage areas for used oil, vehicle maintenance and washing) will be conducted in a way that contaminants are contained in sealed and bunded areas, or sealed under roofs, or in appropriate traps and sumps. • Install water collection and pumping systems within the mining areas capable of rapidly pumping water out, so minimising contact of water with the geochemically reactive material. • The monitoring results must be interpreted annually by a qualified hydrogeologist and the monitoring network should be audited annually to ensure compliance with regulations. • Numerical groundwater model must be updated by calibrating the model with monitoring data. • Implement as many closure measures as possible during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine. • Continuous monitoring and early detection of any deviations from the projected impacts will assist in managing the risks before it impacts on down-gradient receptors. • Samples should be submitted to a SANAS accredited laboratory. The following recommended parameters to be analysed for include (unless specified otherwise by the Water Use License (WUL): - pH. - Electrical Conductivity. - Total Dissolved Solids. - Total Alkalinity. - Anions and Cations (Ca, Mg, Na, K, NO3, NH4, Cl, SO4, F, Fe, Mn, Al, Cr). •	5667-1:2008/ISO 5667-1:20036 • Guidance on the preservation and handling of water samples: SANS 5667-3:2006/ISO 5667-3:2003 • Guidance on sampling of groundwater: SANS 5667-11:2015/ISO 5667-11:2009 • Guidance on quality assurance of environmental water sampling and handling: SANS 5667-14:2016/ISO 5667-14:2014 • Guidance on sampling of groundwater at contaminated sites: SANS 5667-18:2007/ISO 5667-18:2001.						

	Aspect	Impact	Mitigation measures/ Actions	Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
Biodiversity (Flora)	• Inconsiderate planning of infrastructure placement and design (e.g., inappropriate extents of OC footprint, inconsiderate placement of waste dumps and stockpiles within sensitive habitat, and/or poorly planned placement of vents shaft and/or adits for UG mining), leading to the loss of intact (or sensitive) floral habitat, as well as unnecessary edge effect impacts on areas outside of the proposed mining footprint (e.g., fragmentation of landscapes due to poorly designed placement of haul roads).	• Degradation and modification of the receiving environment, loss of floral habitat, species diversity and SCC.	**Mitigation Measures for perceived impacts on habitat and species diversity** The planning phase is essential in ensuring that activities associated with all phases of the project have the lowest possible impact on the receiving environment. As part of the pre-construction phase, of utmost importance will be to prepare a Rehabilitation Plan, Biodiversity Action Plan, an Alien and Invasive Plant Management and Control Plan, Erosion Control Plan, as well as initiating an investigation into the appropriateness/suitability of a biodiversity offset. Mitigation measures include: • Minimise loss of indigenous vegetation where possible through adequate planning and, where necessary, by incorporating the sensitivity of the biodiversity report as well as other specialist studies; • It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of sensitive habitat units; • Access roads should be kept to existing roads, as far as possible, so as to reduce fragmentation of natural habitat outside of the authorised footprint; • It is recommended that prior to the commencement of construction activities that the construction servitude be fenced off and clearly demarcated. • Prior to the commencement of construction activities, an AIP Management/Control Plan should be in place for implementation: - Removal of alien invasive species should preferably commence during the planning phase and continue throughout the mining and decommissioning phases. AIPs should be cleared within the proposed mining area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread with construction rubble, or soils contaminated with AIP seeds during the construction phase; and - An AIP Management/Control Plan should be implemented by a qualified professional. No uncertified chemical use for AIP control to occur within 32 m of watercourses. • Due to the impacts on a CBA 2 and an endangered ecosystem, rehabilitation must aim to achieve the pre-mined condition. If this is not possible, the feasibility of offsetting must be investigated. Offsetting is not feasible for a CBA 2; however,	• GN 598 of 2014-09-30: Alien and Invasive Species Regulations. • Proteted Treess- GN 37037- Notice of the List of Protected Tree Species under the National Forest Act, 1998 (Act No.84 of 1998). • SANS 2001-BS1:2008 Construction works Part BS1: Site clearance. • GN 1003- Alien Invasives Species Lists, 2020. • GNR 325 (Activity 15, 17). • GNR 327 (Activity 24). • GNR 324 (Activity 4, 12e).	SHEQ and ECO	X	X				
	• Potential failure to conduct a walkdown of the footprint areas prior to commencement of construction activities where floral SCC are searched and marked for either rescue and relocation (only applicable to eligible species), for harvesting of propagules (where SCC cannot be relocated but can be propagated in a plant nursery to form part of rehabilitation activities later down the line), or to obtain numbers of SCC individuals that will be destroyed for permit application. • Potential failure to relocate all floral SCC that are eligible for relocation to appropriate habitat outside the proposed OC mining footprint prior to constructions activities, or failure to harvest sufficient propagules of SCC to propagate for rehabilitation later down the line.	The unnecessary loss of floral SCC from the proposed mining area with potential to impact on their population numbers and dynamics in the larger region. Rescue and relocation of SCC from their natural habitat can result in (SANBI, 2020): • A net habitat and biodiversity loss within the proposed mining area ; • Low success rates due to the difficulties of locating and translocating all individuals of an SCC (flowering periods often short and doesn't align with all SCC in a site); • Potential for eroding the genetic integrity of the targeted species; and • Substantial increased risk to the receiving populations (where the 'rescued' species are being translocated to), through deleterious genes, parasite and pathogen introduction, and excessive competition for resources.				X	X				
	• Potential failure to comply with national (NFA and TOPS) and provincial (LEMA) legislation regarding permit applications for the removal, destruction, harvesting, or relocation of floral SCC within proposed mining area .	• Unnecessary or unlawful destruction/removal of floral SCC without input from the relevant conservation authorities, leading to a decline in the numbers of NEMBA (RDL) and TOPS plants, LEMA-Protected plants and/or NFA-protected tree species within the proposed mining area .				X	X				

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	• Potential inadequate liaison with the LEDET and the DFFE with regards to floral SCC rescue and relocation permits; • Potential failure to prepare a Rescue and Relocation Plan for eligible floral SCC; and • Potential inadequate planning with regards to new site locations for floral SCC eligible to be relocated.	• Potential decline in the numbers of NEMBA (RDL) and TOPS plants, LEMA-Protected plants and/or NFA-protected tree species within the proposed mining area, especially without guidance from the relevant regulating and conservation authorities.	were the proposed mine to be approved, it is recommended that it be on the basis that there will be compensation for lost habitat in accordance with applicable National and Provincial Offset Guidelines. The offset must address themes such as "like for like" and "no net loss". **Mitigation Measures for impacts on SCC** Key considerations during the planning phase will be to properly plan timelines associated with the rescue and relocation of floral SCC within the OC footprint and those that will potentially be impacted by surface infrastructure associated with the UG mining activities. A suitable relocation plan must be drafted and approved by LEDET and DFFE and enough time must be made available to implement the rescue and relocation before the mining (construction and operation) phase of the project commences. • Floral SCC recorded within the proposed OC mining footprint included species threatened and endemic species, as well as species protected under the NFA, NEMBA TOPS regulations, and LEMA. A walkdown of the footprint area is required before construction activities commence, where all anticipated floral SCC/protected species are searched and marked for relocation and/or destruction so that all necessary permits can be obtained from LEDET and DFFE; • It is important to consider the following regarding 'search and rescue' operations (SANBI, 2020): - Translocation of species may only occur onto directly adjacent areas (including protected areas) considered to be part of the same original population and within the same home range; and - Translocation of particular species through search and rescue operations may not be considered as an impact minimisation mitigation measure during the significance calculation of anticipated post-mitigation impacts, to provide justification/ motivation for the development to proceed. • All RDL plant species that will be lost due to clearing of vegetation must be replaced either during rehabilitation initiatives or through translocation to suitable habitat surrounding the disturbance footprint. The relocation site will need to be fenced-off (or somehow barricaded) and monitoring of relocated / transplanted species will be essential until it is evident that the species have successfully established.			X	X			
	• Potential failure to demarcate the authorised footprint areas so to avoid footprint creep into sensitive habitat and floral SCC populations occurring outside of the direct project footprint before construction commences.	• Unessasary clearing of vegetation and loss floral SCC individuals. Overall increase in the decline of floral diversity and habitat.				X	X				
	• Potential failure to design and initiate an Alien and Invasive Plant (AIP) Management/Control plan before the commencement of mining activities, resulting in the spread of AIPs from the mining footprint to surrounding natural habitat (propagules "hitch-hike" with construction vehicles).	• Spread of AIPs, leading to potential loss of floral habitat and species diversity from surrounding natural habitat.				X	X				
	• Potential failure to set up an Erosion Control Plan for sloped areas, as well as potential inadequate design of stormwater management measures that could lead to increased erosion and expansion of the OC mining footprint. Loss of a nutrient-rich topsoil layer and degradation of soil structure may also result.	• Loss of floral habitat outside of the direct, authorised mining footprint.				X	X				

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			• For NFA protected tree species, attempting to relocate mature individuals are often too expensive and/or result in unsuccessful re-establishment due to unavoidable damage to their root systems during their excavation. Where possible, seedlings of affected tree species should be targeted for relocation, and seeds must be harvested prior to vegetation clearance to use in rehabilitation activities. It is important that seedlings and seeds be harvested within a close proximity of an area to be impacted, so as to prevent alteration of population genetics; • Geophytes and succulents are good candidates for rescue and relocation, and these should be targeted for such initiatives. Where possible, propagules of such species must also be harvested and propagated in a plant nursery to use in rehabilitation activities during the closure and rehabilitation phase of the project; and • A rescue and relocation plan must be drafted and approved by the relevant authorities for all floral SCC that will potentially be impacted by the proposed mining activities. The Rescue and Relocation Plan must be used in conjunction with an approved Rehabilitation Plan for the proposed mining area to ensure successful translocation and/or reinstatement of floral SCC and habitat for such species.							
Biodiversity (Fauna)	• Inadequate layout optimisation and inconsiderate placement and planning of mining footprints and infrastructure design, leading to the loss of intact, sensitive faunal habitat. • Failure to demarcate footprint boundaries, leading to excessive clearing in sensitive habitats.	• Long-term loss of faunal habitat and habitat connectivity leading to a decline in faunal diversity, including a decline in faunal SCC numbers within the proposed mining area . Furthermore, edge effects may impact on faunal habitat outside of the proposed mining footprint	**Mitigation Measures for perceived impacts on habitat and species diversity** • Footprint areas should be kept as small as possible to appropriately access the ore body. • As much processing as possible should take place off site. • Design of infrastructure and layouts should be environmentally sound. • Where possible, and feasible, all access roads should be kept to existing roads so to reduce fragmentation of existing natural habitat. • At all times, ensure that sound environmental management is in place during the planning phase. • Minimise loss of indigenous vegetation where possible through planning and adherence to suitable layouts. • It is recommended that prior to the commencement of construction activities the entire construction and mining footprint be clearly demarcated to limit footprint creep and edge effects – especially where creep into Freshwater Habitat can result in downstream impacts on faunal communities.	• IUCN-Red List of Threatened Species.		X	X			
	• Potential failure to have an action plan for the likelihood of encountering a SCC during construction and mining activities. • Potential failure to obtain the necessary provincial and national permits for the removal of protected faunal species resulting in delays to the mining activities and relocation of SCC. • Potential failure to effectively implement mitigatory measures to reduce or avoid impacts on habitat important for faunal SCC	• Loss of faunal SCC within the development footprint areas in the proposed mining area with threatened populations possibly being placed under further pressure				X	X				
	• Potential failure to have a Rehabilitation Plan developed and ready for implementation	• Loss of viable soils for optimal plant growth and faunal habitat recreation resulting in				X	X				

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	before the commencement of mining activities. Backfilling of the OC pits by using waste rock and topsoil, without a Rehabilitation Plan in place prior to the construction phase, could result in potential delays in the implementation of the rehabilitation plan at later stages	the permanent loss of faunal habitat and diversity in the proposed mining area.	• Prior to the commencement of construction activities, an authorised AIP Management/Control Plan should be compiled for implementation. • Prior to the commencement of construction activities on site, a rehabilitation plan should be developed for implementation throughout the mining development phases (accommodating concurrent rehabilitation); • An offset plan to address the residual loss of habitat should be developed and approved as par to of the conditions of the mining right being granted **Mitigation Measures for Planning Phase Impacts on SCC** • In terms of the DFFE (2013) mitigation hierarchy, avoidance should be undertaken first and foremost to avoid high impacts. As such, all areas indicated as highly sensitive from a faunal perspective should be avoided. Following this, and if not completely possible (based on location of the mined resources) a search and rescue should be undertaken just prior to the vegetation clearing activities. This search and rescue should be focused on smaller, less mobile SCC that will not be able to move away from the disturbances. This should be overseen by a suitably qualified specialist or nominated mine personnel in order to ensure that species loss during construction activities is kept to a minimum. • An authorised rescue and relocation plan must be compiled prior to commencement of construction and mining activities so all personnel are aware of the requirements should a SCC be encountered. • Prior to vegetation clearing activities, the site should be inspected for the presence of SCC, including burrowing scorpion burrows, reptiles and baboon spiders. If located, these species should be carefully rescued and relocated as per an approved rescue and relocation plan that must be developed. • Permits are to be obtained from Department of Forestry and Fisheries (DFFE) and Limpopo Economic Development, Environmental and Tourism (LEDET) prior to the relocation of any faunal SCC. • The open cast pits are to be kept to the designed pit shells indicated in this report and should not exceed these footprints, particularly where there are rocky habitats considered crucial to avifaunal, reptilian and mammalian (Cohen's Horseshoe Bat) SCC. • As far as possible mining footprints should not be placed within the Freshwater Habitat unit.							
	• Potential failure to have a well-designed Biodiversity Action Plan (BAP) designed and implemented from the commencement of the proposed mining development.	• Permanent transformation of habitat and long-term degradation of non-transformed habitat within the region.				X	X				
	• Potential failure to implement an Alien and Invasive Plant (AIP) Management/Control Plan before construction activities commence which is required to allow for non-contaminated topsoil stockpiles (highly beneficial for improved AIP management and rehabilitation down the line).	• Loss of viable, non-contaminated soils for rehabilitation purposes and displacement of indigenous plant species by AIPs resulting in degradation to faunal habitat.				X	X				
	• Contaminated soil and water resources leads to a loss of viable growing conditions for plants and results in a decrease of faunal habitat, diversity and SCC – rehabilitation efforts will also be increased as a result.	• Inadequate design of infrastructure, potentially resulting in future leaks from infrastructure failure, leading to pollution of soils and freshwater resources				X	X				
	• Unnecessary clearing of vegetation and increased impact significance to the receiving environment.	• Potential failure to demarcate sensitive habitat outside of the direct project footprint as "No-Go" areas before construction and mining commences				X	X				

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			• As far as possible existing access roads are to be used for haul roads and for access to mining footprints to minimise the need for additional vegetation clearance. • Footprint sizes of the proposed mining footprints, access roads, haul roads and all mining-related infrastructure are to remain as small as possible.								
Biodiversity (Flora)	• Site preparation and clearing of vegetation for hauling roads, OC mining and adits/shafts for UG mining, as well as all associated and supporting surface infrastructure.	• Loss of sensitive floral habitat (Freshwater habitat, endemic vegetation types, endangered ecosystem, CBA2 habitat) and the potential loss of additional floral SCC individuals outside of authorised footprint area (i.e., those that have not been relocated) due to loss of favourable habitat or footprint creep.	**<u>Mitigation Measures for perceived impacts on habitat and species diversity</u>** • The mining phase will have the greatest direct impact to the receiving environment, especially with regards to the OC mining activities, but additional indirect impacts are anticipated to be associated with the proposed OC and UG mining layout, e.g., fragmentation of habitat, potential spread of AIPs and footprint creep into sensitive habitat outside of authorised footprints. With no surface infrastructure proposed for the current UG mining layout, the worst-case scenario was assumed. UG mining impacts can be of low to very low significance if surface footprints are planned adequately. <u>Development footprint mitigation measures</u> • The disturbance footprint must be kept as small as possible in order to minimise impact on the surrounding environment (edge effect management). • All areas of increased ecological sensitivity beyond the approved footprint must be designated as No-Go areas and be off-limits to all unauthorised construction vehicles and personnel. • Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved footprint. • No additional habitat is to be disturbed during the operational phase of the project outside of the demarcated approved footprints (being applied for). Biweekly (recommended) to monthly (minimum requirement) monitoring and recording of the footprint areas must be done by the Environmental Control Officer (ECO) and photographic records kept – special attention should also be paid to potential increase and spread of alien vegetation and bush encroachment. • Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what	• GN 598 of 2014-09-30: Alien and Invasive Species Regulations. • Proteted Treess- GN 37037- Notice of the List of Protected Tree Species under the National Forest Act, 1998 (Act No.84 of 1998). • SANS 2001-BS1:2008 Construction works Part BS1: Site clearance. • GN 1003- Alien Invasives Species Lists, 2020. • GNR 325 (Activity 15, 17). • GNR 327 (Activity 24). • GNR 324 (Activity 4, 12e).			X	X		
	• Potential failure to have relocated or harvested all floral SCC prior to the commencement of site clearing activities.	• Loss of SCC individuals.						X	X		
	• Potential failure to implement an Erosion Control Plan leading to the loss of a nutrient rich topsoil layer and degradation of soil structure. • Continuing erosion as a result of ongoing mining development, storm water runoff and on-going disturbance of soils due to operational activities	• Loss of downslope vegetation communities beyond the approved footprint areas. Loss of viable soils for rehabilitation and thus permanent loss of floral diversity, habitat and SCC.						X	X		
	• Habitat fragmentation resulting from placement of the OC mining footprint as well as loss of habitat due to limited potential for - rehabilitation to re-establish the desired floral composition.	• Long-term changes in floral structure, altered genetic fitness and potential loss of SCC and their habitat.						X	X		
	• Proliferation of AIP species that colonise areas of increased disturbances and that outcompete native species, including the ongoing transformation of adjacent or nearby natural and more sensitive habitat.	• Loss of favourable floral habitat outside of the direct mining footprint, including a decrease in floral diversity and loss of potentially occurring SCC.						X	X		
	• Potential overexploitation through the removal and/or collection of important or sensitive floral SCC beyond the direct footprint area due to increased presence of workers on site.	• Local to regional loss of floral SCC individuals.						X	X		

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	• Additional pressure on floral habitat by increased human movement associated with the proposed construction and operational activities, including increased vehicular movement, contributing to: - Overexploitation through the removal and/or collection of important or sensitive floral SCC beyond the direct footprint area; - Increased introduction and spread of AIPs; and - Increased risk of fire frequency.	• Loss of sensitive floral habitat and the potential loss of floral SCC.	is absolutely necessary, and the footprint thereof kept to a minimal. • No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC. • No dumping of litter, rubble or cleared vegetation on site must be allowed. Infrastructure and rubble removed as a result of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural vegetation. Waste disposal containers and bins should be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility.					X	X		
	• Potential failure to rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in loss of viable soils, increased erosion risks and/or the proliferation of AIPs and increased bush encroachment.	• Long-term loss of favourable habitat for the establishment of floral species. Loss of floral diversity and SCC.	• If any spills occur, they should be cleaned up immediately to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil. • Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.					X	X		
	• Potentially poorly managed edge effects: Potential failure to implement erosion control measures resulting in loss of downslope habitat beyond the approved footprint areas; - Potential ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas that then alter the floral habitat; - Increased introduction and proliferation of AIP species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area; and - Potential fragmentation of sensitive habitat by transport vehicles not using designated roads.	• Loss of floral habitat, diversity and potentially occurring SCC within and beyond the direct footprint of the proposed mining activities. Loss of surrounding floral diversity and floral SCC through the displacement of indigenous flora by AIP species and bush encroachers- especially in response to increased disturbances.	<u>Edge effect Management</u> • To limit edge effect impacts to the surrounding natural habitat, the below guidelines must be followed: - Demarcating all footprint areas during construction activities; - No construction rubble to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility; - All soils compacted as a result of construction activities should be ripped, profiled and reseeded; - Suppress dust to mitigate the impact of dust on flora within a close proximity of construction activities; - Minimise the risk of erosion by limiting the extent of disturbed vegetation and exposed soil; and - Manage the spread of AIP species and bush encroachers, which may affect remaining natural habitat within surrounding areas. • Ongoing alien and invasive plant monitoring and clearing/control should take place throughout all phases of the project activities. The project perimeters should regularly be checked for AIP proliferation to prevent spread into surrounding natural areas.					X	X		
	• Risk of contamination from all operational facilities, spills and leaks of hazardous	• Altered floral habitat with sub-optimal growing conditions.						X	X		

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	materials and the deposition of contaminated windblown dust can lead to soil contamination.		• Management of AIPs during the construction-phase and operational-phase activities must be focused on limiting their introduction and preventing their spread. For example, roadsides should be monitored, as they serve as common corridors along which AIP species are introduced and dispersed and disturbed areas should regularly be monitored for AIP recruitment until successfully rehabilitated. <u>Fire Management</u> • No illicit fires must be allowed during the operational phases of the proposed miming activities; and • Fire breaks should be maintained during the construction and operational phases. <u>Dust Management</u> • An effective dust management plan must be designed and implemented to mitigate the impact of dust on flora throughout the construction phase. • Dust pollution have been associated with poor photosynthetic functionality in plants. There is evidence of dust pollution leading to a reduction in chlorophyll, including chlorophyll degradation and reduced photosynthetic activity, resulting from dust deposition on leaf surfaces. Dust deposition also result in stomata clogging, which causes a decreased rate of carbon dioxide exchange, carbon assimilation, transpiration, and therefore decreased net photosynthesis. <u>Rehabilitation – a concurrent approach must be adopted</u> • Rehabilitation of natural vegetation should proceed in accordance with the rehabilitation plan – concurrent rehabilitation is strongly recommended. This rehabilitation plan should consider all phases of the project indicating rehabilitation actions to be undertaken during and once construction has been completed, with ongoing rehabilitation taking place during the operational phase of the project as well as after operations have ceased. • Appropriate shaping of disturbed areas is essential. To promote successful establishment of vegetation, the slopes must not be steeper than 1(V):5(H) or 1(V):3(H) (depending on engineering input and recommendations). New slopes should resemble/mimic the natural topography of the surrounding area. Where slopes are left steeper than what is recommended for whatever reason, additional measures will be required to prevent soil erosion and to appropriately manage stormwater.							
	• Dumping of excavated and construction material outside of designated areas, promoting the establishment of AIPs and/or an increase in encroaching woody species.	• Loss of floral habitat, diversity and SCC through displacement by AIPs and indigenous encroachers.						X	X		
	• Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants and potentially further decreasing optimal growing /re-establishing conditions.	• Declines in plant functioning leading to loss of floral species and habitat for optimal growth.						X	X		
	• Possible increased fire frequency during construction.	• Loss or alteration of floral habitat and species diversity.						X	X		
	• Continued disturbance during operational phase may lead to erosion and sedimentation of surrounding floral habitat.	• Degradation of favourable habitat and limited potential for floral re-establishment leading to loss of floral habitat and diversity within the local area.						X	X		

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			• Any natural areas beyond the direct footprint, which have been affected by the construction or operational activities, must be rehabilitated using indigenous species. • Floral monitoring should be done annually during operational activities. Please also refer to the monitoring guidelines in section 5.3. • Rehabilitation must be implemented concurrently as per an approved rehabilitation plan, and disturbed areas must be rehabilitated as soon as such areas become available. This will not only reduce the total disturbance footprint but will also reduce the overall rehabilitation effort and costs associated with it. • All soils compacted because of construction activities falling outside of the project area should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. **Mitigation Measures for impacts on SCC** • By the mining phase of the proposed activities, all floral SCC within direct footprint areas should have been either rescued and relocated, or sufficient propagules of specimens sampled for nursery propagation. • Any unauthorised collection of floral material is to be prohibited. • Monitoring of any rescued and relocated floral SCC should commence during the construction phase and continue unit it is evident that relocated species have successfully established. • Harvesting of protected floral species by construction and operational personnel should be strictly prohibited. • Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed development footprint area.							
Biodiversity (Fauna)	• Vegetation clearing, ground excavation and drilling activities within the proposed mining footprints.	• Loss of sensitive and unique faunal habitat resulting in an increased loss of faunal diversity, including SCC.	**Mitigation Measures for perceived impacts on habitat and species diversity** • Smaller species of invertebrates and reptiles are likely to be less mobile during colder periods, as such should any be observed in the footprint areas during clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Mining personnel are to be educated about these species and the need for their conservation. Harmless reptiles should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine	• IUCN-Red List of Threatened Species.				X	X		
	• Construction of mining-related infrastructure such as haul roads, waste rock dumps, product floors and offices.	• Loss of intact faunal habitat leading to direct decline in faunal resources and diversity within construction footprints						X	X		
	• Potential failure to implement a monitoring plan for erosion which could lead to the sedimentation of Freshwater and surrounding habitat leading to the loss of a nutrient rich topsoil layer and degradation of soil structure.	• Loss of faunal habitat and consequent declines in faunal diversity, including the potential loss of faunal SCC.						X	X		

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	• Increase in the movement of large vehicles and other mobile mining machinery.	• Increase risk of collision with fauna crossing roads resulting in indirect loss of faunal diversity.	official should be contacted to affect the relocation of the species, should it not move off on its own. • Maintain habitat connectivity; greenspace and corridors for species movement. • Developing research and monitoring programs and consider contributing to funding initiatives to better understand fauna (notably invertebrates) in the valley. • Route haul roads and place offices etc in a way that won't impact on species movement. • Mitigate the impacts of lighting, noise and vibrations. • Implement stormwater management to reduce accumulation of sediment loads within the Rivers and Streams habitat. • Mining footprints are to be placed outside of the Freshwater habitat and buffers as far as possible. • Design of infrastructure and layouts should be environmentally sound, adhering to all relevant legislation relating to mining activities. • No collection or hunting of any fauna species is to be allowed by personnel during the mining phase, especially with regards to faunal SCC (if encountered and not rescued/relocated). • No unauthorised fires are to be allowed on the site. • All faunal species rescued must be relocated to a suitable area, with similar habitat adjacent to the footprint area or within the mining property. • Excavated topsoil must be stored with associated native vegetation debris for subsequent use in rehabilitation. • The footprint of all pits must remain as small as possible whilst allowing for economical and optimal extraction of the material. • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust on flora and therefore fauna habitat throughout the mining phase. • Edge effect control needs to be implemented to ensure no further degradation and potential loss of faunal SCC outside of the proposed project footprint area. An on-site Environmental Control Officer (ECO) should monitor and mitigate any edge effects throughout the life of the mine. • No additional habitat is to be disturbed outside of the approved footprints areas. Weekly (recommended) to monthly (minimum requirement) monitoring and recording of the footprint areas must be done during the construction phase by the ECO and photographic records kept – special attention should also be paid to potential increase and spread of AIPs.					X	X		
	• Additional pressure on faunal habitat by increased human populations associated with the proposed mining development contributing to: - Potential increase in vehicle movement of vehicles through natural habitat; - Increased risk of fire frequency; and - Increased risk of over-exploitation/hunting or trapping of faunal species including SCC in the direct mining footprint.	• Loss or alteration of faunal habitat and diversity including the potential loss of faunal SCC.						X	X		
	• Erosion as a result of mining development, storm water runoff and on-going disturbance of soils due to operational activities.	• Leading to a loss of faunal habitat and niche species breeding and foraging grounds.						X	X		
	• Excavation and compaction of soils leading to increased runoff and sedimentation in Freshwater Habitat.	• Loss of faunal habitat and decline in species diversity – downstream impacts are highly likely.						X	X		
	• Decreased ecoservice provision & decreased ability of Freshwater habitat to support biodiversity, due to vegetation and soil disturbance.	• Loss or alteration of favourable fauna habitat and associated species diversity.						X	X		
	• Seepage of waste containing toxicants affecting soils and the groundwater regime.	• Altered Freshwater Habitat.						X	X		
	• Risk of contamination from all operational facilities may pollute receiving environment. Of particular concern is the Freshwater Habitat, especially the Rivers and Streams and Wetlands Habitat.	• Altered faunal habitat with risk of poisoning of faunal species.						X	X		
	• Habitat fragmentation resulting from linear developments (roads, berms, channels) and poorly rehabilitated areas.	• Long-term changes in faunal movement and behavioural patterns, loss of genetic potential and genetic spread. Potential loss of faunal SCC due to barriers to movement whilst searching out habitat or mates.						X	X		
	• Proliferation of AIP species in areas of increased disturbances and the further	• Loss of faunal habitat outside of the direct construction footprint, including a decrease in faunal diversity, loss of						X	X		

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	transformation of adjacent or nearby natural, more sensitive habitat.	potentially occurring SCC and potential loss of suitable faunal movement corridors and foraging grounds.	• Where possible existing roads are to be used for access purposes. • It is recommended that prior to the commencement of construction activities the entire construction servitude be clearly demarcated to limit footprint creep and edge effects. • An AIP Management/Control Plan should be implemented by a qualified professional. • No dumping of waste on site should take place. As such it is advised that waste disposal containers and bins be provided during the construction phase for all dilapidates, rubble and general waste. • If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder faunal rehabilitation later down the line. Spill kits should be kept on site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised preventing the ingress of hydrocarbons into the topsoil. • All disturbed areas should be revegetated as soon as possible to reinstate habitat that was lost. Rehabilitation should be undertaken concurrently with mining activities; • Minimise the risk of erosion by limiting the extent of disturbed vegetation and exposed soil. • When rehabilitating a footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated, so that faunal species that were displaced by vegetation clearing activities are able to recolonise the rehabilitated area. **Mitigation Measures for impact on SCC** • The relevant permits are to be obtained from DFFE and LEDET prior to the relocation of any faunal SCC. All faunal species rescued must be relocated to a suitable, representative habitat outside the mining footprint. • No collection or hunting of any fauna species is to be allowed by personnel during the mining phase, especially with regards to faunal SCC (if encountered and not part of a rescue/relocation plan). • Minimise loss of indigenous vegetation where possible through the planning of suitable layouts. As far as possible layouts must avoid placement within habitat of increased sensitivity. In this instance, the eastern section of the ridge earmarked for OC mining, should be avoided. As such, the alternative OC layout must be adhered to. Pits should be strategically placed to avoid total loss of connectivity.						
	• Dumping of excavated material within areas where no activities are planned or within the sensitive habitats thereby leading to further habitat disturbance - allowing the establishment and spread of AIPs.	• Loss of favourable faunal habitat, diversity and SCC as AIPs degrades native habitat for fauna species.						X	X		
	• Potential failure to correctly stockpile topsoil leading to: - Potential contamination of topsoil stockpiles with AIP propagules; - Compaction of stockpiled topsoil leading to loss of viable soils for rehabilitation; and - Inadequately vegetating stockpiled topsoil resulting in degradation of soils	• Loss of viable soils for rehabilitation, thus hampering the potential for plant species to successfully establish during concurrent rehabilitation activities impacting the re-establishment of faunal habitat and faunal communities.						X	X		
	• Poorly managed edge effects: - Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas; - Potential fragmentation of sensitive habitat by transport vehicles not using designated roads; and - Potential erosion stemming from soil left unvegetated leading to sedimentation of downslope habitat and Freshwater Habitat	• Loss of faunal habitat, diversity and potentially occurring SCC within the direct footprint of the mine. Loss of surrounding faunal diversity and SCC and the proliferation of AIP species leading to further habitat and species loss.						X	X		
	• Failure to concurrently rehabilitate bare areas or disturbed sites as soon as possible, potentially resulting in loss of viable soils, increased erosion risks and/or the proliferation of AIPs.	• Long-term loss of favourable habitat for the establishment of plant species leading to a loss of faunal diversity and abundance.						X	X		

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			• Mining development footprints are to be located outside of the active channel of the rivers and their associated riparian zones and as well as a 32 m buffer zone. Edge effect control needs to be implemented to ensure no further degradation and potential loss of faunal habitat and SCC outside of the proposed project footprint area. An on-site ECO should monitor and mitigate any edge effects throughout the life of the mine.								
Biodiversity (Flora)	• Potential ineffective rehabilitation of OC mined areas, decommissioned mine infrastructure, and exposed and impacted areas leading to a shift in vegetation type. • Potential failure to initiate a biodiversity offset investigation process to address all residual impacts – leading to permanent loss of SCC and cumulative loss of floral diversity for the region.	• Permanent loss of floral habitat, floral diversity, and floral SCC (due to direct loss and loss of favourable habitat to reinstate floral SCC). Higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.	**<u>Mitigation Measures for perceived impacts on habitat and species diversity</u>** The construction phase will have the largest direct impact on floral ecology due to extensive vegetation clearing. However, long-term, and potentially permanent, high significance impacts are more likely to result from the decommissioning phase of the project if all mitigation measures are not adequately implemented, or if rehabilitation is not carried out long enough. • All infrastructure and footprint areas should be rehabilitated in accordance with the rehabilitation plan. • The rehabilitation plan should extend beyond rehabilitation to include restoration. All rehabilitated areas should be rehabilitated to a point where natural processes will allow the ecological functioning and biodiversity of the area to be re-instated to a level similar to that of the pre-mining condition over a period of no more than 20 years following closure. • Edge effects such as erosion and AIP proliferation, which may affect adjacent or downstream sensitive habitat, need to be strictly managed adjacent to the footprint areas and as part of the rehabilitation phase. • Ongoing alien and invasive vegetation monitoring and clearance should take place throughout the rehabilitation phase of the project. **<u>Mitigation Measures for impacts on SCC</u>** Monitoring of rescued and relocated floral SCC should continue during the Decommissioning & Closure Phase until it is evident that the species have successfully established. Where possible, these species should be reintroduced into rehabilitation sites.	• GN 598 of 2014-09-30: Alien and Invasive Species Regulations. • Proteted Treess- GN 37037- Notice of the List of Protected Tree Species under the National Forest Act, 1998 (Act No.84 of 1998). • SANS 2001-BS1:2008 Construction works Part BS1: Site clearance. • GN 1003- Alien Invasives Species Lists, 2020. • GNR 325 (Activity 15, 17). • GNR 327 (Activity 24). • GNR 324 (Activity 4, 12e).					**X**	**X**
	• Potential inability to restore specialised habitats such as CBA2 habitat, endemic vegetation types, and freshwater habitat (particularly communities associated with the drainage lines and the Groot Dwars River).	• Loss of species diversity and a permanent loss of habitat for a variety of endemics, threatened floral species, and several nationally and provincially protected species that are typically associated with these localised habitats.								**X**	**X**
	• Potential poor management and failure to monitor rehabilitation efforts, leading to: - Landscapes left fragmented, resulting in reduced dispersal capabilities of floral species and a decrease in floral diversity. Permanent alteration of sensitive habitat and associated floral communities. - Compacted soils and increased AIP cover limiting the re-establishment of natural vegetation. - Increased risk of erosion in areas left disturbed.	• Long-term (or permanent) loss of floral habitat, diversity and SCC.								**X**	**X**
	• Potentially poorly implemented and monitored AIP Management programme and bush encroachment management, leading to the reintroduction and proliferation of AIP species, or the intensification of bush encroachment within the area.	• Permanent loss of surrounding natural floral habitat, diversity and SCC.								**X**	**X**

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	• Potential poor monitoring of relocated SCC and nursery specimens to be used for rehabilitation.	• Loss of SCC from the proposed mining area and poorly reinstated and represented floral SCC within rehabilitated areas.								X	X
	• Potential failure to have a well-designed Rehabilitation Plan developed and ready for implementation before the commencement of mining activities. Backfilling of the OC pits by using overburden from overburden stockpiles, without a Rehabilitation Plan in place prior to the construction phase, could result in potential delays in the implementation of the rehabilitation plan at later stages	• Loss of viable soils for optimal plant growth and faunal habitat recreation resulting in the permanent loss of faunal habitat and diversity in the proposed mining area .	• Prior to the commencement of construction activities on site, a rehabilitation plan will be developed for implementation throughout the opencast mining development phases (accommodating concurrent rehabilitation).							X	X
Biodiversity (Fauna)	• Ineffective rehabilitation of exposed and impacted areas potentially leading to a shift in vegetation type.	• Permanent loss of faunal habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity	**Mitigation Measures for perceived impacts on habitat and species diversity** • Rehabilitation must proceed in accordance with the approved rehabilitation plan and must aim to achieve more than rehabilitation but must ensure that the veld is restored, at least, to a point where natural processes can re-instate the environment to a state that has the majority of the elements of biodiversity can be re-instated and supported. • The pre-mining topographical and terrain forms should be rein-stated as far as possible. Soil must be ameliorated and indigenous floral species representative of the surrounding vegetation type must be used for rehabilitation as this will ensure suitable habitat and food resources for fauna in the region are reinstated. • Ongoing alien and invasive vegetation and bush encroachment monitoring and control should take place throughout the rehabilitation phase of the project. • The Alien and Invasive Plant Management and Control Plan designed and implemented as part of the mining operations must include for control and eradication for a period of at least 5 years after decommissioning and closure. • Preserve, enhance, restore or replace faunal movement corridors and habitat. • The best technology and cautionary actions should be taken to sufficiently clean up and remediate any soils that may become contaminated.	• GN 1150-43855-2020. • GN320-43110-2020.					X	X
	• Potential poor management and failure to monitor rehabilitation efforts, leading to: - Landscapes left fragmented, resulting in reduced habitation and dispersal capabilities of faunal species and a decrease in faunal diversity; - Compacted soils limiting the re-establishment of natural vegetation and faunal re-colonisation within the affected areas; - Increased risk of erosion in areas left disturbed.	• Long-term (or permanent) loss of faunal habitat, diversity and SCC								X	X
	• Potential poor implementation and monitoring of AIP Management programme leading to the proliferation of AIP species, leading to ongoing displacement of natural vegetation outside of the footprint area.	• Ongoing or permanent loss of surrounding natural faunal habitat, diversity and SCC.								X	X
	• Rehabilitation of degraded habitat and AIP clearance.	• Some ecological functioning will be restored that has been lost due to AIP proliferation and habitat transformation although pre-mining conditions will not be achieved.								X	X

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	• Recovery and natural relocation of faunal species into rehabilitated areas.	• Increase in faunal species diversity and abundance although pre-mining conditions will most likely not be achieved.	• All footprints and access roads are to be sufficiently rehabilitated post mining activities. • Rehabilitation and monitoring efforts must be implemented for a period of at least five years after decommissioning and closure. • Rehabilitation should only cease once a suitably qualified team of ecologists sign off that the rehabilitation and restoration is adequate. **Mitigation Measures for impacts on SCC** • Rehabilitation schemes should aim to recreate the current habitat units as far as possible, such as appropriate woody areas, rocky outcrops and re-planting food plants relied on by invertebrate SCC. • No collection or hunting of faunal SCC may be allowed by decommissioning phase personnel. • All mining footprints should be rehabilitated as close to their pre-mined conditions as possible, with indigenous vegetation re-instated to support faunal recolonisation of the area. • Rehabilitation efforts must be implemented for a period of at least five years after decommissioning and closure.					X	X
Aquatic Biodiversity	Site preparation prior to construction activities of surface infrastructure, including placement of contractor laydown areas and storage facilities: • Vehicular movement and access to the site. • Removal of vegetation (terrestrial) and associated disturbances of soil. • Removal of topsoil from project footprint and stockpiling thereof for rehabilitation.	• Exposure of soil, leading to increased runoff, erosion and stream incision, and thus potentially increased sedimentation of the Dwars River • Increased sedimentation of the watercourse may lead to smothering of flora and benthic biota and potentially further alter surface water quality. • Decreased ecoservice provision. • Further proliferation of alien vegetation or increased bush encroachment as a result of disturbances.	• The approved construction footprint of the optimised mining development layout must be adhered to, to ensure that there is no encroachment on the watercourses and the relevant regulated zones. • As far as practically possible, clearing and construction activities must take place during the dry season to limit potential impacts to the watercourses in the surrounding area as a result of clearing and construction activities. • The construction of sediment traps around the downgradient boundary of the construction areas is strongly recommended to minimise the volume of sediment transported in runoff from the cleared/construction sites. • Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the delineated watercourses and the 100m GN704 regulated zone. • Construction footprint areas to remain as small as possible and vegetation clearing to be limited to what is absolutely essential. • Vegetation removal to be kept to a minimum, and preferably only alien floral species to be removed; and • Retain as much indigenous vegetation as possible.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).	SHEQ/Mine Manager			X			

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	• Construction of surface support infrastructure such as offices workshops and parking: - Removal of vegetation and topsoil; - Ground-breaking and earthworks relating to foundations and trenches; - Mixing and casting of concrete for construction purposes; and - Miscellaneous activities by construction personnel. • Development of clean and dirty water separation systems as well as PCDs surrounding the proposed mining and infrastructure areas outside the delineated extent of the watercourses and the 100m GN704 regulated Zones.	• Loss of catchment yield resulting from stormwater containment. • Potential for erosion, leading to sedimentation of the watercourse. • Reduction in volume of water entering the watercourse, leading to loss of recharge of the watercourse. • Altered vegetation community structure and diversity due to moisture stress and changes to goods and service provision. • Disturbances of soil leading to increased alien vegetation proliferation or bush encroachment, and in turn to further alteration of surrounding watercourse and terrestrial habitat, with potential to affect the downgradient watercourse habitat. • Altered runoff patterns, leading to increased erosion and sedimentation of the downgradient watercourses. • Erosion of the exposed areas. • Potential impacts on the water quality of runoff which may potentially enter the downgradient watercourses and contamination of soils due to concrete being cast. • Potential of backfill material to enter the downgradient watercourses, increasing the sediment load of the watercourses.	• The design of the surface infrastructure must ensure that no dirty water runoff must be permitted to reach the watercourses in line with GN704 as it relates to the NWA and appropriate clean and dirty water separation and stormwater management controls must be developed as the first part of the construction activities. • The clean and dirty water systems must be designed to contain a minimum storm event of a 24 hour 1 in 50 year flood event. • Clean runoff captured in the clean and dirty water separation system should be returned back into the adjacent watercourse. Dirty water must be managed within the mining development water management system. • All pollution control and dirty water management systems must be appropriately lined and appropriately sized to comply with GN704 of 1999. • Regular and ongoing monitoring must take place to ensure that early detection of impacts and adaptive management can take place. • Workshops must have appropriate facilities present to remove and recycle oils with a minimum recovery of 33%. • With regards to concrete mixing on site: - No mixed concrete may be deposited outside of the designated construction footprint. - Protective equipment should be provided, onto which any mixed concrete can be deposited whilst it awaits placing. - Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).				X			
	Construction of access roads that traverse watercourses: • Disturbances to soil of the watercourses • Interruption of flow in the watercourses during the construction activities • Movement of construction machinery/ vehicles within the watercourses	• Earthworks and exposure of soils could result in sedimentation of the watercourses, which may be transported as runoff into the downstream watercourse areas and may smother vegetation associated with the watercourses. • Proliferation of alien and/or invasive vegetation as a result of disturbances.	• It is imperative that all construction works be undertaken during the driest period of the year when there is limited/no flow within the watercourses, and thus no diversion of flow would be necessary. • As far as feasible, the road layout must consider existing roads and watercourse crossings to avoid new disturbance to watercourse areas. • The reaches of the watercourses where no activities are planned to occur must be considered no-go areas. These no-go areas can be marked at a maximum distance of 5 m upstream and downstream of the proposed road crossing. This 5 m buffer area would allow for construction personal, vehicles (if applicable) to enter the watercourse crossing where the road is proposed to be upgraded.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).				X			

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			• Material to be used (gravel – if applicable) as part of the upgrading of the existing roads must be stockpiled outside the delineated extent of the watercourses (preferably at least 32 m from the watercourse) to prevent sedimentation thereof and to avoid any other vegetation being impacted by the construction activities. These stockpiles may not exceed a height of 2 m and should be protected from wind using tarpaulins. • The area surrounding the road must be revegetated with suitable indigenous vegetation to prevent the establishment of alien vegetation species and to prevent erosion from occurring. With regards to excavation and soil compaction activities within the watercourses • Although the proposed watercourse crossings are associated with existing gravel roads, and as such the most significant impacts have already occurred, the existing gravel roads are relatively small with no formal through flow structures in most cases. The following are applicable with regards to excavation works and any concrete related activities. • The culvert crossing must be designed to ensure that the structures are geotechnically sound and that they are hydraulically stable, even if a 1:100 year flood event was to occur. The designs should include culverts installed intermittently to ensure a free draining landscape. It is recommended that a suitably qualified hydrologist be consulted to provide guidance on the relevant sizes and width requirements to ensure that hydraulic functioning of the system is maintained. In addition, the crossings must be designed such that should they be overtopped, they remain stable and do not lead to excessive downstream erosion and incision. Similarly, a freshwater ecologist must ensure that the final design accounts for appropriate wetting frequencies and patterns are maintained in the pre-development condition. • During the excavation activities, any soil/sediment or silt removed from the watercourse may be temporarily stockpiled in the road reserve but outside the delineated extent of the watercourse. These stockpiles may not exceed 2 m in height, and their footprint should be kept to a minimum. Stockpiling of removed materials may only be temporary (may only be stockpiled during the period of construction at a particular site) and should be disposed of at a registered waste disposal facility. • Excavated materials should not be contaminated, and it should be ensured that the minimum surface area is taken up. Mixture of the lower and upper layers of the excavated soil should be kept								

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			to a minimum, for later usage as backfill material or as part of rehabilitation activities. • Care must be taken to ensure that no scouring or erosion occurs as a result of the proposed culvert crossing. Installation of riprap or gabion mattresses adjacent to the abutments may be required and/or concrete aprons associated with any culverts. • All construction material (with specific mention of prefabricated culvert structures) must be stockpiled in the construction camp and must only be imported to the construction site when required. • Machinery/vehicles used to install culvert structures must be parked on the existing road surface and may not enter the watercourses. • Reno-mattresses or riprap must be installed at the outlet side of the culvert/bridge structures to ensure energy dissipation and prevent concentrated runoff into the downstream watercourse. The reno mattress/riprap must be installed flush with the culvert outlet. • Control measures specific to concrete works: - High alkalinity associated with cement can dramatically affect and contaminate both soil and ground water. The following measures must be adhered to: - Fresh concrete and cement mortar should not be mixed near or in the watercourses. • Mixing of cement may be done within a construction camp, however it may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be given to the use of ready-mix concrete. • No mixed concrete shall be deposited directly onto the ground or within the watercourses. All concrete must be brought in via a cement mixing truck which must remain within the road reserve, and cement must be piped down to the proposed crossing. Any areas that require manual application of cement require that the mixed materials be placed on a batter board or other suitable platform/mixing tray until it is deposited. • A washout area should be designated outside of the delineated extent of the watercourses, and wash water should be treated on-site or discharged to a suitable sanitation system. • At no point may batter boards/mixing trays or cement trucks be rinsed off on site and run-off water may not be allowed into the watercourses. • Cement bags (if any) must be disposed of in the demarcated hazardous waste receptacles and the used bags must be disposed of through the hazardous substance waste stream.							

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			• Spilled or excess concrete must be disposed of at a suitable landfill site. Chain of custody documentation must be provided.								
	Open cast mining activities outside the delineated extent of the watercourses and the 100m GN704 regulated Zones: • Blasting/mining activities in order to remove the ore; and • Removal of ore and overburden from the open cast pit.	Nitrates from blasting leading to eutrophication of the receiving environment and resulting in loss of potable water within the catchment	• It should be ensured that the clean and dirty water systems all constantly being monitored and maintained to prevent the contamination of watercourses; - All clean and dirty water systems as well as waste rock dump pads should be appropriately lined to prevent contamination of the receiving environment; - Reduce airborne dust during blasting activities through: o Damping dust generation areas with freshwater (although not in sufficient quantities to generate runoff). o Use of hessian or brush barrier fences	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).					X		
	Dewatering of the open cast pits for safe mining conditions: • Drawdown of the groundwater level due to dewatering potentially leading to changes in the surrounding groundwater flow patterns, so that groundwater in the aquifers flows towards the open cast pit area.	• Potential impact on the hydrological regime of the surrounding watercourses (specifically the Groot Dwars River) over time since the mining activities will cause a dewatering effect of the local geohydrological resources (decrease of groundwater levels) and thus a reduced rate of recharge. • The formation of a cone of depression will also result in loss of baseflow the riparian watercourses and potential changes in wetland zonation, in turn potentially resulting in altered freshwater vegetation community. • The cone of depression could impact on the reserve of the larger downstream system, by lowering the water quantity entering the downstream system (potentially not conforming to the objectives of the EWR for the downstream system).	• Any dewatered water from the pit must be used in the mine process water systems and no discharge from the facility should be permitted. • An extensive monitoring programme needs to be implemented to track the cone of depression on an ongoing basis for the LOM, and suitable mitigation measures will be required to protect surface water recharge in the vicinity of the open cast pit areas. The watercourses will need to be monitored for changes in riparian vegetation structure. • The hydrological regime and the Ecological Water Reserve (EWR) of the larger rivers (Groot Dwars River) should be minimally impacted. It should be ensured that the volume of water lost (due to the formation of a cone of depression) which would have otherwise entered the river, be returned into the river. If possible, treated water pumped from the mine pits should be returned into the Groot Dwars River to achieve the EWR of the river.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).					X		
	Operation of the WRDs: • Runoff from the WRD could impact on the hydrological functioning of the downgradient watercourses. • Contamination of surface water quality via groundwater seepage with specific mention of the Groot Dwars River.	• Impacts to the hydrological regime (flow pattern, and timing) in the downgradient watercourses: - Decrease in surface water quality due to potential contamination thereof. • Increase sediment load of the downgradient watercourses	• All clean and dirty water systems as well as waste rock dump pads should be appropriately lined to prevent contamination of the receiving environment. • WRDs should be managed to minimise runoff of contaminants into the catchment and groundwater via efficient management of the stormwater management system. Mitigation methods that should be considered include the correct placement of the stockpiles (as far as feasible from the watercourses - at least outside of the 100m GN704 regulated zone) and capping the	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).					X		

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			stockpiles (if it will be permanent) and revegetate the stockpiles with indigenous vegetation species. The shape of the stockpiles should be managed to control the ease with which water can run off from the facility. • Strict monitoring of the footprint area and the height of these dumps should be implemented, in order to prevent encroachment thereof into the 100m GN704 regulated zone.							
	• Operation and maintenance of the clean and dirty water separation system around the mining operations: - Loss of catchment yield due to storm water containment. - Containment/ diversion of all runoff into the clean and dirty water system. - Potential of malfunctioning of the dirty water system. - Sedimentation and increased turbidity of downgradient watercourses.	• Increased flood peaks into the watercourse as a result of formalization and concentration of surface runoff. • Potential for erosion of terrestrial areas as a result of the formation of preferential flow paths, leading to sedimentation of the watercourse. • Reduction in volume of water entering the watercourse, leading to loss of recharge (and thus potential desiccation) of the watercourse systems. • Erosion and sedimentation of the watercourse at the outlet of the clean water trench. • Altered vegetation communities due to moisture stress. • Loss of aquatic habitat and refugia. • Silt deposition may lead to smothering of benthic layer.	• Clean and dirty water separation systems must be implemented and be kept separate in line with Regulation GN704 and maintained to ensure that any contaminated water does not reach the watercourses. • Runoff from areas within the dirty water area should be captured in sumps and pumped to a storage facility before being re-used as process water of the mine. • Stormwater infrastructure should be regularly inspected in order to prevent the failure thereof and the spilling of contaminated water into the clean water areas or the watercourses. • Where clean water would be released into the watercourses, proposed stormwater management outlets should be installed, with erosion prevention structures (such as reno-mattresses) to limit the velocity of stormwater inflow from eroding the watercourse. • The TSF and RWD must be managed throughout the life of both facilities in such a way to ensure that storage and surge capacity is available if a rainfall event occurs. • An Emergency Response Plan must be compiled, and must include the measures below: - In the case of failure, as much sediment as possible, contaminated by the spill, must be removed from the point of its source, following the spill path to the affected watercourses. Sediment must be removed until the natural in situ substrate is reached or until a clear change in the sediment colour is reached indicating that the natural soil level has been reached. - All silt removed should be returned to the TSF or disposed of at a suitably managed site. - Following the removal of the contaminated sediment, it must be ensured the slope of the excavated areas is in line with the natural topography – i.e. a low gradient no more than 1:3. - Edge effects must be strictly controlled – for example no removal of sediment must take place beyond the spill pathway.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).			X		
	Potential Risk of failure of pollution control facilities leading to spill of tailings in the vicinity of watercourses leading to deposition in the aquatic environment.: Sedimentation and increased turbidity of downgradient watercourses	• Loss of aquatic habitat and refugia. • Silt deposition may lead to smothering of benthic layer.									
	Potential Risk of failure of pollution control facilities leading to spill of tailings in the vicinity of watercourses leading to deposition in the aquatic environment.: Reduced water quality with specific mention of increased dissolved salt concentrations and potentially introducing toxins into the system.	• Loss of aquatic biodiversity and loss of aquatic taxa. • Negative impact on aquatic biota community diversity and integrity due to deterioration of water quality.									
	Potential Risk of failure of pollution control facilities leading to spill of tailings in the vicinity of watercourses leading to deposition in the aquatic environment.: Temporary and momentary	• Potential loss of biodiversity, aquatic taxa, riparian habitat.									

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	increased velocity and flow of downgradient watercourses		- Possible seepage and contamination of the groundwater resources is possible and should be monitored at suitable groundwater monitoring points, as guided by the geohydrological study. - Toxicological monitoring of the receiving environment and of the PCD must occur immediately following the first rain event after rehabilitation and again at the end of the wet season. The aquatic ecologist should make a recommendation concerning the necessity of future monitoring following the assessment.							
	Operation of the internal access roads, including watercourse crossings: • Concentrated runoff from the road crossings entering the watercourses. • Increased vehicular activity and impermeable surfaces in the catchment of the watercourses.	• Potential contamination of stormwater runoff from hard surfaces by hydrocarbons from vehicles, leading to potential contamination of surface water, groundwater and soil. • Impacts on geomorphological processes and instream habitat due to disturbances leading to scour and sedimentation.	• Hot spots for the build-up of debris and excess sediment must be identified and when necessary, debris/excess sediment must be removed by hand to prevent future flooding and potential damage to infrastructure. • Routine maintenance of the roads must be undertaken to ensure that no concentration of flow and subsequent erosion occurs due to the road crossings/instream infrastructure. Such maintenance activities must specifically be undertaken after high rainfall events. • Stormwater runoff from the road crossings should be monitored to ensure it does not result in erosion of the watercourses. Stormwater should be allowed to diffusely spread across the landscape, by ensuring adequate surface roughness in the watercourse (through vegetation and rocky areas). • Maintenance vehicles must make use of dedicated access roads and no indiscriminate movement in the watercourses may be permitted. • During periodic maintenance activities of the roads, monitoring for erosion should be undertaken. • Should erosion be observed, caused by the road crossings/instream infrastructure, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation. Use can also be made of rocks collected from the surrounding area to infill any area prone to erosion, as a natural dispersal mechanism.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).				X		
	Rehabilitation of mining footprint areas: • Backfilling of the opencast pits by using overburden from existing WRDs; • Rehabilitation of remaining WRD by contouring and revegetating them; and • Removal of stormwater management infrastructure.	• Compaction of soils due to vehicular movement. • Compacted soils underneath the WRD which have been removed. • Latent impacts of vegetation losses. • Increased runoff volumes and formation of preferential surface flow paths as a result of compacted soils, leading to alteration of	• Material from the WRD should be used to backfill the opencast pits. • The final backfilled opencast topography should be free draining. The post-closure recharge of the catchment should also be as near natural as possible. • Ensure that soils are replaced in the correct layers, ripped and re-profiled post-closure, and that vegetation is restored to a point where succession will lead to the same conditions as the pre-mining state as a minimum.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).						X	X

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
		hydropedological flow paths, increased sedimentation and erosion.	• Bare areas should be revegetated within suitable indigenous vegetation species. • Rehabilitation measures stipulated in Maintenance and Management Plan (MMP) must be implemented. Implementation must be overseen by a suitably qualified Environmental Site Officer (ESO) with watercourse rehabilitation experience and the ESO must sign off the rehabilitation before the relevant contractors leave site. • Post-closure monitoring of the watercourses is recommended to be undertaken. This should be determined by an appropriately qualified geohydrological specialist								
	Decant form infilled open cast pit areas entering the watercourses. Note risk is assessed as if decant occurs prior to the mitigation of objectives being reached: • Possible contamination of surface and ground water; and • Increased volume of water entering the watercourses.	• Impaired water quality and salination of soils within the watercourses. • Impacts on the hydrological regime and inundation periods of the watercourses.	• Decant from the opencast operations must be prevented until such time as the groundwater quality matches that of the natural environment. Until this time groundwater must be treated before release into the receiving environment.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).						**X**	**X**
Visual	Disruptions to "sense of place"	• Reduction in visual resource value due to presence of mine buildings and associated mining infrastructure.	• Visual barriers such as soil berms or vegetation berms will be constructed to mitigate the view of the Mine infrastructure.	N/A	SHEQ/ Mine Manager			**X**	**X**		
		• Reduction in visual resource value due to presence of physical depression of the opencast pit		N/A				**X**	**X**		
		• Reduction in visual resource value due to the overburden dump.		N/A				**X**	**X**		
		• Formation of dust plumes as a result of construction activities	• Implement dust suppression using a watercart to minimise airborne dust. • Apply chemical dust suppressants if deemed necessary. • Enforce a 50 km/h speed limit on-site for Light Duty Vehicles and a 40 km/h speed limit for large construction vehicles and machinery. • Implement a gravimetric dust fallout monitoring programme.	• South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution. • National Dust Control Regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004.				**X**	**X**		

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
				• Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (GNR 1210 of 24 December 2009). (GNR 897 of November 2013). • SANS 1929: Ambient air quality - Limits for common pollutants • GN 1210 of 2009-12-24: National Ambient Air Quality Standards							
		• Light pollution at night	• Plan the lighting requirements of the facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination. • Avoid up-lighting of structures by rather directing lighting downwards and focused on the area to be illuminated. • Reduce the height and angle of illumination from which floodlights are fixed as much as possible while still maintaining the required levels of illumination • Lighting should be shielded in areas where specific objects are to be illuminated. • Minimise the use of lighting on the track itself. • Lighting should exclude the blue-rich wavelengths and be closer to the red-rich wavelength spectrum. Globes used in lighting outside areas and should be warm white. This also applies to light spilling out from within buildings. A colour temperature of no more than 3000 Kelvins is recommended for lighting. • Light intensity of illuminating lights should be limited as far as possible, i.e., to limit lighting to areas required to serve operational functionality. • Illumination where not permanently required should be fitted with timers, motion activated sensors or be dimmable to reduce total light emitted.	N/A				X	X		
		• Reinstatement of visual resource value due to dismantling of mining buildings, associated mining infrastructure and subsequent rehabilitation of footprint areas.	• Shape the overburden dump's slopes and crest to pre-determined maximum gradient/s which will prevent erosion and allow for adequate vegetation growth while taking the appearance of the natural topography into consideration.	N/A							X

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
		• Permanent alteration of site topographical and visual character of due to presence of a depression.	• Conduct on-going monitoring and maintenance of the rehabilitated dump to ensure that vegetation establishes successfully, and that erosion does not occur. • Eradicate invasive alien plant species. • Remove all built infrastructure. • Re-shape all footprint areas to be as natural in appearance as possible and revegetate using locally occurring grass species. • Stabilise and backfill the decline shaft, and contour to ensure it is free draining.	N/A							X
		• Visible dust plumes during rehabilitation.	• Implement dust suppression using a watercart to minimise airborne dust. • Apply chemical dust suppressants if deemed necessary. • Enforce a 50 km/h speed limit on-site for Light Duty Vehicles and a 40 km/h speed limit for large construction vehicles and machinery. • Implement a gravimetric dust fallout monitoring programme.	• South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution. • National Dust Control Regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004. • Register online to the National Atmospheric Emissions Inventory System (NAEIS) in terms of the National Reporting Regulations (GNR 283) as Group C emitters. (GNR 1210 of 24 December 2009). (GNR 897 of November 2013). • SANS 1929: Ambient air quality - Limits for common pollutants • GN 1210 of 2009-12-24: National Ambient Air Quality Standards							X
		• Light pollution at night	• Plan the lighting requirements of the facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination. • Avoid up-lighting of structures by rather directing lighting downwards and focused on the area to be illuminated.	N/A							X

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			• Reduce the height and angle of illumination from which floodlights are fixed as much as possible while still maintaining the required levels of illumination. • Lighting should be shielded in areas where specific objects are to be illuminated. • Minimise the use of lighting on the track itself. • Lighting should exclude the blue-rich wavelengths and be closer to the red-rich wavelength spectrum. Globes used in lighting outside areas and should be warm white. This also applies to light spilling out from within buildings. A colour temperature of no more than 3000 Kelvins is recommended for lighting. • Light intensity of illuminating lights should be limited as far as possible, i.e., to limit lighting to areas required to serve operational functionality. • Illumination where not permanently required should be fitted with timers, motion activated sensors or be dimmable to reduce total light emitted.							
Air Quality	• Increased dust affecting community health in close proximity- (Vehicle Exhaust Emissions, Exposed Surfaces) • Fugitive emissions from excavation and wind entrainment from exposed ground surface.	The increased generation of dust, concentration of Total Suspended Particles (TSP) and PM10 during construction of the Concentrator plant affecting the health of communities.	• A dust monitoring programme will be implemented to monitor the impacts from dust. • Dust suppression will be undertaken using process water. • An Air Quality Management Plan must be implemented. • The area cleared for construction will be limited to the minimum area safe for construction and operation activities • A strict speed of 40 km per hour will be enforced during the construction phase. The objective of this measure would be to reduce emissions by 20% from unpaved roads which are a significant source during this phase of the development. • A complaints register must be in place at the site. A complaints register must include the following: – Date and time of the complaint. – Date and time of the incident(s) complained about. – Nature and contact details of the complainant. – Nature of complaint. – Response issued to the complainant. • Complaints must be added within 48hours and corrective measures must be implemented. • In terms of Fugitive emissions, the site must prevent unacceptable dust entrainment from exposed surfaces and soil handling thought he implementation of practicable options such as: – Surface regulation. – Vehicle Weight	• National Dust Control Regulations GNR 827 of 2013. • SANS 1929: Ambient air quality - Limits for common pollutants • GN 1210 of 2009-12-24: National Ambient Air Quality Standards	SHEQ/ Contractor/ Mine Manager			**X**			

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						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			– Number of vehicles on the road. • Temporary exposed surface from the construction phase must be rehabilitated as soon as is practical, where applicable and reasonable. • All operators' vehicles must be maintained and serviced in accordance with manufacturer's recommendations. Should relevant legislation be brought into effect for vehicle exhaust emissions management then this must be complied with accordingly.							
	• Dismantling and demolition of mining infrastructures and facilities including transportation off site will result in dust emissions.	• Generation of dust due to dismantling of infrastructure.	• Demolition of infrastructures/ facilities must not happen during windy/ spring season in order to minimise dust emission from the demolition phase. • Develop and implement a dust suppression schedule. Dust suppression should take place at least three (3) times a day.	• National Dust Control Regulations GNR 827 of 2013. • SANS 1929: Ambient air quality - Limits for common pollutants • GN 1210 of 2009-12-24: National Ambient Air Quality Standards.							X
Noise and Vibration	• Increase in ambient noise on proximity communities.	• Increase in ambient noise levels relating to construction of the mine axillary structures and increase in construction vehicles which may affect nearby villages that are directly adjacent to the Marresburg Mine footprint.	• A noise monitoring programme will be implemented at the Mine site prior to construction and will be continued during operations. • Noise prevention barriers, placed as close as possible to the noise generator, should be erected in areas where noise can travel to sensitive receptors. • Regular servicing of equipment and machinery per manufacturer requirements. • All equipment and machinery should be fitted with noise reduction technology to prevent noise generation as far as possible. • As is possible, all activities should be limited to day-time hours. Construction work should not be allowed on Sundays and Public Holidays. • All noise generating activities should be planned and places as far away as possible from sensitive receptors. If this is not possible, barriers should be installed at various points around these noise generators. • All equipment must be switched off when not in use. • No workers should be allowed to take residence on the site. • Site workers must comply with the Provincial Noise Regulations. • Appropriate directional and intensity settings are to be maintained on all hooters and sirens. • Excessively noisy machinery must only be used during regular operating hours where possible. • Construction activities will be confined to daylight hours.	• Compliance with SANS 10103 Acceptable Ambient Levels and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise SANS 10328 of 2008. • GNR 154 of 1992-01-10: Noise Control Regulations • SANS 10181:2003 The measurement of noise emitted by road vehicles when stationary. • SANS 10205:2007 The measurement of noise emitted by motor vehicles in motion. • SANS 10210:2004 Calculating and predicting road traffic noise. • SANS 10328:2008 Methods for environmental noise impact assessments.	SHEQ/ Contractor/Mine Manager/Specialist			X			X

	Aspect	Impact	Mitigation measures/ Actions	Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	• Vibration impacts	• Vibration due to construction activities	• Blasting should be limited to daylight hours when ambient noise levels are highest. • The blasting must ensure that the peak particle velocity (PPV) must be kept below 15mm/s. This is the maximum allowable limit that would avoid damage to infrastructure in the surrounding area. • It should be identified if there are any sensitive buildings within the blasting area. • Blasting and crusher/mill vibrations will propagate through the rock sub-strata, and this needs to be taken cognisance of with regard to potential liquefaction and instabilities of the adjacent TSF. The appropriate peak particle velocities can be determined in consultation with the TSF designer and TSF Engineer of Record. It is further recommended that the crushers and mill equipment be located as far as possible from the TSF. • The pit activities appear to be in the TSF zone of influence, and this may impact the consequence classification of the TSF. Every effort must therefore be made to reduce any vibration impacts on the TSF risk of failure. This can be determined and agreed with the TSF designer and TSF Engineer of Record. • Blasting noise levels should be kept between 94 to 98 dB, with a maximum upper level of 120 to 134 dB.	• SANS 10103:2008. 'The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. • SANS 10357: 2004. 'The calculation of sound propagation by the Concawe method.'				X	X		
Socio-economic	• Capital investment into the establishment of the mine.	• Stimulation of production and GDP due to investment.	• The Mine will engage with Local authorities and business organisations to investigate the possibility of procurement of construction materials, goods, and services from Local suppliers where feasible.	N/A	HR/Transformation/Site Managers			X			
	• Capital investment into the establishment of the mine.	• Stimulation of employment due to investment.	• Employ labor-intensive methods in construction where feasible. • The mine will where possible, consider Local labour and sub-contracting to Local companies to increase the positive impact on the Local economy.	N/A				X			
	• Disruption of community life during operations	• Disruptions with regards to noise, dust, safety and blasting could impact on community life during Mareesburg Mine operations.	• The mine will implement management commitments with respect to noise, dust, safety, blasting and vibrations and other activities as part of monitoring programe. • Develop and implement a Complaints register.	N/A				X			
	• Creation of employment	• Improved standard of living due to creation of employment.	• Employ labor-intensive methods in construction where feasible. • The mine will where possible, consider Local labour and sub-contracting to Local companies to increase the positive impact on the Local economy.	N/A				X			
	• The operation of the Mareesburg Mine resulting in generation of improved economic and job opportunities at a local, regional, and national scale.	• Skills development.	• Facilitate knowledge and skills transfer between workers during the construction phases.	N/A				X			

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			• Set up apprenticeship programmes to build on existing skills or for the advancement of development of new skills for construction workers, especially those coming from the Local communities.								
	• Sterilisation of land due to construction and mine establishment activities	• Change in the sense of place among the directly and indirectly affected farming communities.	• The Mine will engage with the directly and indirectly affected farmers to investigate the opportunities to minimise the loss of productive agricultural land	N/A				X			
	• Capital investment into the establishment of the mine and recruitment of construction workers	• Increase in social pathologies (Crime, xenophobia, prostitution, etc.) due to influx of people into the area.	• Establish central recruitment offices and enforce a labour and recruitment legislation/procedure. • Set up a gate and controlled access system to monitor the movement of people to and from the site, as well as to reduce the influx of job seekers to the area. • The Mine will support tribal authorities in controlling influx of people into the area by: • Adhering to policies which will facilitate the recruitment of local labour; • Encouraging and facilitating the provision of offsite housing of "non-local employees".	N/A				X			
	• Disruption of social networks and access.	• The operation of mining infrastructure such as shafts/opencast will disrupt numerous access routes that link villages, grazing and agricultural land.	• Routes must take cognisance of land that has agricultural potential.	N/A				X			
	• Influx of job seekers.	• Added pressure on basic service delivery and growth of informal settlements.	• Engage with Local authorities to inform them of the development as well as discuss with them the ability of the Municipality to meet the demands for social and basic services created by the migrant construction workers. • Partner with Local Municipal authorities and other prominent users of the Local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the construction of this component of the proposed project.	N/A				X			
	• Cumulative impacts to the Eastern Limb due to development in the region.	• The operation of the Mareesburg Mine is one of many planned or in operation on the Eastern Limb area of Fetakgomo-Tubatse local Municipality. In combination with other planned and existing mining developments, the mining industry has the potential to change the economic status of this region, to both benefit and potentially harm the surrounding communities, environmental resources, and ecology of the area.	• The management of the cumulative social and economic impacts which the mining developments may have on the area will be critical in minimising negative impacts and enhancing positive impacts and will require the participation of all stakeholders including the mines, local and provincial government, communities, and specialist interest groups in the development of a strategy for the Eastern Limb. • Mareesburg Mine ust participate in regional forums and contribute to a government through LED initiatives in the SLP to address the cumulative impacts of development of the Eastern Limb.	N/A				X			

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
	• Mining operations.	• Stimulation of production and GDP due to operations.	• Encourage procurement of required services, materials and other inputs from Local communities.	N/A					X		
	• Mining operations.	• Stimulation of employment creation due to operations.	• Encourage procurement of required services, materials and other inputs from Local communities. • Recruit Local labour as far as feasible to increase the benefits to the Local communities.	N/A					X		
	• Mining operations.	• Skills development.	• Devise skills development programmes as part of SLP and implement them.	N/A					X		
	• Creation of employment at the mine.	• Improved standard of living due to creation of employment.	• Encourage procurement of required services, materials and other inputs from Local communities. • Recruit Local labour as far as feasible to increase the benefits to the Local communities.	N/A					X		
	• Extraction and processing of minerals	• Export Earnings.	• Seek opportunities to export the mined commodity.	N/A					X		
	• Investment into the Local communities through SLP.	• Improved quality of life and service delivery.	• Mine is to devise a project that enhances water supply to Municipality and subsequently communities as per the SLP and seek alternative water-saving initiatives. • Devise and implement projects to address the Local community needs and create SMME opportunities (as part of SLP).	N/A					X		
	• Decommissioning and Closure cost to Samancor		• The holder of a right or permit must ensure that a review is undertaken of the requirements for annual rehabilitation, final rehabilitation, decommissioning and closure of the mining or production operations and the remediation of latent or residual environmental impacts • The financial provision must be determined through a detailed itemisation of all activities and costs, calculated on the actual costs of implementation of the measures required for - • Rehabilitation and remediation; • Decommissioning and closure activities at the end of mining or production operations; and • Remediation and management of latent or residual environmental impacts. • Regulation 11 requires the holder of a right or permit to review and assess the adequacy of the financial provision and to make adjustments, if necessary, within • One year of the commencement of the operations authorised; • If operations have already commenced and holder is a person with a financial year, immediately after its financial year end that follows such commencement; and annually thereafter. • Such results must be audited by an independent auditor and included in any environmental audit report required in terms of the Environmental Impact Assessment Regulations, 2014, and must	• GNR1147-Financial Provsion Regulations							X

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			be submitted to the Minister responsible for mineral resources within the period stipulated [11(3)(c)]. • Any shortfall in the financial provision must be increased to meet the reviewed, assessed and audited financial provision within 90 days from the date of signature • Stakeholder Engagement, Consultation and Empowerment: Stakeholders, especially those in closest proximity to the mine (the host community) must be engaged at the earliest planning stages of the mine. • Agreed sustainable post-mining land use must be established and clearly defined to the satisfaction of the community and government. • Agreed continuous maintenance plan and criteria addressing environment, social and economic outcomes. • Encourage procurement of required services, materials and other inputs from Local communities.							
Cultural heritage	• Loss of cultural resources	• Disturbance and loss of areas of cultural heritage (Graves) as a result of the contract construction of Mine related infrastructure	• The mine will ensure that no activities intrude on the area within a radius stipulated in prevailing legislation to allow community access to and privacy within the area identified as cultural significance. • The mine will fence-off unaffected graves and erect signs for construction staff and all operations staff to ensure that staff are aware of and that they respect any significance of the cultural sites present in the Mine. • Should any surface development be considered for the demarcated underground section, the area must be inspected by a qualified archaeologist and the report and recommendations must be updated accordingly. • Demarcated Sensitive Area 1, delineated from field observations, are associated with a dense concentration of LIA artefacts and structures that include stone-walled enclosures, terrace walling, potsherds and grinding stones. An ESA and several MSA tools were also observed within the boundary of Sensitive Area 2 (Sites K04, K05, K07, K08). The demarcated sensitive areas should be avoided by the proposed mining development, especially since LIA settlement sites are often associated with unmarked burial sites. It should also be noted that due to the dilapidated state of the sites and consequent poor visibility, the sites might exceed the indicated boundaries and care should therefore be exercised when developing in the general vicinity of the boundaries. Should impact to the demarcated sensitive areas be unavoidable, a Phase 2 AIA must be conducted. The Phase 2 AIA should map the LIA sites in detail and should include test pit excavations. A	• Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925). • GNR 1485 of 1999-12-09: World Heritage Conversation Act No 49 of 1999	SHEQ, ECO and Heritage Specialist.			X			

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			surface collection of the stone age material should also be conducted in the event of a Phase 2 AIA. • The potential grave (Site K02) should be considered culturally significant. A fenced-off conservation buffer of 10 m is therefore recommended. Alternatively, the site may be inspected using Ground Penetrating Radar (GPR) operated by a suitably qualified heritage practitioner in order to determine the potential presence of human remains. An alternative option is to initiate a grave relocation process. • The southern area demarcated for the proposed alternative opencast area intersects Sensitive Area 2. The intersected section appears to form part of a larger site and is associated with LIA artefacts that include potsherds and upper and lower grinding stones. A section of dilapidated LIA stone walling, as well as some MSA tools were also observed within the boundary of Sensitive Area 2. The intersected section of demarcated Sensitive Area 2 should be avoided by the proposed mining development, especially since LIA settlement sites are often associated with unmarked burial sites. It should also be noted that due to the dilapidated state of the sites and consequent poor visibility, the sites might exceed the indicated boundary and care should therefore be exercised when developing in the general vicinity of the boundary. Should impact to the demarcated sensitive area be unavoidable, a Phase 2 AIA must be conducted. The Phase 2 AIA should map the LIA sites in detail and should include test pit excavations. A surface collection of the stone age material should also be conducted in the event of a Phase 2 AIA. • Should the proposed surface impact areas be changed, a qualified archaeologist must conduct a pedestrian survey on the new area and amend the report and recommendations accordingly. • Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the construction and development phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended, and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)). • Some cultural sites were identified on a portion in the mining areas, therefore prior to construction, a permit should need to be submitted to SAHRA and where necessary, should be relocated.						

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
Traffic	• Increase in vehicles due to mine.	• Increase in vehicle movement to and from the mine as a result of the proposed mine. • Increased traffic level - Increased the risk of an accident with a pedestrian and/or another vehicle.	• Prepare a permanent road signage master plan for the section of Road D995, to sign post the access points. • A site traffic assessment to be prepared for the respective erven, prior to the approval of the site development plan. • Heavy vehicles should adhere to speed limits of the road	• The South African Department of Transport (DoT) Manual for Traffic Impact Studies (RR 93/635, of 1995) • National Land Transport Act NLTA (Act No 5 of 2009) • Road Classification and Access Management (RCAM) guideline 2010 • Road Transport Act 2013; • Road Transport (General) Regulation 2013;	Mine Manager			X	X		
Stormwater	• Impact from mining Operations on stormwater	• Increased uncontrolled stormwater • Contamination of stormwater	• Formulating a SWMP and action plans to be implemented and updated continuously during the life of mine. • Stormwater will be diverted from activities such as construction works, plant areas and roads must be managed in such a manner as to disperse runoff and to prevent the concentration of storm water flow. • Stormwater leaving the mine premises shall in no way be contaminated by any substance, whether such substance is a solid, liquid, vapor or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises. • Stormwater is diverted from the mine complex sites and roads and managed in such a manner as to disperse runoff and concentrating the stormwater flow. • Stormwater works are constructed to attenuate the velocity of the stormwater discharge and to protect the banks of affected watercourses. • Stormwater control works are constructed, operated and maintained in a sustainable manner throughout the impacted area. • Increase runoff due to vegetation clearance and/or soil compaction is managed to ensure that storm water does not lead to bank instability and excessive levels of silt entering the stream/ watercourse(s). • All stormwater that would naturally run across the pollution areas shall be diverted via channels and trapezoidal drains designed to contain the 1:50 year flood. • Polluted stormwater captured in the stormwater control dams shall be pumped back to the processing plant for reuse and recycling.	• GN704 Regulations in terms of the National Water Act, 1998 (Act No 36 of 1998).	SHEQ/Mine Manager			X	X		X

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			• Where the stormwater enters the river systems, sediment and debris trapping, as well as energy dissipation control structures will be put in place. • If surface and/or groundwater pollution has occurred or may possibly occur, the ECM to conduct an internal investigation, and should a need arise, the specialists to conduct the necessary investigations and implement additional monitoring, pollution prevention and remediation measures. • Water management has the potential to be a major cost associated with decommissioning and post closure management of the mining areas. Even during the design and operational phase, the water management measures should be aimed at facilitating successful decommissioning, closure, and post closure management of the area. • Hazardous materials and chemicals must be stored on solid concrete surfaces. • Discussions with the regulatory authorities and I&APs are recommended to establish that the proposed final landforms, vegetation and land use, and water management structures will be acceptable at closure. • Further, the sustainability of water management measures needs to be demonstrated, e.g. the impact of floods larger than the design flood on the need to reconstruct or repair structures. This can already be assessed during the operational phase but monitoring during the post closure phase will also be required, and allowance for this must be made in the financial provision. <u>Post-mining</u> • Collect data and determine the performance of the post-mining landform activity against the agreed post mining. • Land use/environmental values: publish the information so that governmental authorities and the mining industry can improve their environmental performance.							
Land Capability	• Impact from construction activities on high land capability areas.	• Loss of Agricultural fields/ Reduction in land capability in other areas	• The fields are used as pastures for livestock and are severely over-grazed that resulted in degradation of the land. The mitigation focus of the agricultural resources should focus on improvement of the natural capital. (rehabilitation of the veld, soil, and other vegetation). Planting of non-climax grasses and using excess water from the mine to improve the natural biological processes should be used as primary mitigation measures. • Implement and continuously update the AIP Management Plan as part of an Biodiversity management plan, the plan will be updated continuously during the life of mine.	• Manage soil erosion in line with the requirements of the National Norms and Standards under The Conservation of Agriculture Resources Act (Act no. 107 of 1998) (GN R 2687 of 1985-12-06 and GN R 280 of 2001-03-30). Requires the protection of land against soil erosion and	SHEQ/Mine Manager			**X**	**X**		

	Aspect	Impact	Mitigation measures/ Actions	• Compliance with Standards	Responsible Person (s)	Project Phase					
						Planning & Design	Pre-Construction	Construction	Operational	Rehabilitation	Closure / Decommissioning and Post Closure
			• Implement soil conservation and management measures and replace stripped soil to a depth of 750 mm in re-profiled mined out areas. • Re-establish surface drainage and a free draining landform. • Implement soil protection and conditioning measures. • Monitor rehabilitated areas annually to assess performance of rehabilitation approach employed in order to identify: • Occurrence of surface erosion. • Vegetation die back. • To establish whether salinization of soil is occurring. • Fertility status of rehabilitated land.	the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained.						

5. ENVIRONMENTAL MONITORING REQUIREMENTS

The objective of environmental monitoring is to to outline what monitoring programmes will be in place for the impacts identified as part of the impact assessment. It will also indicate who is responsible for implementing the programmes and for what period the monitoring programmes should run. The monitoring programme also provides transparent assurance to ECM Mareesburg and external parties that specified standards are being set to reduce (negative) impacts to tolerable levels, and that target performance levels are being met.

A monitoring programme can effectively serve to characterise existing environmental conditions and then continue through construction, operations and closure to detect unacceptable environmental changes. As such it is not necessary, or practical to continuously monitor all potentially affected environmental parameters.

By systematic sampling, the monitoring programme assesses the quality of the receiving environment, which can then be compared to both the baseline data and the receiving environment quality standards. It has been designed to measure environmental performance against applicable standards, guidelines, and expectations, and to provide early detections of undesirable impacts to the environment. Such information is used to ensure that project standards are being met, and to demonstrate compliance with regulatory requirements. The monitoring programme is reviewed and amended as and when necessary to ensure safe operation and optimal environmental protection.

The EP will regularly review all monitoring data to assess compliance with the various project standards. Where monitoring results indicate an area of concern or that project standards are not being met, corrective action is undertaken by the responsible party. If the input of a specialist consultant is required to determine the source of the problem and give solutions, then such a specialist is contracted to carry out the relevant study/ies.

6. FREQUENCY OF THE SUBMISSION OF REPORTS

The requirement for auditing the EMPR in terms of Performance Assessment must be undertaken as per authorisation and submitted to the DMRE.

7. Environmental Awareness Plan

The Environmental Awareness Plan describes the way the mine intends informing its employees of any environmental risks which may result from their work and the manner in which the risk must be dealt with to avoid pollution or degradation of the environment.

Table 10: Awareness Plan and Roles and Responsibilities

Awareness Description	Roles and responsibility
INDUCTION PROGRAMME	
Training programmes will, be established and maintained for mine personnel, contractors and visitors. Training shall include the following: • Administrative requirements and procedures which will include the Emergency Procedures. • Resource conservation and environmental reporting and general environmental awareness for Mine related environmental issues.	Environmental Superintendent and HRD Superintendent.
Contractors that are employed on the mine must, prior to any starting of working activities, complete the safety file/pack. This package requires the contractor to perform Safety, Health and Environment (SHE) Risk assessments on the activities to be undertaken. The entire risk assessment process and the applicable procedures are referenced within the contractor's safety file.	SHEQ Superintendent
Environmental Induction slides/presentation shall be revised as and when required. Induction is valid for the period of one year hence refresher shall be done after 365 days or following annual leave.	All employees and contractors
Reporting of oil spills and incidents shall form part of induction program.	Environmental Superintendent
TRAINING NEEDS	

Training and awareness needs shall be identified as per the significant impact per job category. • Training needs shall be identified through: • Performance appraisal; • Personal Development Plan (PDP) • Audit findings and recommendations; • Training needs analysis; • Impact/Aspect Register • The updating of procedures (quality, technical and administrative). Training needs will also be identified through work performance, request by employee and work area.	HRD Superintendent and Section Heads
Once training needs have been established it is up to the supervisor to notify the Training Department of the requirements. The training department will then identify pertinent and relevant courses (if not already done so by employee/supervisor) and schedule training accordingly.	HRD Superintendent and Section Heads
Monthly EnvironmentalTopic will be distributed to all in the mine including contractors.	Environmental Superintendent, Section Heads and SHEQ Coordinators
Environmental related awareness days celebrations are done to enhance awareness to employees and local communities (Water week, environmental Week, Arbour week etc.) to communicate environmental tips to all employees.	Environmental Superintendent
TRAINING PLANNING	
Identified and agreed training needs shall be included in budgets and processed. Course attendance (other than at the internal induction courses) shall be scheduled based on the importance of task contribution to the maintenance, effectiveness and improvement of the objectives.	Section Heads
EMS TRAINING	
Mine Personnel: All employees, current or new, and contractors will undergo induction, a part of which is environmental awareness training and includes the Safety, Health, Environmental and Quality policy. Depending on a person's job category training will be performed on significant aspects pertinent to his/her area of work. At the end of this training, personnel will be required to complete the awareness test and the level of awareness assessed by the Training Department. Re-testing or induction may be required if test was failed.	HRD Superintendent

All personnel performing tasks which can cause significant or major environmental impacts shall be competent on the basis of training, education and/or experience.	
Visitors: All visitors to any controlled access areas of the Mine will undertake a short "visitors' induction", which highlights the main safety and environmental aspects relevant to short term visitors at the mine.	Site Safety Officer or host
Activity / Procedure	**Roles and responsibility**
Standard Procedures: Employees and contractors shall be made aware of Environmental Standard/ Operating procedure related to their activities which might have environmental impacts e.g. waste management, oil management etc.	Environmental Superintendent

8. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

Refer to Appendix 7 of the Final EIA Report for authority correspondence.

9. UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports ☒

b) the inclusion of comments and inputs from stakeholders and I&APs ; ☒

c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☒ and

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒

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