

**NHLABATHI
MINERALS (PTY)
LTD**

**RIETKOL MINING
OPERATION**

**DRAFT ENVIRONMENTAL
MANAGEMENT
PROGRAMME
SEPTEMBER 2021**





RIETKOL MINING OPERATION - NHLABATHI MINERALS (PTY) LTD

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

SEPTEMBER 2021

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mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

PART B

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

PROPOSED RIETKOL MINING OPERATION

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT: Nhlabathi Minerals (Pty) Ltd

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FILE REFERENCE NUMBER SAMRAD: MP 30/5/1/2/2/10268 MR

IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVES OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

- (a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
 - (b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
 - (c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, biophysical, biological, social, economic, heritage and cultural aspects of the environment;
 - (d) determine the -
 - i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - ii) degree to which these impacts -
 - a. can be reversed;
 - b. may cause irreplaceable loss of resources; and
 - c. can be avoided, managed or mitigated;
 - (e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
 - (f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
 - (g) identify suitable measures to manage, avoid or mitigate identified impacts; and
 - (h) identify residual risks that need to be managed and monitored.
-

In terms of the NEMA 2014 EIA Regulations contained in GN R982 of 04 December 2014 (as amended in 2017) the Environmental Management Programme (EMPr) must comply with Appendix 4 of the NEMA 2014 EIA Regulations (GN R982 of 04 December 2014).

Legal Requirement		Relevant section in EMPr
(1)	An EMPr must comply with section 24N of the Act and include–	
(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 1.2
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 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 should be avoided, including buffers;	Section 2.4 Figure 8
(d)	a description of the impact management outcomes, 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, operational activities;	Section 3
(e)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 4 Table 5
(f)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (e);	Section 4 & 5.2 Table 6
(g)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (e);	Section 4 & 5.2 Table 6
(h)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 4 & 5.2 Table 6
(i)	the time periods within which the impact management actions contemplated in paragraph (e) must be implemented;	Section 4 & 5.2 Table 6
(j)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (e);	Section 4 & 5.2 Table 6
(k)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 5.2
(l)	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; and	Section 6
(m)	any specific information that may be required by the competent authority.	Section 7

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GLOSSARY OF TERMS

TERM / ABBREVIATION	MEANING
ABA	Acid-base accounting
AEL	Atmospheric Emissions Licence
AH	Agricultural Holding
AHs	Agricultural Holdings
AMD	Acid Mine Drainage
AQA	National Environmental Management: Air Quality Act 39 of 2004
AQMP	Air Quality Management Plan
BAS	Best Attainable State
BAMP	Biodiversity Action Management Plan
BCM	Bank cubic meters
Biome	A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate
BM&C	Blast Management & Consulting
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act 43 of 1983
CBA	Critical Biodiversity Area
CFP	Chance Find Protocol
CRR	Comments and Response Report
DAFF	Department of Agriculture, Forestry and Fisheries
DALRRD	Department of Agriculture, Land Reform and Rural Development
dBA	Decibels
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DMRE	Department of Mineral Resources
DoA	Department of Agriculture
DRDLR	Mpumalanga Department of Rural Development and Land Reform
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Ecological Importance and Sensitivity
EMC	Environmental Management Committee

TERM / ABBREVIATION	MEANING
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FAII	Fish Assemblage Integrity Index
FSR	Final Scoping Report
GC	Groundwater Complete
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GN	Government Notice
GPS	Global Positioning system
HHRA	Human Health Risk Assessment
HIA	Heritage Impact Assessment
HPA	Highveld Priority Area
HSEC	Health, Safety, Environmental, Community
IAPs	Interested and Affected Parties
IBA	Important Bird Area
IDPs	Integrated Development Plans
IHAS	Invertebrate Habitat Assessment System
IHIA	Intermediate Habitat Integrity Assessment
ISP	Internal Strategic Perspective
IUCN	International Union for Conservation of Nature and Natural Resources
IWUL	Integrated Water Use Licence
IWWMP	Integrated Water and Waste Management Plan
LC	Leachable concentration
LCC	Land Claims Commissioner
LM	Local Municipality
LOM	Life of Mine
Mamsl	Meters above mean sea level
MAE	Mean Annual Evaporation
MAP	Mean Annual Precipitation
MAR	Mean Annual Run-off
mbs	Meters below surface
MBSP	Mpumalanga Biodiversity Sector Plan
MDARDLEA	Mpumalanga Department of Agriculture, Rural Development, Land Reform, Environmental Affairs
MDEDET	Mpumalanga Department of Economic Development, Environment and Tourism
MNCA	Mpumalanga Nature Conservation Act 10 of 1998

TERM / ABBREVIATION	MEANING
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
MRA	Mining Right Application
Mt	Million tonnes
Mtpa	Million tonnes per annum
MTPA	Mpumalanga Tourism and Parks Agency
NBA	National Biodiversity Assessment
NDP	National Development Plan
NEMA	National Environmental Management Act 107 of 1998
NEMBA	National Environmental Management: Biodiversity Act 10 of 2004
NEMWA	National Environmental Management: Waste Act 59 of 2008
NFA	National Forest Act 84 of 1998
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act 25 of 1999
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act 36 of 2008
NWCS	National Wetland Classification System
OES	One Environmental System
PCD	Pollution Control Dam
PES	Present Ecological State
PFD	Process Flow Diagram
PIA	Palaeontological Impact Assessment
PM	Particulate matter
PRECIS	Pretoria Computer Information Systems
RDL	Red Data List
RDM	Resource Directed Measures
RE	Remaining Extent
REC	Recommended Ecological Category
RHP	River Health Programme
RMO	Resource Management Objective
RoM	Run of Mine
RWD	Return Water Dam
RWQO	Receiving Water Quality Objective
SAHRA	South African Heritage Resources Agency
SAM	Social Accounting Matrix
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SAS	Scientific Aquatic Services

TERM / ABBREVIATION	MEANING
SCC	Species of Conservational Concern
SDF	Spatial Development Framework
S&EIR	Scoping and environmental impact reporting process
SEIA	Socio-Economic Impact Assessment
SIA	Social Impact Assessment
SUR	Strict Unemployment Rate
SWMP	Surface Water Management Plan
TC	Total concentration
TDS	Total Dissolved Solids
TFR	Transnet Freight Rail
TIA	Traffic Impact Assessment
TOPS	Threatened or Protected Species
TSP	Total suspended particulates
TWQR	Target Water Quality Range
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
WMA	Water Management Area
WML	Waste Management Licence
WQO	Water Quality Objective

1 INTRODUCTION

1.1 BACKGROUND

Consol Glass (Pty) Limited (Consol) was the holder of a prospecting right over portions of Olifantsfontein 196 IR and Rietkol 237 IR. Consol commenced with an internal restructuring process of its mining interests in terms of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002) in 2013. The restructure included the establishment of Apex Silica Mining (Pty) Ltd (Apex Silica) and Nhlabathi Minerals (Pty) Ltd (Nhlabathi). Following the restructuring process, Consol gave consent to Nhlabathi to apply for a Mining Right over the area to which it held the prospecting right, for the Rietkol Mining Operation (referred to as the **Rietkol Project**).

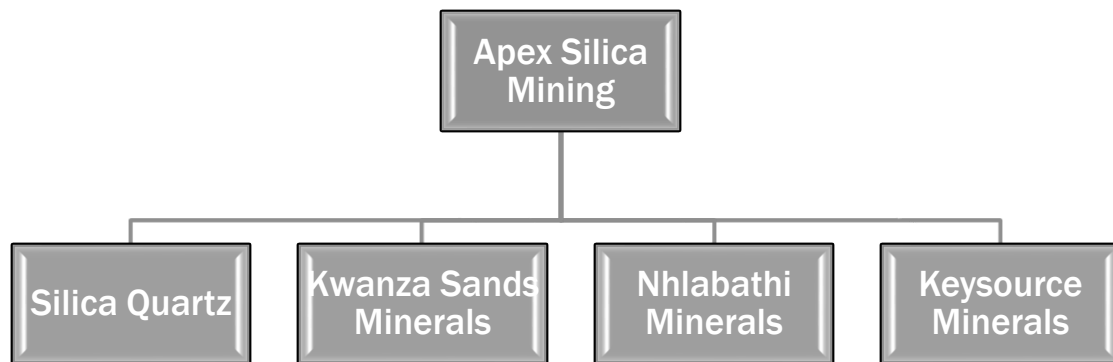


Figure 1: Company Structure

Nhlabathi applied for a Mining Right to mine silica in February 2018 and commenced with the Environmental Impact Assessment (EIA) process as contemplated in the National Environmental Management Act 107 of 1998 (NEMA) and Government Notice (GN) No. R. 982-986 of 4 December 2014: NEMA: EIA Regulations, as amended, for the Rietkol Project.

Several specialist studies were conducted within the Mining Right Application (MRA) area in support of the EIA process, and a comprehensive Public Participation process was initiated. The final Scoping Report was submitted on 3 April 2018 and accepted by the Department of Mineral Resources and Energy (DMRE) on 26 April 2018. However, the MRA was rejected by the DMRE Mpumalanga Mine Economics Directorate on the basis that the MRA formed part of another right granted in terms of the MPRDA. This decision resulted in a delay in the EIA process, ultimately causing the application for Environmental Authorisation to lapse.

After research by DMRE officials and Nhlabathi employees, it was established that the prior right, on which basis the MRA was rejected, was the prospecting right registered over the properties held by Consol. To remedy the situation, Consol submitted a letter to the DMRE on 8 June 2018 granting Nhlabathi the consent to proceed with the MRA. As a result, the DMRE withdrew the refusal letter by issuing an acceptance letter on 12 September 2018. Nhlabathi could, therefore, continue with the EIA process.

However, on 31 August 2018, Mineral Resources and Energy Minister Gwede Mantashe closed the Mpumalanga DMRE Office until further notice, with the result that DMRE accepted no new applications for Environmental Authorisation. The DMRE Office was only re-opened for business on 5 August 2019.

Following the re-opening of the DMRE Office, Nhlabathi has re-initiated the MRA process and applied for a Mining Right over the same farm portions in early 2020. The MRA was accepted by the DMRE on 21 January 2021 and Nhlabathi has since re-initiated the EIA process with Jacana Environmentals cc (Jacana) appointed as the independent Environmental Assessment Practitioner (EAP).

Consol has appointed Jacana to apply for Integrated Environmental and Water Use Authorisation for the Rietkol Project in terms of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998), the 2014 Environment Impact Assessment (EIA) regulations, the National Environmental Management: Waste Act (NEMWA), 2008 (Act 59 of 2008) and the National Water Act (NWA), 1998 (Act 36 of 1998), as amended. The integrated application for Environmental Authorisation (EA) and the Waste Management Licence (WML) was submitted to the DMRE on 18 March 2021, the Competent Authority (CA) for any mining and related activities.

The Final Scoping Report (FSR), following a 30-day commenting period by registered Interested and Affected Parties (IAPs) and commenting authorities on the draft Scoping Report (DSR), was submitted to the CA on 7 May 2021. The FSR and Plan of Study was accepted on 11 August 2021.

This document serves as the **Draft Environmental Management Programme** (EMPr) which is, together with the Draft Environmental Impact Assessment Report (EIAR), available for comment by registered IAPs and commenting authorities for a period of 30 days, from 4 October to 4 November 2021.

1.2 APPLICANT

Project applicant	Nhlabathi Minerals (Pty) Ltd
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1.3 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Independent EAP	Jacana Environmentals cc
Responsible person	Marietjie Eksteen
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Professional Affiliation	<p>Registered Environmental Assessment Practitioner at the Environmental Assessment Practitioners Association of South Africa (EAPASA) – Number 2020/1800</p> <p>Registered as a Professional Environmental Scientist (Pr.Sci.Nat.) at the South African Council for Natural Scientific Professions – Registration No. 400090/02</p> <p>Member of the Land Rehabilitation Society of Southern Africa (LaRSSA): Membership ID 30835</p>
Abbreviated Curriculum Vitae	<p>Marietjie Eksteen is the Managing Member of the consulting firm Jacana Environmentals cc, an environmental consulting firm based in Polokwane. She is an environmental scientist with 30 years' experience, her main fields of expertise being water quality management, mine water management, environmental legal compliance, and project management. She obtained a Masters' degree in Exploration Geophysics (MSc) from the University of Pretoria in 1993. Since establishing Jacana Environmentals in 2006, she has been involved in a variety of mine- and industry-related environmental projects serving clients such as MC Mining Limited, South32 SA Coal Holdings, Glencore Operations South Africa, Consol Glass and Silicon Smelters, amongst others. Prior to 2006 she was employed by Pulles Howard & De Lange Inc as an environmental consultant for 2 years. Before consulting, Ms. Eksteen was employed by BHP Billiton as a mine environmental manager at their operations in Mpumalanga, as well as the Department of Water Affairs where she was appointed as a water quality specialist for the mining industry. Her career started off as a geophysicist at Genmin in 1990.</p>

2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

2.1 PROJECT LOCATION

The Rietkol Project is in Wards 8 and 9 of the Victor Khanye Local Municipality within the Nkangala District Municipality of Mpumalanga Province. Delmas/Botleng are approximately 6 km east and Eloff 4 km south of the MRA area. The Rietkol Project is located strategically close to major roads in the area, including the N12 (to the north-west), R50 (to the north-east) and R555 (to the south). The Springs/Durban Transnet Freight Rail (TFR) railway line is situated to the south, alongside the R555.

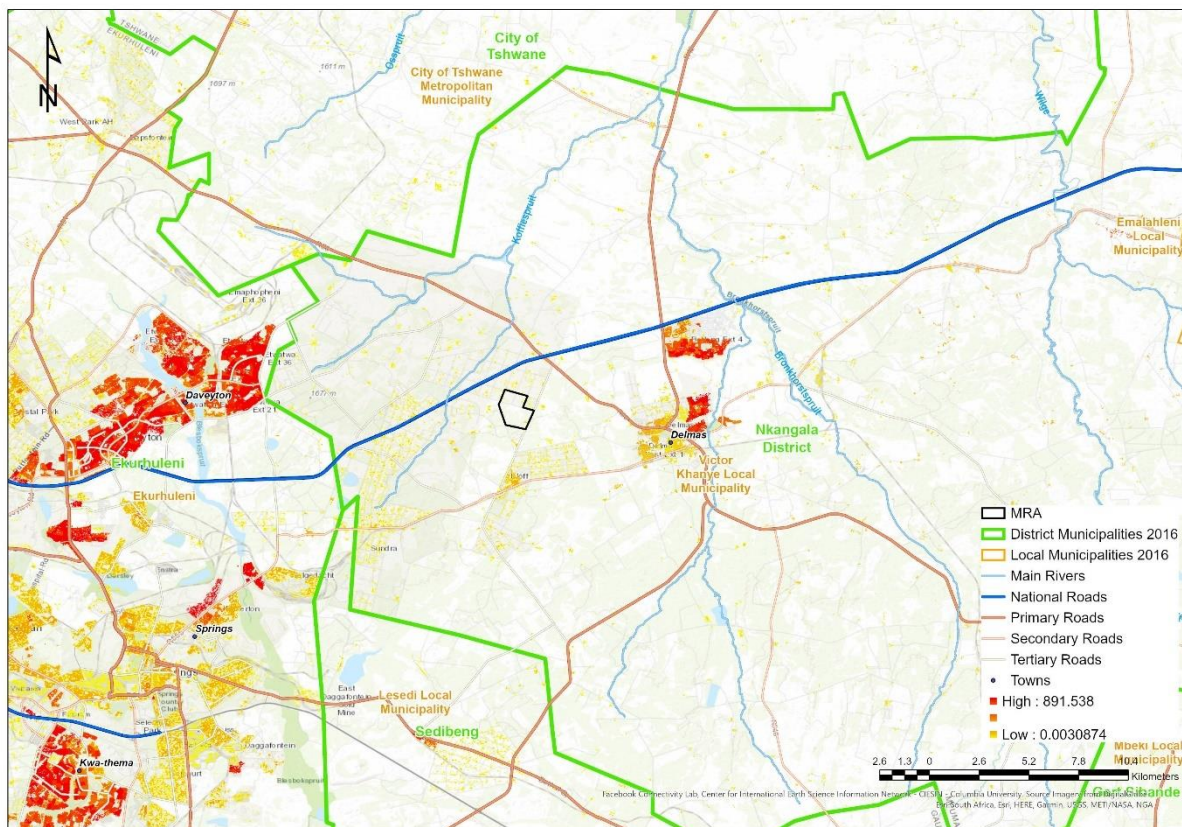


Figure 2: Project locality and institutional map

The Rietkol MRA covers an area of 221 ha consisting of:

- 16 Modder East Agricultural Holdings (AHs) on the farm Olifantsfontein 196 IR, each approximately 4.1 ha in extent;
- Portion 71 of the farm Rietkol 237 IR; and
- A portion of Remaining Extent (RE) of portion 31 of the farm Rietkol 237 IR.

2.2 PROPERTY DESCRIPTION

The registered description of the properties involved is tabled below, as indicated in Figure 3.

Table 1: Registered landowners

Portion Number	Title Deed Number [#]	SG Number	Owner
AH 209	T11927/2019	TOIR04410000020900000	Consol Glass (Pty) Ltd
AH 210	T8896/2019	TOIR04410000021000000	Consol Glass (Pty) Ltd
AH 211	T38311/1969	TOIR04410000021100000	Willem Christoffel Meyer
AH 212	T1558/2020	TOIR04410000021200000	Consol Glass (Pty) Ltd
AH 213	T171746/2005	TOIR04410000021300000	Johanna Elizabeth van der Walt
AH 214	T5414/2018	TOIR04410000021400000	Consol Glass (Pty) Ltd
AH 215	T2743/2003	TOIR04410000021500000	Veizaj Sokol
AH 216	T116099/2006	TOIR04410000021600000	Bheki & Lorraine Mthethwa
AH 217	T2918/2019	TOIR04410000021700000	Consol Glass (Pty) Ltd
AH 218	T7171/2019	TOIR04410000021800000	Consol Glass (Pty) Ltd
AH 219	T7171/2019	TOIR04410000021900000	Consol Glass (Pty) Ltd
AH 220	T2918/2019	TOIR04410000022000000	Consol Glass (Pty) Ltd
AH 221	T2918/2019	TOIR04410000022100000	Consol Glass (Pty) Ltd
AH 222	Pending	TOIR04410000022200000	Consol Glass (Pty) Ltd
AH 223	T2918/2019	TOIR04410000022300000	Consol Glass (Pty) Ltd
AH 224	Pending	TOIR04410000022400000	Consol Glass (Pty) Ltd
RE of Ptn 31 of Rietkol 237 IR	T16617/1993	TOIR00000000023700031	Christiaan Le Cordeur Rossouw
Ptn 71 of Rietkol 237 IR	T1885/2018	TOIR00000000023700071	Rossouw Plumvee-Eiers (Pty) Ltd

[#]Pending: Consol (Pty) Ltd purchased the property, in process of transfer.

The Department of Rural Development and Land Reform (DRDLR) in Mpumalanga indicated the following regarding land claims within the MRA area:

Olifantsfontein 196 IR	According to the DRDLR database there are no land claims against the property.
Ptn 31 & 71 of Rietkol 237 IR	There is a land claim against the property, but so far only Ptn 91 has been affected and settled. Ptns 31 & 71 are not affected, but research is ongoing.

No traditional authority is present in this area, and none was identified in close proximity of the proposed mine.

The landownership associated with the MRA area and surrounds (1 km radius) is provided in Figure 3.

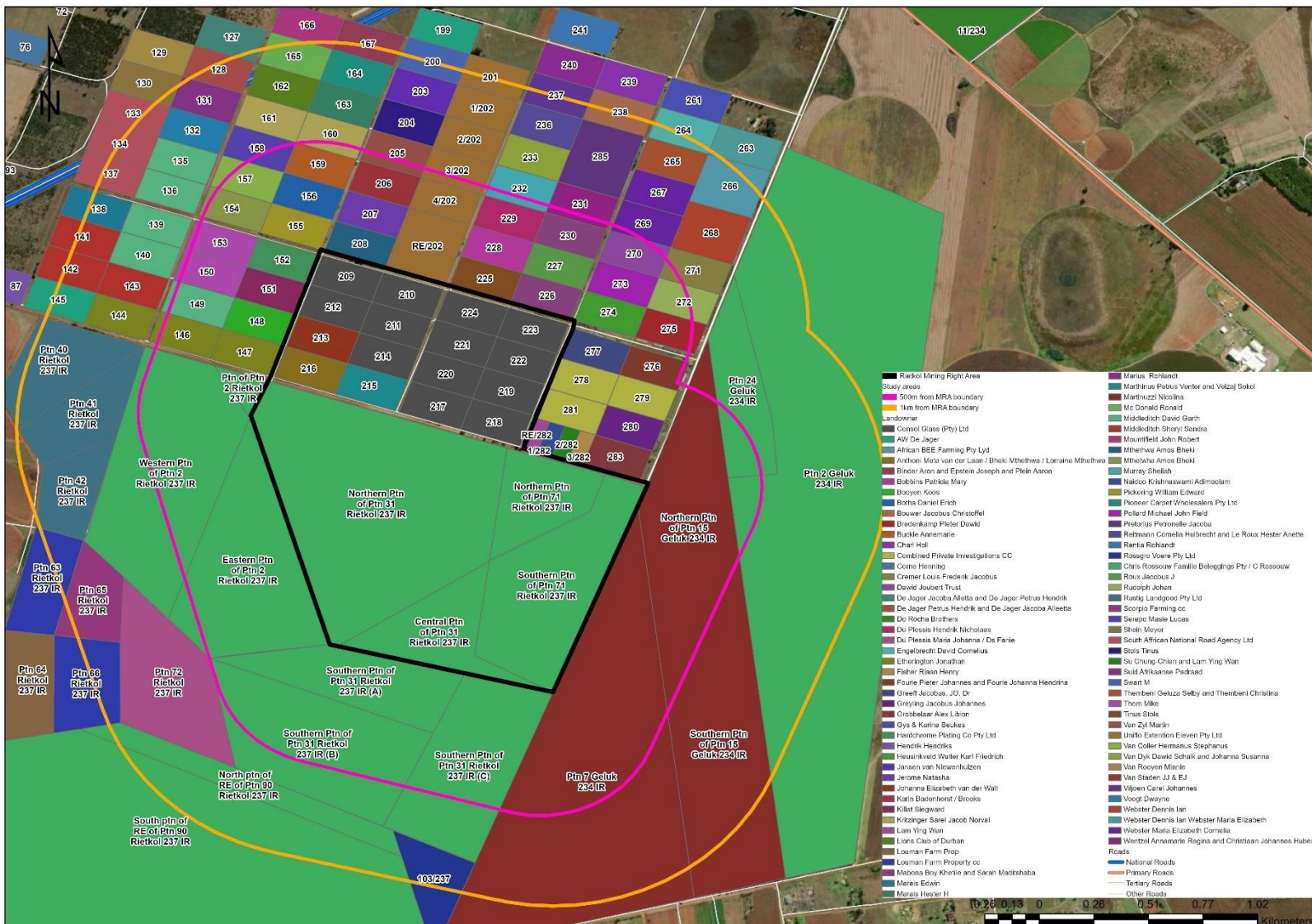


Figure 3: Landownership map within 1 km radius of the MRA boundary

2.3 MINING AND INFRASTRUCTURE LAYOUT

Silica is planned to be mined by means of conventional opencast methods to a depth of between 30 and 50 meters below surface (mbs). The estimated life of mine (LOM) for the proposed Rietkol Project is 20 years. Further exploration drilling will be conducted during the operational phase, which may increase the LOM and mining depth if the resource proves viable. **It is important to note that this EIAR deals with the first 20 years of mining only.**

The proposed project includes the following mining and related infrastructure:

- Opencast pits;
- Run of mine (RoM) stockpiles;
- Processing plant (crushing, screening, washing and drying operations);
- Product stockpiles;
- Administration office facilities (security building, administration and staff offices, reception area, ablution facilities);
- Production facilities (locker rooms, laboratory, workshops, stores, ablution facilities);
- Bagging facility and warehouse;
- Weighbridge;
- Access roads; and
- Clean and dirty water management infrastructure.

A detailed project description is provided in the EIAR and is only briefly summarised below.

2.3.1 Mining Methodology and Schedule

Silica will be mined through an opencast bench mining method. The benches will be mined at a width of 8m and a height of 10m. Final mining depth will be between 30 and 50 mbs. Mining will commence in the northern portion of the MRA area and will progress in a south-easterly direction.

Drilling and blasting of the rock face will be conducted on a predetermined schedule in accordance with projected volumes of production and will be undertaken by blast professionals and with the required safety procedures applied.

The mining method will include:

- Vegetation and topsoil will be stripped ahead of mining. At least one cut (8m width) should already be stripped and available for drilling between the active topsoil stripping operation and the open void;
- The topsoil will be loaded onto dump trucks by excavators and hauled to areas that require rehabilitation or used to construct stormwater berms;
- Drilling operations will commence in the front of the advancing pit after the topsoil has been removed;
- The blasted Run of Mine (RoM) will be stockpiled with excavators; and
- Thereafter RoM will be transported to the crushing plant by means of haul trucks with a loading capacity of approximately 40 tons.

Access ramps will be located along the eastern pit limit and are laid out within the orebody to minimise the mining of waste.

The North Block will be mined for the first 3 years of LOM in a northerly direction, commencing from Block S04. Block S04 is the deepest and the ore body floor slopes up to the outcrop in Block S01. The ore from Block S04 will be used as a strategic stockpile in readiness for plant start-up.

Once Block S04 has been mined out a void exists to dump the tailings from the washing plant from about YR2 onwards. Since it is the deepest portion of the block the water will not negatively impact on the mining operation of S03, S02 and S01. The void created by mining the North Block is 309 197 bank cubic meters (BCM) and tailings can be dumped in the North Block for the first 16 years of mining.

Once the North block has been mined out, mining in the Main Block will commence in YR4, in a southerly direction up to Block 14 in YR20.

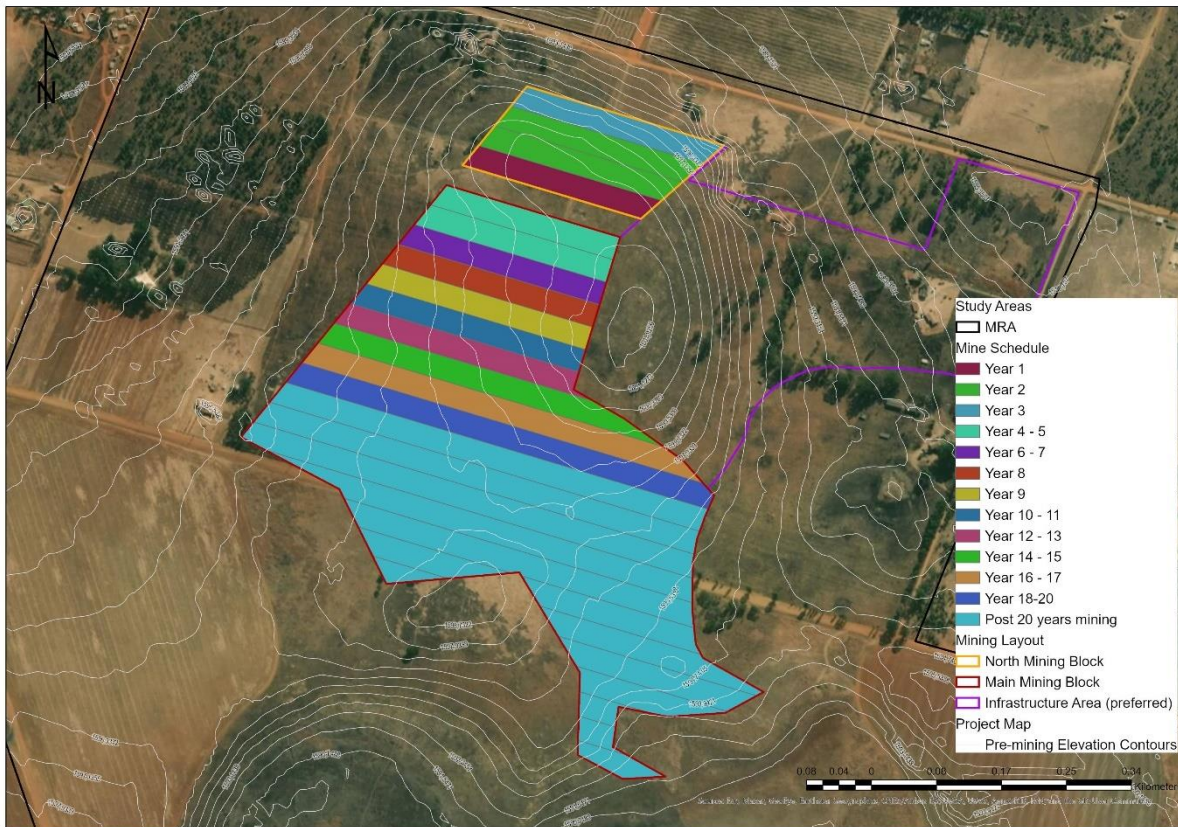


Figure 4: Mine schedule for first 20 years of mining

2.3.2 Surface Infrastructure Layout

The infrastructure components and layout are presented in Figure 5.

An 11 kV electricity supply line is located on the northern boundary of the MRA area and discussions with Eskom is underway to connect to this supply line. Generators will be installed to supplement Eskom power where required.

Limited water is consumed during processing and all processing water will be recycled. However, there will be a loss of approximately 20% through moisture in the product and evaporation. Water for processing and dust suppression will be obtained from the open pit (groundwater influx) and the existing boreholes within the MRA area.

The maximum on-site water requirement at full production is expected to be 4 ℓ/s (i.e. 0.4 ℓ/s dust suppression, 0.2 ℓ/s potable water and 3.4 ℓ/s plant). The groundwater testing shows that the combined sustainable yield of the on-site tested boreholes is around 4 ℓ/s. The existing boreholes on site would therefore be sufficient to supply the Rietkol operations, not considering groundwater influx and direct rainfall.

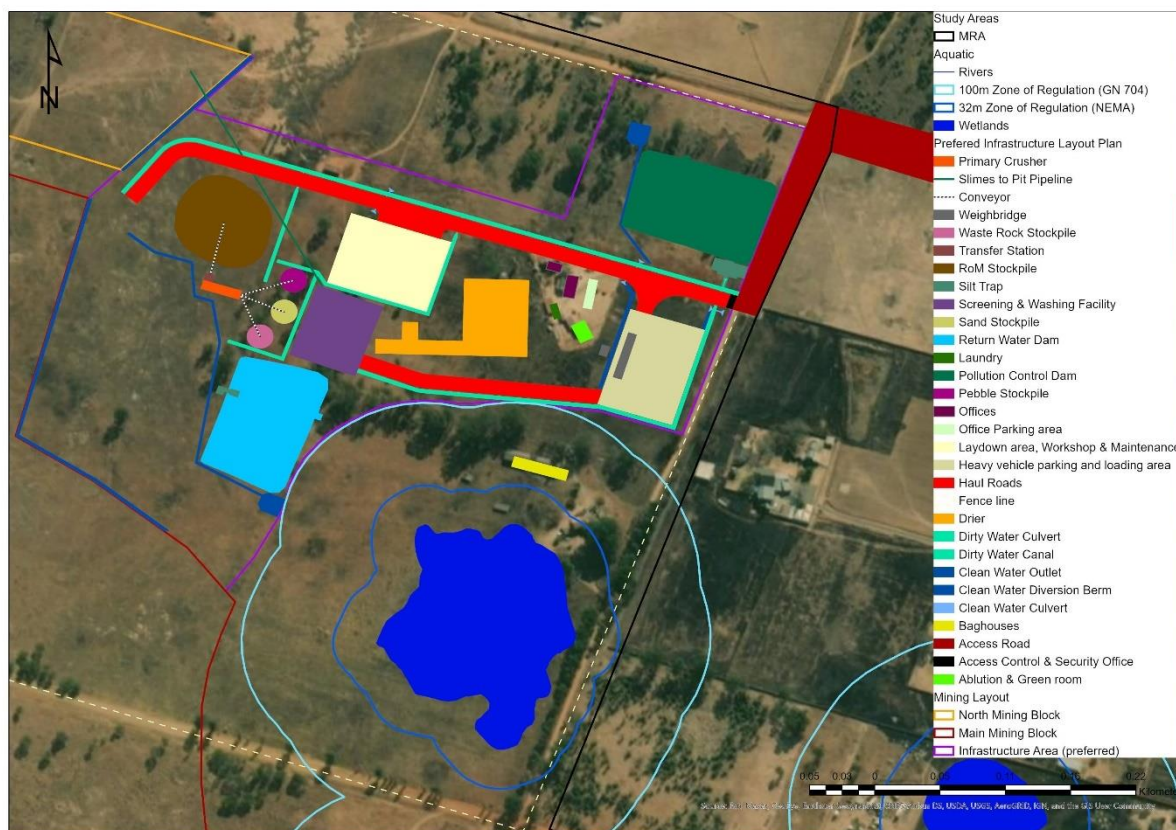


Figure 5: Infrastructure Layout Plan

The only sewage expected to be generated on the mine is from the ablution facilities and washrooms at the infrastructure area. The wastewater and greywater originating from the change houses and laundry will drain into a 44 500 ℓ modular calcamite septic tank system that will need to be emptied twice a week.

2.3.3 Roads and Transport

Access to the site will be gained via the N12 and the R50. From the R50, access to site will be via Provincial Road D1550, a paved secondary provincial road. This road will be upgraded to handle the additional traffic associated with the proposed mining project. From the D1550 the mine will be accessed via an existing gravel road turning off the D1550 just north of AH 276. Similarly, this gravel road will be upgraded to carry the additional traffic load. Formal access will be constructed to the pit and the infrastructure as the development progresses.

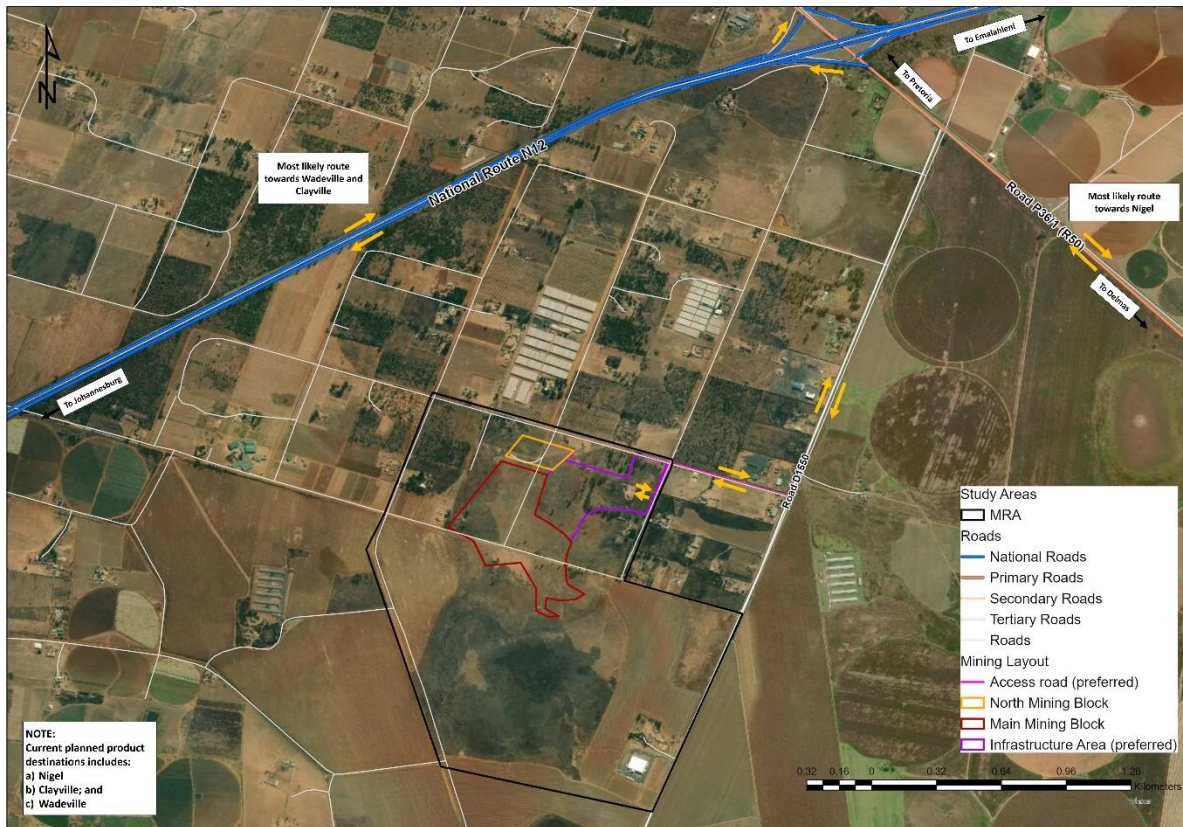


Figure 6: Site access and product transport routes

2.3.4 Listed Activities

The listed and waste management activities associated with the proposed Rietkol Project are provided in Table 2.

Table 2: Listed and waste management activities

Activity	Approximate Extent	Listed or Waste Management Activity	Applicable Notice
Open Pit Mining	North Block: 2.8 ha Main Block: 9.4 ha	X	GNR 984 – A15 GNR 984 – A17 GNR 983 – A28
Infrastructure area, including processing facility, workshops, and stockpiles	12.9 ha	X	GNR 984 – A6 GNR 984 – A15 GNR 983 – A28
Access / haul roads	35 433 m ²	X	GNR 983 – A24 GNR 983 – A56
Water management facilities (including dams)	PCD: 6 000 m ³ RWD: 5 000 m ³ Clean water canals: 215 m Dirty water canals: 1 300 m	X	GNR 983 – A9
Bulk hydrocarbon facilities	128 m ³	X	GNR 983 – A14
Waste management (incl. sewage)	45 m ³ /day (septic tank)	N/A (below threshold)	-
Mine residue (tailings) disposal	404 443 m ³	X	GN No. 921 – Category B11
Blasting	N/A	N/A	-
Product transport	N/A	N/A	-

2.4 COMPOSITE SENSITIVE RECEPTOR MAP

The final preferred mining and layout infrastructure footprint is indicated in Figure 7. The motivation for the preferred development alternatives as detailed in the EIAR is summarised in Table 3.

Table 3: Motivation for preferred development alternatives

Aspect	Preferred Development Alternative	Motivation
Land use activity	Mining	Currently the economic activities within the MRA area are limited and the mine will be a definite economic improvement. Although the proposed mine could potentially impact negatively on the current land use activities in the surrounding area, the net result is a positive improvement in benefits for the area. The positive economic contribution to the Mpumalanga and Gauteng economies is an additional positive factor.
Mining methodology	Opencast mining	The silica resource is shallow, and mining will take place to a depth of 30 m with potential resource up to 50 mbs. Underground mining is not possible at these depths.
Mine residue disposal	In-pit disposal of tailings	In-pit disposal of tailings will allow full rehabilitation of the North Block, with a final land capability of grazing. No surface tailings facilities will be left on surface after mining is completed, which is positive in respect of aesthetics (visual), groundwater and post-mining land use.
Surface infrastructure placement and layout	Revised, preferred alternative indicated in Figure 7	Reduction in footprint of approximately 1.6 ha. A buffer of 100m is maintained between new infrastructure and the wetland systems. Only 16 ha currently used as grazing will be destroyed vs the 17.4 ha of the original layout alternative.
Access Road	Northern access road to the north of AHs 276 & 277	Keep possible migratory routes open between the wetlands identified in the area, thereby reducing the potential risk to <i>Pyxicephalus adspersus</i> (protected Giant Bullfrog) due to the increase in heavy vehicle traffic.
Blasting	Recommended blast design (BM&C, 2021)	Reduces the safe blasting distance and evacuation zone from 526 m to 105 m. Blasting impact is restricted to MRA area, except for possible damage to nearest plastic tunnels (flowers). No safety risks envisaged with revised blast design.

The composite sensitive receptor map is shown in Figure 8, indicating the final preferred mining and layout infrastructure footprint overlain on the identified sensitive receptors, inclusive of built-up areas, floriculture, poultry houses, commercial institutions, informal settlements, wetlands and its associated buffer zones, heritage sites and areas of very high palaeontological sensitivity.

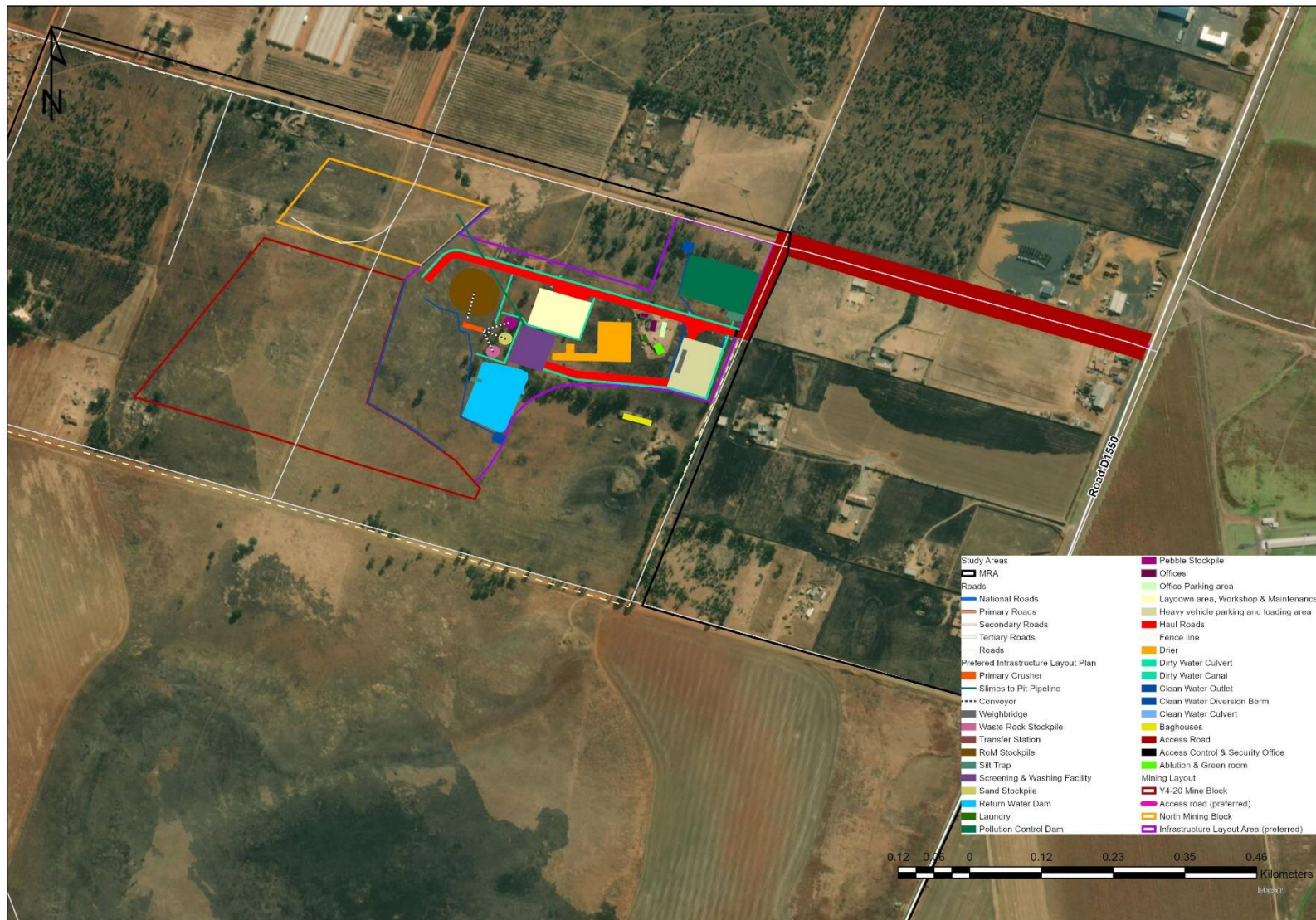


Figure 7: Preferred mining and layout infrastructure footprint (Masterplan)

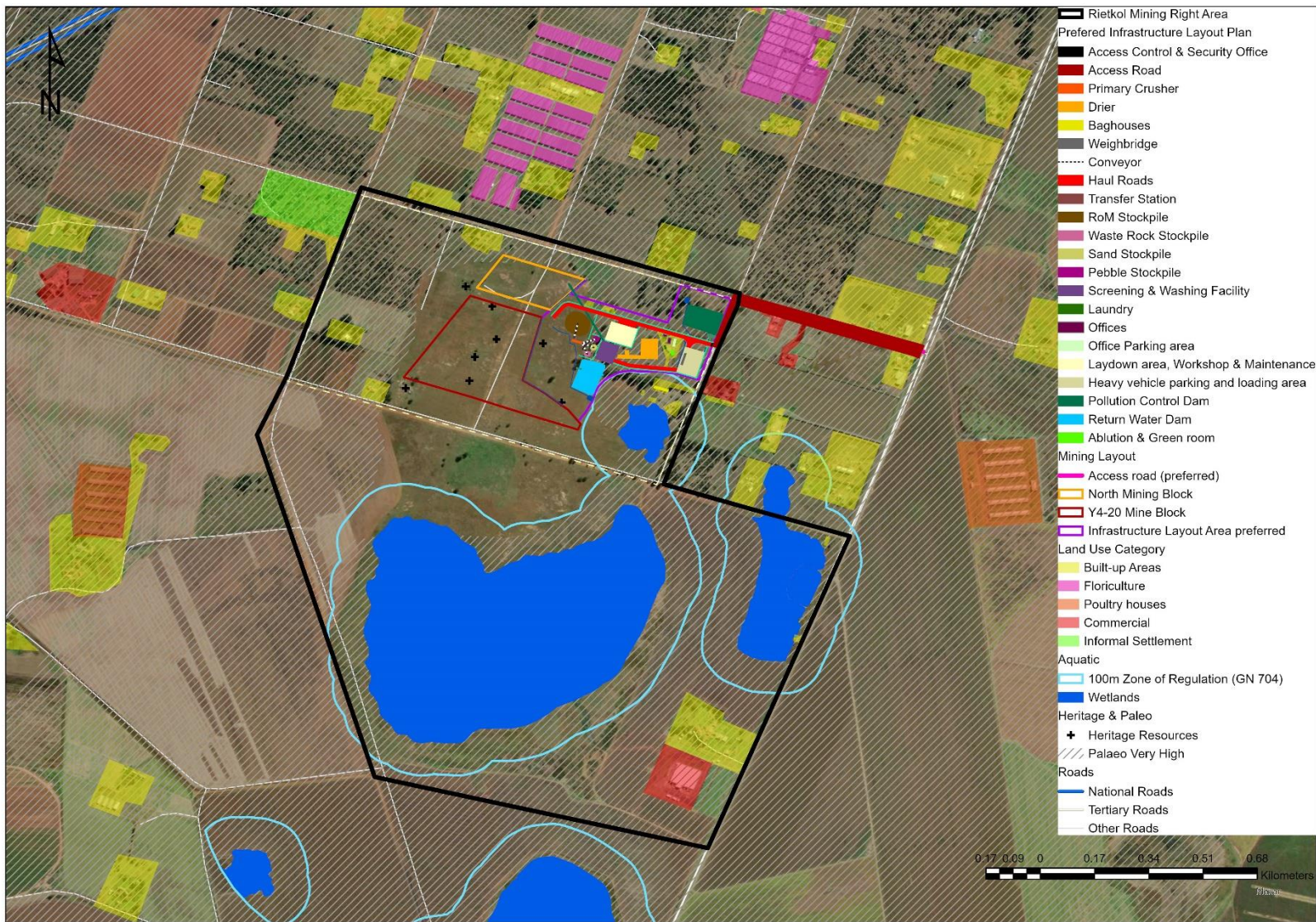


Figure 8: Composite sensitive receptor map

3 DESCRIPTION OF IMPACT MANAGEMENT OUTCOMES

3.1 CLOSURE MANAGEMENT OUTCOMES

3.1.1 Closure guiding principles

The following closure-related guiding principles underpin the closure planning process for the Rietkol Project, as presented in the Rehabilitation, Decommissioning and Closure Plan that was compiled in terms Government Notice No. R.1147 (GN R.1147) of 20 November 2015 (refer to Appendix 19):

- To comply with relevant or applicable local legislative requirements;
- To ensure that stakeholders' needs, concerns and aspirations are taken into account when considering closure and the eventual closure vision;
- To ensure the health, safety and welfare of all humans and the environment are safeguarded from hazards resulting from mining operations that have been terminated;
- To limit or mitigate adverse environmental effects to an extent that it is acceptable by all parties;
- To mitigate socio-economic impacts in which an operation is located following decommissioning and subsequent closure as far as reasonably possible;
- To avoid or minimise costs and long-term liabilities to the company and to the State and public; and
- To ensure investment decisions include appropriate consideration of closure, including both quantitative and qualitative impacts of closure.

3.1.2 Closure vision

The overall closure vision for the Rietkol Project is:

To achieve a post-mining landscape that is safe, stable, and non-polluting, that will sustain rural agricultural activities after mining has ceased

3.1.3 Closure objectives and performance targets

Aspect	Closure Objective	Rehabilitation-Related Performance Target
Infrastructure	To remove and/or stabilise surface infrastructure to facilitate the implementation of post-mining land uses	<ul style="list-style-type: none"> • Identification and retainment of all infrastructure that has a beneficial post-mining use • Transfer of the retained infrastructure to a third party for long-term management and maintenance purposes • Demolish and dismantle all non-beneficial infrastructure and rehabilitate the area to facilitate the post-mining land use
Land capability	To re-instate suitable grazing capabilities over the rehabilitate portions of the mine site	<ul style="list-style-type: none"> • Establishment of a self-sustaining, grazing land capability over the rehabilitated areas
Biodiversity	To re-establish an appropriate mix of grassland and other native flora species in the rehabilitated areas to enable the natural re-instatement of biodiversity over time	<ul style="list-style-type: none"> • Implementation of a low maintenance alien and invasive eradication plan • Establishment of a sustainable vegetation cover to facilitate the final grazing land capability requirements
Post-mining land use	To establish a post-mining land use that will sustain rural agricultural activities once mining is concluded, whilst providing an acceptable overall aesthetic appearance aligned to the surrounding landscape	<ul style="list-style-type: none"> • Establishment of a suitable final landform in the North Block and infrastructure rehabilitated areas that is free-draining and non-erosive • Establishment of a recreational area within the Main Block final void area, as per the agreement with the stakeholders and authorities
Water resources	To limit the impact on the wetland systems in and around the mine site	<ul style="list-style-type: none"> • Surface water quality indicates that the surface water runoff is unpolluted • Biomonitoring indicates that the Recommended Ecological Category (REC) is achieved
	Limit the impact of the groundwater quality and yields	<ul style="list-style-type: none"> • Demonstrate that the surrounding groundwater users are not impacted in terms of quality or yield • Implementation of compensation strategy if the above cannot be demonstrated
Social	Limit the possible health and safety threats to humans and animals that will utilise the mining site post-closure	<ul style="list-style-type: none"> • Access to high-risk areas are safe-guarded and monitored • Risk of silica exposure to the general public is restricted
	Identify and establish livelihood retention projects to create off-mine livelihoods during and post-mining	<ul style="list-style-type: none"> • Projects are in advanced stages of execution with specified timeframes on completion and desired outcomes
	Equip employees with portable skills that can be used in other sectors post-mining	<ul style="list-style-type: none"> • Successful implementation of Social and Labour Plan

3.1.4 Proposed final post-mining land use

The proposed final post-mining land use in the infrastructure areas and at North Block will be grazing, with the Main Block area constituting a wilderness area – refer to Figure 9.

Of the total disturbed area of approximately 25 ha, approximately 15.65 ha will constitute a final post-mining use of grazing, the remaining 9.35 ha associated with the Main Block will be wilderness. The post-mining land use is therefore very similar to the pre-mining land use as discussed in the EIAR.

3.1.5 Final landform

The final landform and associated elevations and drainage directions are indicated in Figure 10.

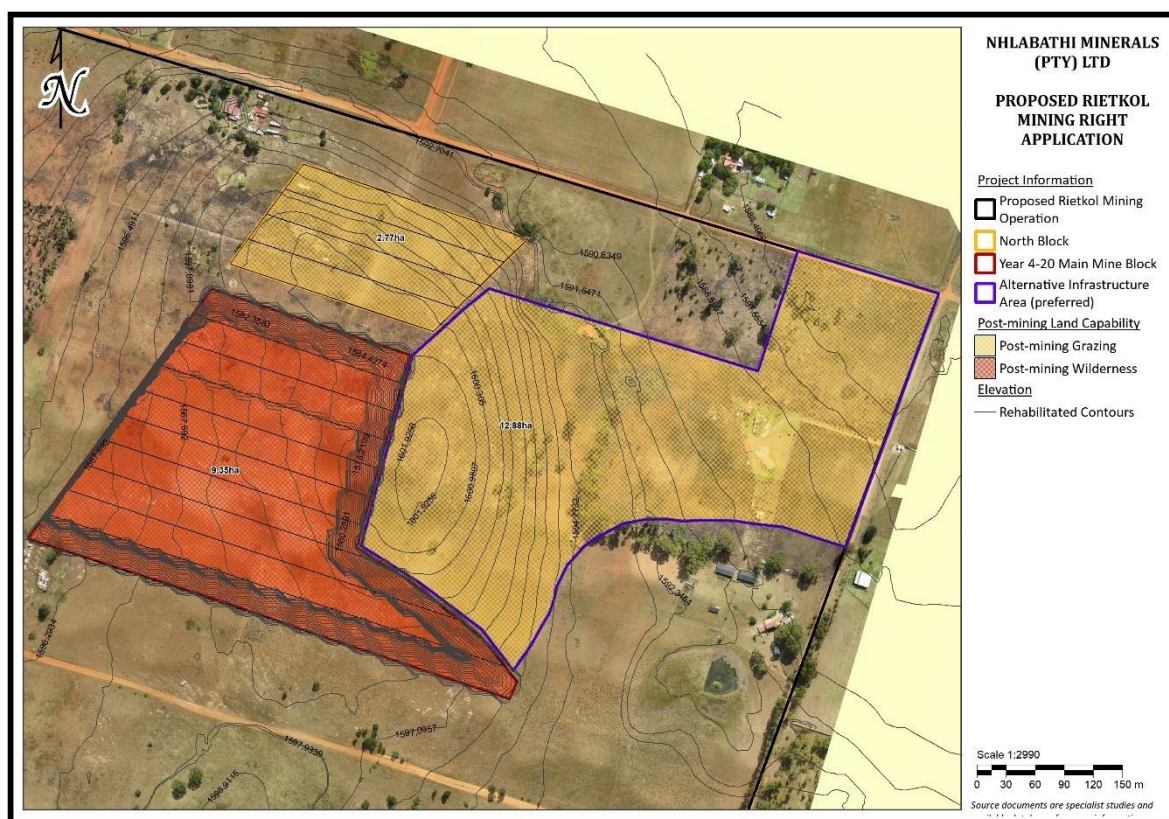


Figure 9: Proposed post-mining land use within disturbed footprint for mining and infrastructure

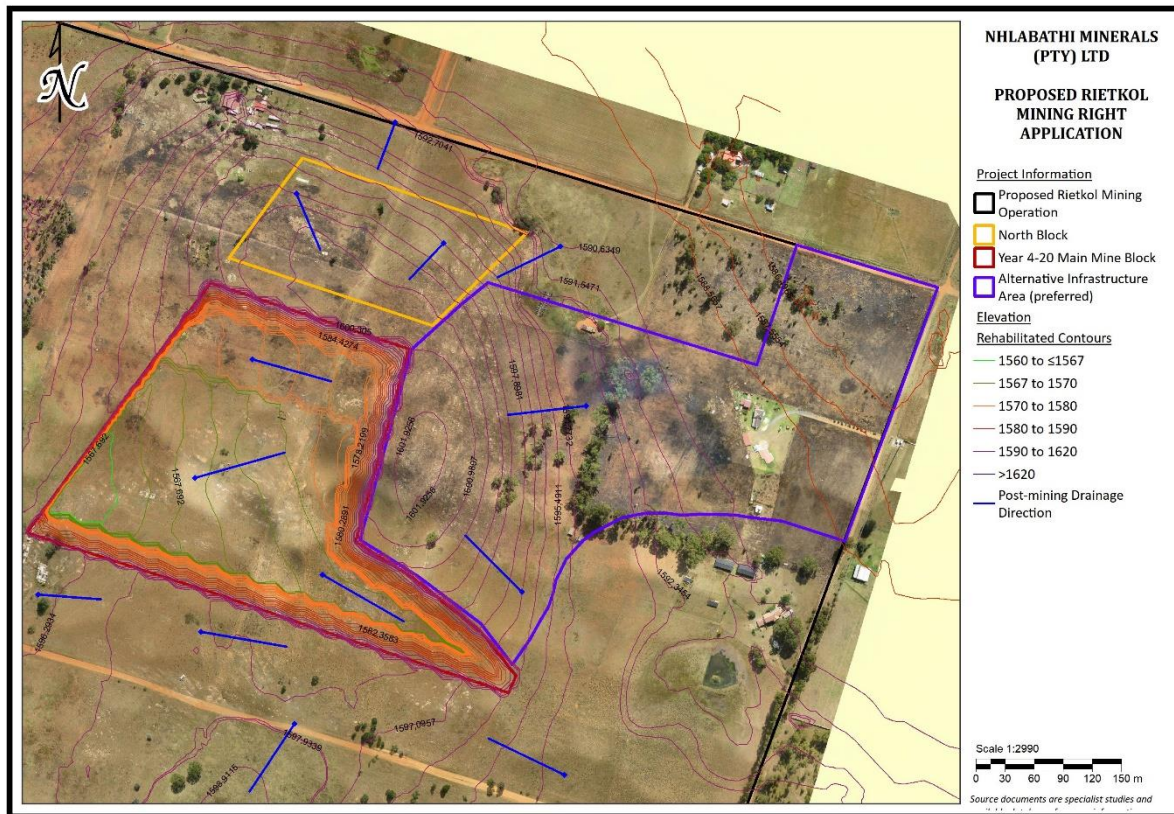


Figure 10: Final landform for Rietkol Project footprint after rehabilitation

3.2 OPERATIONAL MANAGEMENT OUTCOMES

3.2.1 Management Objectives and Outcomes

The operational environmental and social management objectives and impact management outcomes are presented in Table 4.

Table 4: Proposed management objectives and outcomes for the Rietkol Project

Aspect	Management Objectives	Impact Management Outcomes (Performance Target)
Land capability	To re-instate suitable grazing capabilities over the rehabilitated portions of the mine site	<ul style="list-style-type: none"> Development of a Rehabilitation, Decommissioning and Closure Plan Establishment of a self-sustaining, grazing land capability over the rehabilitated areas
Ecology	Minimise impact on the biodiversity habitat in the area and protected species	<ul style="list-style-type: none"> Limit the clearance of vegetation and topsoil to 25 ha (disturbed footprint) Implementation of a Rescue and Relocation Plan Implementation of a low maintenance alien and invasive eradication plan

Aspect	Management Objectives	Impact Management Outcomes (Performance Target)
	To re-establish an appropriate mix of grassland and other native flora species in the rehabilitated areas to enable the natural re-instatement of biodiversity over time	<ul style="list-style-type: none"> Establishment of a sustainable vegetation cover to facilitate the final grazing land capability requirements
Water resources	Limit the impact on the wetland systems in and around the mine site	<ul style="list-style-type: none"> Maintain buffer of 100m between wetlands and mine development footprint Surface water quality indicates that the surface water runoff is unpolluted Biomonitoring indicates that the REC is achieved: <ul style="list-style-type: none"> Hillslope wetlands: REC of D Pan: REC of C
	Prevent erosion and downstream siltation	<ul style="list-style-type: none"> Implement SWMP to separate clean and dirty water Erosion monitoring indicates suspended solids within RWQO for aquatic systems
	Limit the impact of the groundwater quality and yields	<ul style="list-style-type: none"> Groundwater monitoring demonstrates that the surrounding groundwater users are not impacted in terms of quality or yield Implementation of compensation strategy if the above cannot be demonstrated
Air quality	Limit the risk of dust and silica exposure to the general public	<ul style="list-style-type: none"> Dust fallout < 600 mg/m²/day on MRA boundary PM₁₀ (24-hour) < 75 µg/m³ on MRA boundary Silica fallout < 50 µg/m³ on MRA boundary
Noise	Limit the noise impact on sensitive receptors	<ul style="list-style-type: none"> Urban noise level <ul style="list-style-type: none"> Day: 55 dB Night: 45 dB Increase in ambient noise levels (on MRA boundary) < 7 dB
Blasting	Limit the blasting impact on sensitive receptors Prevent any structural damage to infrastructure	<ul style="list-style-type: none"> Air blast < 120 dB on MRA boundary Ground vibration < 12.5 mm/s on MRA boundary Maintain exclusion zone of 105 m
Heritage / Palaeontology	Prevent any impact on heritage and palaeontological material	<ul style="list-style-type: none"> No damage to heritage and palaeontological material without the necessary investigations and permits
Local community / adjacent landowners	Minimise health and safety impacts on sensitive receptors	<ul style="list-style-type: none"> Resettlement of sensitive receptors within Cumulative High Impact Zone
	Prevent vehicle and pedestrian accidents due to increase in traffic	<ul style="list-style-type: none"> Implementation of road upgrades as proposed in the TIA No fatal accidents
	Maximise social benefits (employment, procurement, etc.) to local communities	<ul style="list-style-type: none"> 40% local target
	Identify and establish livelihood retention projects to create off-mine livelihoods during and post-mining	<ul style="list-style-type: none"> Successful implementation of Social and Labour Plan

Aspect	Management Objectives	Impact Management Outcomes (Performance Target)
	Equip employees with portable skills that can be used in other sectors post-mining	<ul style="list-style-type: none"> • Successful implementation of Social and Labour Plan

Appropriate monitoring should be implemented to ensure compliance with the objectives and outcomes as proposed.

3.2.2 Biodiversity Action Management Plan

To ensure that impact mitigation takes place to an adequate level should mining proceed it is deemed essential that a Biodiversity Action Management Plan (BAMP) be developed which contains details on all actions that need to be undertaken to manage impacts on the ecology of the region. In addition, the BAMP and its implementation should be overseen by an Environmental Management Committee (EMC) which should include representatives from the mine, the local communities and the local farmers' association. The BAMP should also be seen as a living document and must be continuously updated based on the findings of management and the ecological monitoring program.

3.2.3 Social Impact Management

The Social Impact Assessment (SIA) has identified and developed several Social Management and Monitoring Strategies that would be implemented to ensure that all identified impacts are addressed and managed accordingly. The main aim of the strategies is to minimise negative impacts and maximise positive impacts by means of effective compensation and mitigation measures.

The strategies are listed below and will be further developed and implemented as part of this EMP.

- Communication, Consultation and Awareness Management Plan: Ensuring continuous engagement with project affected parties and stakeholders.
- Complaints and Grievance Management Strategy: To ensure the appropriate management of issues and grievances.
- Influx and Land Use Management Strategy: To manage the influx of job seekers.
- Employment Strategy:
 - Recruitment Strategy: to maximise employment opportunities for the local communities and reduce the influx of a foreign labour force whilst ensuring an effective construction and operational process.

- Human Resource Development and Training Strategy: to identify appropriate training and skills transfer opportunities that will enhance the skills level of the local labour force both during and after project implementation.
- Procurement Policy: to ensure that local business outfits, especially those of HDIs, women and SMMEs get allocated a fair business share of project related business opportunities. The policy should include a SMME Development Programme.
- Health and Safety Strategy:
 - Occupational Health and Safety Strategy: to ensure that during the project construction process and the operational phase of the project, employees receive adequate health support from the project team for work-related health problems.
 - Community Health and Welfare Strategy: to ensure that the project intervention will not have a negative impact on the health and welfare infrastructure in the project area, and to suggest appropriate measures to enhance the capacity of existing health infrastructure.
 - Traffic Safety and Awareness Strategy: to ensure that appropriate traffic management measures are planned and employed, in anticipation of the major increase in both heavy and light vehicle traffic.
- Social Monitoring and Evaluation Strategy: to ensure that the project intervention process is monitored with the aim of implementing corrective measures if and when required

3.2.4 On-going research for closure options

To enhance the feasibility of achieving the closure vision, the following research has been identified for implementation during the operational period:

- Development and implementation of a low maintenance alien and invasive eradication plan. This could be considered for a community project as part of the Social and Labour Plan (SLP).
- Conduct appropriate research to refine the soil amelioration and/or seed mix requirements to improve vegetation growth in high-risk erosion areas.
- Identify and develop livelihood retention projects to create off-mine livelihoods during and post-mining in consultation with the communities and employees and conduct appropriate feasibility studies to ensure the viability of the projects.
- Identify and evaluate potential end land uses for the Main Block wilderness area after closure, considering the Nkangala Spatial Development Framework (SDF) and Integrated Development

Plan (IDP) and expectations from the surrounding communities and landowners. Possible projects may include:

- Creation of a recreational area for fishing and angling
- Renewable energy facility – solar
- Waste recycling facility
- Determination of mining-related infrastructure and associated roads that could have a beneficial post-mining use, as well as the way this may need to be maintained by a new owner/third party.

Once the Rietkol Project is approved and mining commences, alternative or additional research opportunities may arise. These could be generated from the outcome of annual performance assessments, audits and/or monitoring programmes.

4 IMPACT MANAGEMENT ACTIONS

Table 5 lists the impact management actions (mitigatory measures) identified for the Rietkol Project to reverse, reduce, and mitigate the impacts. The management objectives and outcomes are presented in Table 4.

The persons responsible for mitigating measures at the Rietkol Project include:

- GM - General Manager
- Mine M - Mine Manager
- Eng M - Engineering Manager
- Rehab M - Rehabilitation and Closure Manager
- EO - Environmental Officer
- ES - External Specialist
- HRD - Human Resources Department
- TD - Training Department
- EMC - Environmental Management Committee

Mechanisms and responsibilities for the implementation of the impact management actions is provided in Table 6.

Table 5: Impact Management Actions for the Rietkol Project

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
PRE-CONSTRUCTION PHASE			
1	Open Pit Mining Infrastructure area	<ul style="list-style-type: none"> Poor planning with regards to the placement of mining related infrastructure within proximity to sensitive floral and faunal habitats. Inadequate liaison and applications with MPTA with regards to floral SCC rescue and relocation permits. Inadequate planning with regards to new site locations for floral SCC. Poor planning with regards to the placement and design of infrastructure within proximity to the wetlands that could result in loss of catchment yields and surface water recharge, loss of biodiversity of the wetlands, impaired water quality and hydrological regimes of the downgradient wetlands and changes in wetland habitat. 	<ul style="list-style-type: none"> Proposed infrastructure layouts must be optimised, ensuring that the proposed layout footprint is as small as possible. Develop and implement a rescue and relocation plan for floral SCC and obtain relevant permits from MPTA. Infrastructure placement must be planned outside of delineated wetlands and outside of the 100m GN704 Zone of Regulation. Design of infrastructure should be environmentally and structurally sound and all possible precautions should be taken to prevent spillage or seepage into the down gradient wetlands. It must be ensured that the design and construction of all infrastructure prevents failure.
2	Open Pit Mining Infrastructure area	<p>Visual intrusion of mining activities on sensitive receptors during the preconstruction phase, due to:</p> <ul style="list-style-type: none"> Positioning of visually intrusive infrastructure on higher lying areas where it will be visible for significant distances and within a clear line of sight from various visual receptor sites, during the planning phase. Failure to plan for final closure and rehabilitation in the form of backfilling of opencast pits, final shaping, grading and revegetation, that may lead to further visual intrusion and receptor exposure impacts on the landscape character during later development phases. 	<ul style="list-style-type: none"> Proposed infrastructure layouts must be optimised, ensuring that the proposed layout footprint is as small as possible. As far as possible, surface infrastructure should be positioned in areas that have already been disturbed. As far as possible, natural contours must be followed during infrastructure placement to minimise cut-and-fill activities. Infrastructure heights should be designed to be as low as possible. A lighting specialist should be consulted to assist in the planning and placement of light fixtures for the mining facility and all ancillary infrastructure to reduce visual impacts associated with glare and light trespass. Areas cleared of natural vegetation and topsoil must be kept to a minimum. Planning for closure and final rehabilitation must be initiated.
3	All activities	Displacement of agricultural residences and support infrastructure within mine footprint areas & those with a High Sensitivity Risk Rating.	<ul style="list-style-type: none"> Valuation of productive land for inclusion in the land acquisition agreement for those properties to be purchased. Engagement with owners of the key economic activities surrounding the development should be implemented. This is to determine measures that can be implemented apart from the already stated mitigation measures against noise, air quality and blasting impacts to safeguard the existing economic activities. Any unforeseen impacts should be identified immediately or where monitoring indicates noise, air quality and blasting impacts cannot be mitigated effectively, the mine and land / business owners should agree on such additional measures necessary to avoid or minimize impacts on economic activities and livelihoods. If environmental impacts cannot be effectively mitigated, and it's determined that an adverse impact exists, then compensation for landowners affected by the mining operations must be negotiated on a fair basis. Where possible, and if safety permits, land purchased but not required for mining infrastructure should be made available for small scale grazing to existing agricultural operators. Implementation of noise air quality and blasting monitoring programmes with measurements taken where sensitive receptors may be at risk.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
			<ul style="list-style-type: none"> Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones.
4	All activities	Loss of access to productive land and livelihood activities (economic displacement) within mine footprint areas & those with a High Sensitivity Risk Rating.	<ul style="list-style-type: none"> Valuation of all immovable assets for inclusion in the land acquisition agreement. Where possible offer employment opportunities to local workers that may have lost employment due to the mine development displacement.
5	All activities	Physical displacement of worker households and/or labour tenants through land acquisition for footprint or high cumulative impact from Environmental Impact Interactions.	<ul style="list-style-type: none"> Implementation of noise, air quality and blasting monitoring programmes with measurements taken where sensitive receptors may be at risk. Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones.
CONSTRUCTION PHASE			
6	Open Pit Mining Infrastructure area	Soil erosion and dust generation during vegetation clearance activities.	<ul style="list-style-type: none"> The footprint of the proposed infrastructure area should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint to the minimum. Vegetation clearance and commencement of construction activities should be scheduled (if practical) to coincide with low rainfall conditions when the erosive stormwater and wind are anticipated to be low. Bare soils must be regularly dampened with water to suppress dust during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast. Disturbed areas adjacent to the infrastructure and opencast areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission. Temporary erosion control measures must be used to protect the disturbed soils during the construction phase until adequate vegetation has established.
7	Open Pit Mining Infrastructure area	Soil compaction resulting from vehicle movement during construction.	<ul style="list-style-type: none"> Vegetation clearance and commencement of construction activities should be scheduled (if practical) to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low, such that the soils are less prone to compaction. Compacted soils adjacent to the mining blocks and associated infrastructure footprint must be lightly ripped to at least 50 cm below ground surface to alleviate compaction prior to re-vegetation.
8	Open Pit Mining Infrastructure area	<ul style="list-style-type: none"> Loss of natural topography, soil depth, soil volume and alteration of natural drainage pattern. Loss of high agricultural potential soils. 	<ul style="list-style-type: none"> Topsoil must be used for berms as it cannot be stored indefinitely. Temporary berms must be installed, if necessary, around disturbed areas whilst vegetation cover has not established to avoid soil loss through erosion. Direct surface disturbance of the identified high agricultural potential soils (i.e. Hutton and Clovelly soil forms) should be avoided where possible. During the decommissioning phase the Rehabilitation, Decommissioning and Closure Plan should be implemented to ensure a self-sustaining post-closure land use.
9	Open Pit Mining Infrastructure area	<ul style="list-style-type: none"> Loss of floral and faunal habitat. Loss of floral and faunal species diversity. Potential loss of floral SCC species. Decreased faunal species habitat connectivity. Proliferation of alien and invasive plant species in the disturbed areas. 	<ul style="list-style-type: none"> All development footprint areas are to remain as small as possible and vegetation clearing must to be limited to what is essential. Prior to construction/mining activities floral SCC that will be directly impacted upon need to be marked and removed to a suitable similar habitat as part of a rescue and relocation plan. Implement an Alien and Invasive Eradication Plan. Clearing of vegetation should take place in a phased manner so that faunal species are given the opportunity to naturally move off and relocate to the surrounding natural areas.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
			<ul style="list-style-type: none"> No indiscriminate driving through the veld may be permitted. As far as possible vehicles are to utilise the existing roads. Where this is not feasible, new roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats. Edge effects of all construction activities which may affect faunal and floral habitat within surrounding areas, need to be strictly managed.
10	Open Pit Mining Infrastructure area	<ul style="list-style-type: none"> Exposure of soils, leading to increased runoff, erosion and incision of the wetlands, and thus increased potential for sedimentation of the sensitive floral and faunal wetland habitat unit. Increased sedimentation of the wetland habitat, leading to changes in habitat, loss in faunal and floral habitats and potentially altering surface water quality. Decreased ecoservice provision. Proliferation of alien vegetation because of disturbances. 	<ul style="list-style-type: none"> Surface infrastructure to be located outside of the 100m GN704 zone of regulation unless infrastructure is authorized. The wetlands and the associated zones of regulation should be clearly demarcated and marked as a no-go area. All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is absolutely essential. Exposed soils to be protected by means of suitable berms, silt curtains, sandbags etc. to prevent contamination of runoff and sedimentation of the down-gradient wetlands. Following the completion of the construction phase, areas of disturbance should be monitored at least once after an erosive rainfall for erosion arising from the surface which leads to concentrated flow and changes to the pattern flow and timing of water in the landscape. Implement an Alien and Invasive Eradication Plan.
11	Infrastructure area	Site clearing, removal of vegetation and associated disturbances to soils causing increased turbidity of surface water, sedimentation of down-gradient wetlands, smothering of vegetation and/or altered vegetation composition, and possible fragmentation of the wetland.	<ul style="list-style-type: none"> Surface infrastructure to be located outside of the 100m GN704 zone of regulation unless infrastructure is authorized. Exposed soils to be protected by means of suitable berms, silt curtains, sandbags etc. to prevent contamination of runoff and sedimentation of the down-gradient wetlands. Flow connectivity must be retained by preventing fragmentation of the wetland habitat. It must also be ensured that no canalisation or incision of the wetlands takes place. Compacted soil should be ripped, profiled, and reseeded with indigenous vegetation following construction.
12	Open Pit Mining Infrastructure area	Clearing of topsoil from footprint areas can increase infiltration rates of water to the groundwater system, ultimately leading to an increase in groundwater levels. This potential impact is not necessarily a negative one.	<ul style="list-style-type: none"> Mitigation not possible.
13	All activities	Indiscriminate driving through the open veld leading to the loss of sensitive floral species and increased vehicle related mortalities of faunal species.	<ul style="list-style-type: none"> No indiscriminate driving through the veld is allowed. As far as possible vehicles are to utilise the existing roads. Where this is not feasible, new roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats. Speed restrictions to be placed on all vehicles within the MRA area to limit faunal and vehicle collisions. Drivers to be educated through the Environmental Awareness Programme about the presence and importance of faunal species and instructed to actively avoid collisions with faunal species, regardless of size.
14	All activities	<ul style="list-style-type: none"> Disposal/ dumping of construction related material in sensitive habitat areas such as wetlands. Dumping of construction material in open space areas other than those demarcated for such waste, leading to increased habitat and species loss. 	<ul style="list-style-type: none"> All vehicle re-fuelling is to take place within the contractor laydown area only, within a bunded area, outside of the wetland habitat. A Spill Management and Emergency Contingency Plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress to groundwater. The relevant authorities should be notified in the event of a significant spill.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
		<ul style="list-style-type: none"> Accidental spills and/or leakages of hazardous chemicals and hydrocarbons resulting in soil contamination. Poor handling of waste and the transport of building material can cause various types of spills (especially hydrocarbons) that may potentially infiltrate and contaminate the underlying groundwater system. 	<ul style="list-style-type: none"> All construction related waste and material is to be disposed of at a registered waste facility, no waste or construction rubble is to be dumped in the wetlands or surrounding habitats. Solid waste must either be stored on-site in an approved waste disposal area or removed by credible contractors.
15	All activities	<ul style="list-style-type: none"> Increased risk of veld fires leading to loss of faunal and floral species as well as alteration of plant diversity. Trapping of faunal species using snares. 	<ul style="list-style-type: none"> Ensure that the sensitive wetland areas are demarcated as no-go zones for personnel and mine vehicles. No uncontrolled or unsanctioned fires should be allowed within the MRA area. A Fire Prevention Plan should be developed in conjunction with local emergency services. No hunting or trapping of faunal species should be allowed within the MRA area. Implement an Environmental Awareness Programme on the mine and within the surrounding communities.
16	Open Pit Mining Infrastructure area	<ul style="list-style-type: none"> Construction activities will generate noise, but it will mainly be limited to the project site and adjacent properties. Several noise sensitive receptors will experience a high-level of noise impact, as identified in the NIA. 	<ul style="list-style-type: none"> Resettlement of sensitive receptors within the MRA area (before any construction activities need to start closer than 300m from these noise sensitive receptors). Use of smallest practical available equipment for construction purposes. Feedback to the adjacent properties on the potential noise impact on them and the mitigation measures identified to reduce the noise impact. Establish and implement a Complaints and Grievance Procedure.
17	Access / haul roads	Construction activities resulting in open unprotected soils which are prone to wind erosion leading to an increase in dust and a reduction in ambient air quality in the MRA area and along the access road.	<ul style="list-style-type: none"> Set the speed limit for hauling vehicles and vehicles in general to as low a speed possible and enforce the speed limits specified. It is recommended that the speed limit be set to 40km/h on unpaved roads. Implement a program of wet suppression of the unpaved roads with major vehicle activity. Limit the load size of the vehicles to ensure the wind in transit does not pick up more dust than necessary.
18	Open Pit Mining Infrastructure area	Construction activities resulting in open unprotected soils which are prone to wind erosion leading to an increase in dust and a reduction of ambient air quality on and adjacent to the MRA area.	<ul style="list-style-type: none"> All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is absolutely essential. Exposed soils to be protected by means of a suitable geotextile covering such as hessian sheeting until revegetated. Bare soils must be regularly dampened with water to suppress dust during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast.
19	Open Pit Mining Infrastructure area	Visual impact on the landscape character and Sense of Place associated with the MRA area and surrounding area during construction and topographic alteration of the landscape within the MRA area.	<ul style="list-style-type: none"> All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is absolutely essential. Implement dust fallout monitoring and wet suppression during the construction phase. Infrastructure placement must be planned outside of delineated wetlands and outside of the 100m GN704 Zone of Regulation.
20	Open Pit Mining Infrastructure area	Visual intrusion of mining construction activities on visual receptors during the construction phase, vegetation damage, scarring of the terrain, and altering of landforms or contours.	<ul style="list-style-type: none"> All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is absolutely essential. As far as possible, existing natural vegetation around the MRA area should be maintained, with particular reference to existing tall trees along the site perimeter. The eucalyptus trees on AH 209 & 212 provide a good visual buffer between the mine and the informal settlement

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
			<p>on AH 151 & 152, and it is proposed that these trees be retained for the duration of the mining operations.</p> <ul style="list-style-type: none"> The perimeter fence must be put in place prior to commencement of mining infrastructure within the MRA area for screening purposes. Where screening of higher infrastructure components located within the direct line of site of highly sensitive visual receptors, is not possible, siting should take advantage of partial screening opportunities with specific mention of large existing or proposed new trees. Implement good housekeeping measures for the duration of the construction phase. Natural colours should be used in all instances and the use of highly reflective material should be avoided. Any metal surfaces should be painted to fit in with the natural environment in a colour that blends in effectively with the background. The use of permanent signs and project construction signs should be minimised and visually unobtrusive.
21	All activities	<ul style="list-style-type: none"> Built environment recordings 2-5 will be destroyed during construction. The trigonometric beacon (recording 7) may be impacted, depending on the construction areas required. The informal graveyard will not be impacted during construction. 	<ul style="list-style-type: none"> The recorded ruins have no cultural significance and are judged to be less than 60 years old – they contain no intrinsic architecture design or pioneer building material and building methods that require further assessment. The trigonometrical beacon will be impacted on, it is advised that the office of the Chief Directorate: National Geo-Spatial Information (NGI) in the Department of Rural Development and Land Reform be informed. The informal graveyard must be demarcated (fenced off) to prevent any damage during construction.
22	All activities	Recovery of sub-surface sites during construction and/or excavation.	<ul style="list-style-type: none"> A qualified archaeologist must monitor excavation activities. Any discovery of artifacts, graves or other remains of archaeological interest should be reported to SAHRA. Activities must cease immediately upon any discovery of cultural or heritage resources and a qualified archaeologist informed to do further assessment and reporting. Identified sites of cultural and heritage significance must be demarcated until such time that an instruction to resume work is provided to the contractor, following consultation with the regulating authorities.
23	All activities	A Very High Palaeontological Sensitivity is allocated to the part of study area underlain by the Malmani Subgroup and the Karoo Supergroup sedimentary rocks (infrastructure footprint) and a Low sensitivity over the central part of the site underlain by quartzite (mining footprint).	<ul style="list-style-type: none"> A suitably qualified palaeontologist must be appointed to assess the construction site once excavations reach a depth of 1.5 m in areas allocated a Very High sensitivity. If fossils are recorded, the palaeontologist must do a Phase 1 PIA and develop a Chance Find Protocol (CFP). Recommendations contained in the resultant Phase 1 PIA and CFP must be approved by the Mpumalanga Provincial Heritage Resources Authority (MPHRA) and SAHRA for inclusion in the EMP of the project.
24	All activities	Impacts on agricultural residences & support infrastructure surrounding mine footprint areas & those with a Moderate Sensitivity Risk Rating specifically due to a high noise impact.	<ul style="list-style-type: none"> Valuation of productive land for inclusion in the land acquisition agreement for those properties to be purchased. Engagement with owners of the key economic activities surrounding the development should be implemented. This is to determine measures that can be implemented apart from the already stated mitigation measures against noise, air quality and blasting impacts to safeguard the existing economic activities.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
			<ul style="list-style-type: none"> Any unforeseen impacts should be identified immediately or where monitoring indicates noise, air quality and blasting impacts cannot be mitigated effectively, the mine and land / business owners should agree on such additional measures necessary to avoid or minimize impacts on economic activities and livelihoods. If environmental impacts cannot be effectively mitigated, and it's determined that an adverse impact exists, then compensation for landowners affected by the mining operations must be negotiated on a fair basis. Where possible, and if safety permits, land purchased but not required for mining infrastructure should be made available for small scale grazing to existing agricultural operators. Implementation of noise air quality and blasting monitoring programmes with measurements taken where sensitive receptors may be at risk. Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones.
25	All activities	Loss of access to productive land and livelihood activities (economic displacement) surrounding mine footprint areas & those with a Moderate Sensitivity Risk Rating due to noise impacts.	<ul style="list-style-type: none"> Valuation of all immovable assets for inclusion in the land acquisition agreement. Where possible offer employment opportunities to local workers that may have lost employment due to the mine development displacement. Implementation of noise air quality and blasting monitoring programmes with measurements taken where sensitive receptors may be at risk. Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones.
26	All activities	Loss of access to productive land and livelihood activities (economic displacement) due to blasting / air blast impacts.	
27	All activities	Physical displacement or impact of worker households and/or labour tenants within a moderate cumulative impact zone from Environmental Impact Interactions.	
28	All activities	Creation of temporary construction employment.	<ul style="list-style-type: none"> Prioritize people residing in local settlements. Establishment of a local labour recruitment committee to monitor recruitment procedures and results.
29	All activities	Loss of employment opportunities associated with land-use activities.	<ul style="list-style-type: none"> During recruitment preference should be provided to unemployed job seekers, to avoid poaching workers already gainfully employed on properties not affected by the mine. Identification of people likely to lose employment due to the impact of the mine, and dependent on their capability, assess, reskill, and employ these workers.
OPERATIONAL PHASE			
30	Open Pit Mining	Disturbance of faunal species in the vicinity of the mine leading to faunal species movement out of the MRA area as well as decreased breeding rates which will impact upon faunal diversity and abundance.	<ul style="list-style-type: none"> The footprint of opencast pits is to remain as small as possible whilst allowing for economical and optimal extraction of the material. Blasting should ideally be done during mid-afternoon and not early mornings or late afternoon/evenings when faunal species are most active. Investigate blasting techniques to minimise ground and air vibrations and disturbances to minimise the impacts on surrounding faunal species.
31	Open Pit Mining	<ul style="list-style-type: none"> Dust and sediment from active mining areas may lead to the smothering of surrounding vegetation as well as increased silt loads within the nearby wetland systems. Increased dust levels during operational activities could enter the wetlands and increase the sediment load thereof. 	<ul style="list-style-type: none"> The footprint of opencast pits is to remain as small as possible whilst allowing for economical and optimal extraction of the material. Water quality (surface and groundwater) need to be managed and monitored to allow for the on-going survival of the wetlands. Reduce airborne dust through dust-suppression. Edge effects relating to opencast blocks must be suitably managed to ensure that the surrounding habitat is not impacted upon.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
		<ul style="list-style-type: none"> Sedimentation of nearby wetland habitats because of storm water runoff carrying sediment from opencast mining areas. This will lead to a loss of wetland habitat for faunal and floral species. Loss of floral and faunal SCC and habitat. Loss of habitat connectivity between the eastern and western portions of the MRA area. Proliferation of alien and invasive plant species in the disturbed areas. 	<ul style="list-style-type: none"> A rescue and relocation plan are to be implemented with regards to floral SCC. Implement erosion control and storm water management measures to manage water runoff and mitigate sedimentation of the surrounding habitat and wetlands. Control alien and invasive plant species throughout the mining process. Maintain habitat connectivity between the MRA area and surrounding areas.
32	Open Pit Mining Infrastructure area	Loss of catchment yield due to dirty stormwater containment, leading to a reduction in volume of water entering the wetlands, leading to loss of recharge of the downgradient wetlands and altered vegetation communities due to moisture stress.	<ul style="list-style-type: none"> Develop and implement a comprehensive stormwater management plan to separate and control clean and dirty stormwater runoff. Clean water must be discharged into the natural environment in a non-erosive and controlled manner, and not allowed to form concentrated channels. Biomonitoring to be implemented to determine any impacts on the wetlands (bi-annually).
33	Infrastructure area	<ul style="list-style-type: none"> Altered surface runoff patterns due to reduced vegetation cover and increased impermeable surfaces. Increased flood peaks because of formalisation and concentration of surface runoff leading to erosion/incision of the wetlands due to concentration of stormwater runoff. Potential for erosion of terrestrial areas because of the formation of preferential flow paths, leading to sedimentation of the down-gradient wetlands. Increased water inputs to the downgradient wetlands. Risk of contaminated stormwater runoff (e.g. hydrocarbons, sediment, originating from impermeable surfaces). 	<ul style="list-style-type: none"> Develop and implement a comprehensive stormwater management plan to separate and control clean and dirty stormwater runoff. Clean water must be discharged into the natural environment in a non-erosive and controlled manner, and not allowed to form concentrated channels. Biomonitoring to be implemented to determine any impacts on the wetlands (bi-annually). Conduct regular inspection of infrastructure to ensure functionality. A Spill Management and Emergency Contingency Plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress to groundwater. The relevant authorities should be notified in the event of a significant spill.
34	Access / haul roads	<ul style="list-style-type: none"> Increased risk of faunal mortality rates due to collisions with mine vehicles. Increased risk to <i>Pyxicephalus adspersus</i> (Giant Bullfrog) moving between wetlands within the MRA area. 	<ul style="list-style-type: none"> Vehicles are to utilise the existing roads. Implement speed restrictions to be placed on all vehicles within the MRA area to limit faunal and vehicle collisions. The Environmental Awareness Programme must include detail on the presence of faunal species including <i>Pyxicephalus adspersus</i> (Giant Bullfrog) which is listed as Vulnerable within the Mpumalanga Province.
35	All activities	<ul style="list-style-type: none"> Risk of uncontrolled fires leading to habitat modification, loss of floral and faunal species as well as impacting upon SCC. Hunting and trapping of faunal species. 	<ul style="list-style-type: none"> Ensure that the sensitive wetland areas are demarcated as no go zones for personnel and mine vehicles. No uncontrolled or unsanctioned fires should be allowed within the MRA area. A Fire Prevention Plan should be developed in conjunction with local emergency services. No hunting or trapping of faunal species should be allowed within the MRA area. Implement an Environmental Awareness Programme on the mine and within the surrounding communities.
36	Open Pit Mining Infrastructure area	Increased lighting will result in the attraction of insects, which will inevitably attract several insectivorous predators, notably bats. This may result in increased risk of injury or mortality to such predatory species either from collision with operational machinery, infrastructure, and vehicles, or because of direct human conflict.	<ul style="list-style-type: none"> Downward facing lights must be installed and limited to absolutely essential areas. Covers/light diffusers must be installed to lessen the intensity of illumination where possible. Outside lights are to utilise bulbs of varying wave lengths that do not attract insects.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
37	Open Pit Mining	Opencast mining, when occurring below the water table, results in an influx of groundwater. Pit dewatering is then required to ensure dry and safe mining conditions, which ultimately leads to a lowering of the local groundwater levels.	<ul style="list-style-type: none"> No mitigation measures are available for when mining occurs below the local water table. Only by remaining above the water table can this impact be avoided. Groundwater monitoring should be implemented for early detection of the lowering of groundwater levels.
38	Mine residue and stockpiling	The soil and ROM material are chemically inert, meaning that any runoff / leachate originating from these stockpile areas is expected to be of acceptable quality. However, leachate from these stockpiles may contain remnants of the nitrate-based explosives used in the mining process.	<ul style="list-style-type: none"> Stockpiles and dirty footprint areas should be kept as small as practically possible. Stockpile areas should be appropriately lined to prevent potentially poor quality leachate from contaminating the underlying groundwater. Stockpile areas should be bunded to prevent clean surface water runoff from being contaminated by dirty surface areas, in line with the Stormwater Management Plan. Groundwater monitoring should be implemented for early detection of groundwater quality impacts.
39	Water management facilities	Water retaining facilities such as the planned pollution control/recycling dam are designed and constructed with the objective to prevent any poor quality water from entering the underlying aquifer and contaminating the groundwater. Poor management and maintenance of such facilities may however lead to spills and/or leakages that could contaminate the surface and groundwater resources.	<ul style="list-style-type: none"> All water retaining facilities should be lined with an impervious liner to prevent dirty water from reaching the underlying aquifer and contaminating the groundwater. Water retaining facilities should be designed in line with the requirements of GN704, for a minimum of a 1:50 year rainfall event. Clean and dirty water separation structures must be maintained throughout the life of mine - O&M Plan. Implement effective management of containment facilities and conduct regular inspections for leakages to ensure functionality. Spills should be cleaned up immediately in line with the Spill Management and Emergency Contingency Plan. Authorities should be notified of significant spills.
40	All activities	<ul style="list-style-type: none"> Disposal/ dumping of waste material in sensitive habitat areas such as wetlands. Dumping of waste material in open space areas other than those demarcated for such waste, leading to increased habitat and species loss. Accidental spills and/or leakages of hazardous chemicals and hydrocarbons resulting in soil contamination. Pollution of surface and groundwater because of accidental spillages of chemicals and hazardous material. Leachate into the groundwater because of ponding/seepage. 	<ul style="list-style-type: none"> All vehicle re-fuelling is to take place within the infrastructure area only, within a bunded area, outside of the wetland habitat. A Spill Management and Emergency Contingency Plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress to groundwater. The relevant authorities should be notified in the event of a significant spill. Solid waste must either be stored on-site in an approved waste disposal area or removed by credible contractors. All waste material is to be disposed of at a registered waste facility, no waste is to be dumped in the wetlands or surrounding habitats. Hydrocarbon storage and work areas (workshops etc.) should be bunded and runoff directed to the dirty water system. Bulk facilities to be concrete lined and bunded to capacity of 110%. Reclamation of soils in the event of accidental spillage.
41	All activities	Operational activities will generate noise, but it will mainly be limited to the project site and adjacent properties.	<ul style="list-style-type: none"> Feedback to the identified receptors on the potential noise impact on them and the mitigation measures identified to reduce the noise impact. Use of smallest practical available equipment for operational purposes. The design of the exhaust stack to minimise noise emissions (e.g. the installation of an industrial exhaust silencer, use of flow control vanes, use of sound insulation, use of diffuser or design of flue section, etc.), or not operating the drier exhaust stack at night to reduce the impact on sensitive receptors to the east of the plant. Establish and implement a Complaints and Grievance Procedure.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
42	Open Pit Mining	Sources of fugitive dust emissions (PM ₁₀ and dust) are released from material handling operations, vehicle entrainment by haul vehicles, windblown dust from tailings and oxides of nitrogen (NOX) and carbon monoxide (CO) which are produced during mining operations. The impact modelling indicated that the impact is confined to the MRA area, the impacts from the mine are below the ambient air quality standards beyond the MRA boundary.	<ul style="list-style-type: none"> Implement a program of wet suppression of the unpaved haul roads with major vehicle activity, within the pit and at stockpile areas. Drilling and blasting activities should not be undertaken during high wind periods to avoid excess dust being transported across to neighbouring sensitive receptors. Development of an Air Quality Management Plan (AQMP). Dust fallout monitoring must be implemented both on and off-site to determine potential exposure. Samples should be analysed regularly to determine silica exposure.
43	Access / haul roads Product transport	<ul style="list-style-type: none"> A large amount of dust emissions is generated by vehicle traffic over these temporary unpaved roads. Substantial secondary emissions may be emitted from material moved during regular grading of the unpaved access road. Product transport may further lead to a decrease in the regional air quality due to wind erosion of product and spillages. 	<ul style="list-style-type: none"> Set the speed limit for hauling vehicles and vehicles in general to as low a speed possible and enforce the speed limits specified. It is recommended the speed limit be set to 40km/h on unpaved roads. Include speedbumps to control the speed limits where appropriate. Include a program of wet suppression of the unpaved roads with major vehicle activity and at stockpile areas. Limit the load size of the vehicles to ensure the wind in transit does not pick up more dust than need be. Product transport trucks must be covered with tarpaulins, the covers must be secured. Spillages along the product transport routes must be cleaned immediately.
44	Infrastructure area	<ul style="list-style-type: none"> Particulate matter and nuisance dust are expected from the working stockpiles, transfer and tipping points during normal operations. The crushing & screening process (beneficiation) will further reduce the ambient air quality in and adjacent to the infrastructure area. The impact modelling indicated that the impact is confined to the MRA area, the impacts from the mine are below the ambient air quality standards beyond the MRA boundary. 	<ul style="list-style-type: none"> Limit the height and slope of stockpiles to reduce wind entrainment. Reduction in drop height to reduce the dispersion of materials being transferred. Windshield (barriers) can be implemented on the slopes and surface of the stockpile; these barriers are typically large trees with a good foliage coverage. During the processing of material, the material should be kept wet to ensure the dust does not escape during the processing. Dust suppression should be installed along all conveyors and at conveyor transfer stations. Water misters must be installed at strategic points in the crushing building to abate dust emissions. The general vehicle traffic around the stockpile areas should be limited.
45	Infrastructure area	The dryer is usually a fuel based rotary dryer, and so emissions from the dryer are based on the fuel burnt, in the form of sulphur dioxide and oxides of nitrogen.	<ul style="list-style-type: none"> As part of the emission mitigation, the dryer will have its own abatement equipment included in the design. Water misters must be installed at strategic points in the drier plant building to abate dust emissions. Low sulphur fuel oil will be used.
46	Open Pit Mining	<ul style="list-style-type: none"> Ground vibration, air blast and fly rock impact on houses and other infrastructure, including boreholes and graves within the MRA area, could lead to damage of structure and/or complaints. With the revised blast design developed by the blast specialist the impacts are confined to the MRA area, except for the potential damage of flower tunnels directly north of the MRA area (Unex). 	<ul style="list-style-type: none"> Re-define blast design and apply for the necessary consent and authorisation for blasting within 500m of non-mining structures. A test blast must be done to confirm levels of ground vibration and air blast. Implement a blast monitoring programme. Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. Conduct pre-blast photographic surveys of infrastructure within 1200m of the mining area. Agree compensation mechanism with Unex Roses in the event of damage to its flower tunnels due to air blast.
47	Open Pit Mining	<ul style="list-style-type: none"> Ground vibration impact on humans and animals - safety and nuisance impacts. 	<ul style="list-style-type: none"> Re-define blast design.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
		<ul style="list-style-type: none"> Potential impact on equestrian horses and events. 	<ul style="list-style-type: none"> Maintain an evacuation zone of 105m, establish an evacuation procedure with the affected parties prior to blasting. Agree to a standard blasting time with the community/affected landowners. Setup blasting notice boards at various routes around the project area that will inform the community of blasting dates and times. No blasting to be scheduled at times during horse show events or equestrian events. Preferably horses must be in stable during blast events – at least for the initial blasts to establish reactions and levels of influence. Monitoring of blasting should be conducted at the facilities of concern, e.g. Rossgro broilers, Goudhoek Equestrian Centre, and other sensitive receptors as identified.
48	All activities	Visual impact on the landscape character and Sense of Place associated with the MRA area and surrounding area during operations, due to noise, dust, increased traffic, and a change in landscape character.	<ul style="list-style-type: none"> North Block opencast area is to be used for in-pit tailings disposal to avoid the construction of additional surface tailings infrastructure. Access roads must be suitably maintained to limit and prevent erosion and dust pollution. Vehicle speed on unpaved roads must be reduced to limit dust generation. Ongoing alien and invasive vegetation control and management should take place. Transport of product should be optimised as far as possible to limit the number of additional vehicles on local and district roads.
49	All activities	Visual intrusion of mining activities on visual receptors during operations, due to presence of mining infrastructure, increased traffic, and increased presence of mining vehicles on the local roads, ongoing loss of vegetation, scarring of the terrain, and alteration of landforms and contours.	<ul style="list-style-type: none"> As far as possible, existing roads are to be utilised to limit cumulative impacts from roads and traffic. Transport of product should be optimised as far as possible to limit the number of additional vehicles on local and district roads. All operational facilities should be actively maintained.
50	All activities	Visual impacts from night-time lighting impacting on receptors accustomed to a low district brightness during night-time.	<ul style="list-style-type: none"> Transport of mined material on public roads must be limited to daylight hours only. A lighting specialist must be consulted to assist in the planning and placement of light fixtures for the mining facility and all ancillary infrastructures to reduce visual impacts associated with glare and light trespass. Placement of lighting outside of the MRA boundary should be limited to security lighting at the main entrance. Outdoor lighting must be strictly controlled. The use of high light masts and high pole top security lighting should be avoided. Any high lighting masts should be covered to reduce sky glow. Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surrounding of the mining infrastructure. Censored and motion lighting may be installed at office areas, workshops, and other buildings to prevent use of lights when not needed. Minimum wattage light fixtures should be used, with the minimum intensity necessary to accomplish the light's purpose. The use of low-pressure sodium lamps, yellow LED lighting, or an equivalent reduces skyglow and wildlife impacts. Bluish-white lighting is more likely to cause glare and attract insects.
51	Product transport	<ul style="list-style-type: none"> The road network, surrounding the Rietkol Project, will be able to handle the traffic, with the identified road improvements, with no detrimental impact on the traffic on any of the relevant roads. 	<ul style="list-style-type: none"> Road R50 (P36/1) require some maintenance to the road edges and shoulders. Road D1550 is currently without any road markings and painted centre lines.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
		<ul style="list-style-type: none"> Safety of other road users do require some intervention. 	<ul style="list-style-type: none"> The gravel access off Road D1550 need to be upgraded to be able to accommodate the future truck movements. Intersection 1: Access road with Road D1550: A dedicated right-turn lane must be provided on the northern approach of Road D1550, plus a left-turn slipway from the mine access onto Road D1550. Intersection 2: Road D1550 with Road R50 (P36/1): The right-turn lane on the north-western approach of Road R50 (P36/1) must be improved in accordance with the current standards of the provincial authority, plus a left-turn slipway from the Road D1550 onto Road R50 (P36/1) should be provided. All proposed road upgrades and improvements are to be designed by a professional engineer and submitted for official approval, by the Mpumalanga Provincial Roads Department, prior to implementation. Bulk product transport trucks must be covered with tarpaulins, the covers must be secured. Speed and safety control of truck movements to be monitored.
52	Open Pit Mining	Mining will be in very close proximity of the graveyard, and clean water berms may directly impact on the graveyard.	<ul style="list-style-type: none"> The informal graveyard should be demarcated (fenced off) to prevent any damage thereto prior to relocation. The informal graveyard should be relocated if mining or any other infrastructure is closer than 100m. Consultation must be initiated at least 2 years prior to relocation to identify the next of kin and obtain their consent. Implement the legal process as prescribed in the NHRA and obtain the necessary permits as prescribed by the relevant legislation.
53	Open Pit Mining	Recovery of sub-surface sites during mining operations.	<ul style="list-style-type: none"> A qualified archaeologist must monitor excavation activities during topsoil stripping over the LOM. Any discovery of artifacts, graves or other remains of archaeological interest should be reported to SAHRA. Activities must cease immediately upon any discovery of cultural or heritage resources and a qualified archaeologist informed to do further assessment and reporting. Identified sites of cultural and heritage significance must be demarcated until such time that an instruction to resume work is provided to the contractor, following consultation with the regulating authorities.
54	Open Pit Mining	The mining pits overlie a Low Palaeontological Sensitivity underlain by quartzite.	<ul style="list-style-type: none"> If any fossils are unexpectedly recorded during mining excavations a suitably qualified palaeontologist must be appointed to prepare a "Chance Find Protocol" (CFP). This CFP report must be included into the EMP of the project and upgraded continuously during the mining phase when excavations of deeper than 1.5m are undertaken.
55	All activities	Impact on property values of adjacent properties.	<ul style="list-style-type: none"> Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones. Mitigate air quality through dust suppression, wet processing, wind entrainment, and windshields or barriers; noise pollution through implementation of noise abatement measures on vehicles and machinery that generates most noise and blasting impacts through blast preparation and specific stemming controls.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
56	All activities	Impact on livelihoods dependent on groundwater due to potential impact on groundwater quality during and after decommissioning of mining.	<ul style="list-style-type: none"> It is acknowledged that there are processes in place to manage potential water pollution and monitor water quality. These processes should be applied continuously and post decommissioning. Implementation of mitigation measures as proposed by the Geohydrological Impact Assessment. Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones.
57	All activities	Impact on the availability of natural resources such as firewood, small mammals for hunting, medicinal plants, and subsistence grazing.	<ul style="list-style-type: none"> Allow local occupants to gather natural resources from specific areas prior to vegetation clearance. Lease back unutilized areas for agricultural purposes (grazing) if safety permits.
58	Open Pit Mining & Processing	Impact on health, well-being, and livelihoods of the public due to risk exposure from potential pollution.	<ul style="list-style-type: none"> Majority of the health impacts related to pollution can be effectively mitigated by reduction of air quality impacts. Mitigate air quality impacts through dust suppression, wet processing, wind entrainment, and windshields or barriers. Purchase of property where risk levels are above an acceptable threshold and those properties within the MRA area where a high risk in air quality pollution levels is indicated by modelled impacts. Implementation of air quality monitoring programmes with measurements taken where sensitive receptors may be at risk. Making available monitoring information as a measure of assurance of the measured impact, and close collaboration with large production units such as Rossgro and Unex Roses to make information available to mitigate the perception of an impact by their customers. If impact is experienced above the predicted impacts and standards, and cannot be further mitigated, the negotiation and agreement on compensation. Identification of a sample of local residents at risk points and implementing a health monitoring programme with identified persons. Conduct lung function testing, once every 12 months on selected members of the public, including children. Communication Strategy to keep community informed of potential pollution risks and mitigation measures. Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones.
59	Open Pit Mining & Processing	Impact on health and well-being of workers due to risk exposure (silica dust, occupational risks, noise).	<ul style="list-style-type: none"> Implementation of Personal Protective Equipment for workers. Implementation of a Health Monitoring Programme with workers. Compensation if risks cause health-related illnesses. Conduct regular full risk assessment and have procedures in place to deal with emergency incidents. Establish on-site emergency equipment and appoint safety staff.
60	All activities	Impact on Aesthetic Value and Sense of Place due to visual intrusions and increase nuisance noise.	<ul style="list-style-type: none"> Implementation of mitigation measures as contained in the Visual Impact Assessment. Implementation of mitigation measures as contained in the Noise Impact Assessment. Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones.
61	All activities	Disruption of daily living and movement patterns and safety of road users.	<ul style="list-style-type: none"> Implementation of the recommendations and mitigation measures as contained in the Traffic Impact Assessment including speed calming measures, safety awareness campaigns and upgrades to intersections.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
			<ul style="list-style-type: none"> Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst landowners in influence zones.
62	Product Transport	Impact on well-being and livelihoods due to dust generation along transport routes.	<ul style="list-style-type: none"> Mitigate air quality impacts through dust suppression, wet processing, wind entrainment, and windshields or barriers, as appropriate. Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst landowners in influence zones.
63	All activities	Influx of Job seekers and Population growth pressures.	<ul style="list-style-type: none"> Development and implementation of an Influx and Land use Management Plan in conjunction with the Local Municipality. Planning infrastructure, services, and utilities in collaboration with the Victor Khanye Local Municipality. Consultations with and involvement of local communities in project planning and implementation. Awareness-raising among local community and workers relating to recruitment processes. Contractor to hire workers through recruitment procedures and avoid hiring "at the gate" to discourage spontaneous influx of job seekers. Prioritise employment from local communities with the development of recruitment procedures and utilizing the existing skills database compiled from the local communities. Implementation of bursary programme and practical skills programmes as part of the Social and Labour Plan. Use of buffer zones. Planning worker transportation that resides in formal settlements surrounding the mine development such as Delmas and Eloff. Effective Delivery of Project Benefits. Increased security on mine premises: Properly constructed and secured fences can control access to mine site and implementing strict access control to the project site. Induction of contractors and workforce about their code of conduct in the local area. Implement health awareness programmes for workers and communities including education programmes on sexually transmitted diseases and HIV/AIDS and other illnesses such as TB. Workers should be urged to recognize and report suspicious activity and signs of burglary and be informed of crime prevention measures that they themselves can take. Liaison with existing community policing forums and project security to properly secure the project area and surrounding area. Establishment of a Complaints and Grievance Procedure and raise awareness of this procedure amongst stakeholders in influence zones.
64	All activities	Changes in Settlement & Housing Patterns.	
65	All activities	Increase in Social Pathologies and Crime.	
66	All activities	Creation of permanent operational employment.	<ul style="list-style-type: none"> Prioritize people residing in local settlements. Implementation of bursary programme and practical skills programmes as part of the SLP.
67	All activities	Opportunities in local Skills Development, Bursaries, Internships and Mentorship Programmes.	<ul style="list-style-type: none"> Implementation of the SLP, with a focus on local settlement residents.
68	All activities	Opportunities in local SMME Development and Procurement.	<ul style="list-style-type: none"> Establishment of a vendor database and assessment of business aptitude and skill. Identification of procurement opportunities that can be ring-fenced for local businesses. Implementation of the SLP, with a focus on local settlement residents, and businesses within the Municipal area.
69	All activities	Impact on Social Development through SLP Community Development Programmes.	<ul style="list-style-type: none"> Implementation of the SLP, with a focus on local settlement residents.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
70	All activities	Generation of tax base, revenue, and GDP contribution.	<ul style="list-style-type: none"> No mitigation required.
DECOMMISSIONING & CLOSURE			
71	Open Pit Mining	<ul style="list-style-type: none"> Proliferation of alien and invasive plant species leading to ongoing floral and faunal habitat loss. Improper rehabilitation of opencast mining blocks and disturbed areas leading to permanent floral and faunal habitat loss. Increased risk of erosion in disturbed areas. Increased runoff volumes and formation of preferential surface flow paths because of compacted soils and unvegetated areas, leading to increased sedimentation, erosion, and increased water inputs to downgradient wetlands. 	<ul style="list-style-type: none"> Ensure sound implementation of an Alien and Invasive Eradication Plan. Where soils have been compacted that are to be ripped and where necessary reprofiled. Indigenous grass species are to be used for revegetation of disturbed areas and the mining blocks. Where necessary hessian sheets (or similar products) are to be used to stabilise the soil surface until complete revegetation has occurred. Erosion mitigation measures are to be implemented to mitigate downslope sedimentation of wetlands and the hindrance of revegetation/ rehabilitation activities. Where possible and feasible the open pit should be filled with tailings to limit the final pit depth. The sides of the open pits should be sloped in such a way as to create ease of access in and out for faunal species once mining activities in that block have ceased.
72	Infrastructure area	<ul style="list-style-type: none"> Highly compacted soils limiting the re-establishment of natural vegetation. Increased runoff volumes and formation of preferential surface flow paths because of compacted soils and unvegetated areas, leading to increased sedimentation, erosion, and increased water inputs to downgradient wetlands. Proliferation of alien and invasive plant species leading to ongoing floral and faunal habitat loss. Improper rehabilitation of disturbed areas leading to permanent floral and faunal habitat loss. 	<ul style="list-style-type: none"> Ensure that soils are replaced, ripped and re-profiled post-closure, and that vegetation is restored (revegetated with indigenous vegetation species) to achieve post-mining land use objectives. Rehabilitation measures as stipulated in the Rehabilitation, Decommissioning and Closure Plan must be implemented. Implementation must be overseen by a suitably qualified Environmental Specialist with wetland experience. Where necessary hessian sheets (or similar products) are to be used to stabilise the soil surface until complete revegetation has occurred. Minimum of three year's post-closure monitoring to be undertaken. Ensure sound implementation of an Alien and Invasive Eradication Plan. During the removal of infrastructure and waste, remediation of contamination should be carried out. Where this is not possible these soils are to be removed to an appropriate waste facility.
73	Open Pit Mining Infrastructure area	Visual intrusion of rehabilitation activities on visual receptors during the decommissioning and closure phase, due to the dismantling of infrastructure and ineffective final rehabilitation actions resulting in poor vegetation cover, erosion being present, infrastructure remaining, and opencast pits not being adequately backfilled and shaped.	<ul style="list-style-type: none"> Rehabilitation measures as stipulated in the Rehabilitation, Decommissioning and Closure Plan must be implemented.
74	Infrastructure area	Migration of residual groundwater contamination plume away from rehabilitated surface source areas.	<ul style="list-style-type: none"> Dedicated plume monitoring boreholes should be drilled in the down-gradient groundwater flow direction and sampled at quarterly intervals to monitor plume migration. Should the monitoring program indicate significant plume migration, interception trenches and/or rehabilitation boreholes may be considered. If an impact is determined on a user borehole and the source of pollution is the mine, these landowners and/or communities must be supplied with clean water, while remediating the water sources of these parties as soon as possible.
75	Open Pit Mining	Migration of groundwater contamination plume away from rehabilitated opencast pits.	<ul style="list-style-type: none"> Dedicated plume monitoring boreholes should be drilled in the down gradient groundwater flow direction and sampled at quarterly intervals to monitor plume migration. Should the monitoring program indicate significant plume migration, interception trenches and/or rehabilitation boreholes may be considered.

ID	Activity	Potential Impact	Impact Management Actions (Mitigation Measures)
			<ul style="list-style-type: none"> • If an impact is determined on a user borehole and the source of pollution is the mine, these landowners and/or communities must be supplied with clean water, while remediating the water sources of these parties as soon as possible.
76	Open Pit Mining Infrastructure area	Final decommissioning activities will have a noise impact lower than either the construction or operational phases. This is because decommissioning and closure activities normally take place during the day using minimal equipment. While there may be various activities, there is a very small risk for any additional noise impact.	<ul style="list-style-type: none"> • Restrict rehabilitation activities to daytime only.
77	Open Pit Mining Infrastructure area	The decommissioning phase may result in some reduction to the ambient air quality, but to a lesser extent than the operational phase. Exposed soil is often prone to erosion by water. The erodibility of soil depends on the amount of rainfall and its intensity, soil type and structure, slope of the terrain and the amount of vegetation cover.	<ul style="list-style-type: none"> • Implement a program of wet suppression during rehabilitation activities. • Revegetate rehabilitated areas as soon as possible for long-term dust and water erosion control.
78	All activities	Loss of job opportunities due to downscaling of the mine employment	<ul style="list-style-type: none"> • Establish a future forum with representation from the workforce to discuss potential difficulties and solutions. • Implementation of programmes to minimize and mitigate the impact of downscaling and retrenchment. • Implementation of portable skills programmes to assist employees, especially those from the local area, to re-enter the agricultural and other sectors prevalent in the Municipal area.

Table 6: Mechanisms and responsibilities for implementation of Impact Management Actions

Source Activity / Impacts	Mechanisms / Actions Required	Time Period for Implementation	Frequency	Roles and Responsibility
Impact on biophysical environment because of mining and infrastructure development	Develop and implement detail Monitoring Procedure	Prior to mining	Annual review of monitoring programme or if major change in scheduling	EO EMC
Impact on biophysical and social environment because of mining and infrastructure development	Implement environmental awareness programme (internal & external)	Construction Phase	Ongoing review Include in annual induction programme	EO HRD
Impact on biophysical environment because of mining and infrastructure development	Review and analyses of monitoring data for: <ul style="list-style-type: none"> • Surface water (aquatic resources) • Groundwater • Mine water balance • Land use management • Air quality • Environmental noise • Blasting • Waste management • Erosion control 	Commencement of mining	Annual review	EO EMC
Impact on SCC/protected floral species	Develop and implement Rescue and Relocation Plan for floral species	Prior to mining	Annual rescue operation for areas to be disturbed in the next 12 months	EO ES
Biodiversity impact because of mining an infrastructure development and vegetation clearance	Develop and implement Biodiversity Action Management Plan (BAMP)	Within one year of mining	Annual review	EO ES
Impact on soils and land use because of mining an infrastructure development	Develop and implement Rehabilitation, Decommissioning and Closure Plan	Prior to mining	Annual review or if major change in scheduling	Rehab M
Impact on soils, land use and biodiversity because of mining an infrastructure development	Conduct research (soil amelioration and/or seed mix requirements) to re-instate suitable grazing capabilities over the rehabilitated portions of the mine site	Within first 2 years of mining (after rehabilitation of construction areas)	Ongoing review and improvement	Rehab M EO ES

Source Activity / Impacts	Mechanisms / Actions Required	Time Period for Implementation	Frequency	Roles and Responsibility
Impact on soils, land use and biodiversity because of mining an infrastructure development	Vegetation audit to determine effectiveness of and long-term sustainability of vegetated areas	Within first 2 years of mining (after rehabilitation of construction areas)	Annually	Rehab M EO ES
Impact on soils, land use and biodiversity because of mining an infrastructure development	Implement aftercare and maintenance programme for rehabilitated areas	Within 2 years of mining	Ongoing implementation as per specialist recommendations	Rehab M
Encroaching / spreading of alien vegetation because of vegetation clearance and rehabilitation	Initiate alien and invasive eradication plan	Construction Phase	Annual review	Rehab M EO
Impact on cultural and heritage aspects due to excavations	Heritage monitoring	Construction phase LOM	Monthly or as new areas are excavated	ES
Impact on palaeontological aspects due to excavations	Palaeontology monitoring	Construction Phase	Monthly or as new areas are excavated	ES
Impact on surrounding boreholes, groundwater levels because of dewatering	Establish baseline groundwater levels of all boreholes within the impact zone	Prior to any activities	Quarterly monitoring	EO ES
Impact on surrounding boreholes, groundwater levels because of dewatering	Enter into negotiations with surrounding landowners and communities impacted regarding compensation or alternative water supply	Once monitoring indicates a lowering in water levels of boreholes	Ongoing review, based on monthly monitoring results	GM EO
Impact on groundwater quality and levels	Revision of groundwater flow and geochemical model	Within 2 years of mining	Revise every 5 years	ES
Impact as a result of blasting	Develop detail blasting procedure in line with specialist advise, including evacuation procedures	Prior to opencast mining	Ongoing review based on monitoring data	Mine M ES
Impact on infrastructure because of blasting (ground vibration)	Pre-blast survey of all structures within a radius of 1200m	Prior to opencast mining (blasting)	Once-off	ES
Impact on infrastructure because of blasting (ground vibration)	Agree compensation mechanism with Unex Roses in the event of damage to its flower tunnels due to air blast	Once damage is experienced as a result of blasting	Ongoing review, based on blast monitoring results	GM ES
Noise impacts on sensitive receptors and surrounding communities	Stipulate best practice requirements in tender documentation i.r.o. emissions, noise, equipment, transport, etc.	Prior to appointment of contractors	Ongoing review as new technology becomes available	Eng M

Source Activity / Impacts	Mechanisms / Actions Required	Time Period for Implementation	Frequency	Roles and Responsibility
Air quality impacts on sensitive receptors and surrounding communities	Apply for AEL for the dryer installation	Prior to construction	As per licence conditions	Eng M EO ES
Air quality impacts on sensitive receptors and surrounding communities	Develop and implement AQMP	Prior to construction / mining	Annual review through EMC	EO EMC
Impact on aquatic systems because of mining and infrastructure development	Development and implementation of a detail water management plan and infrastructure designs	Prior to construction	Annual review or if major change in scheduling	Eng M Mine M
Impact on aquatic systems because of mining and infrastructure development	Maintenance of clean and dirty water system	Operational Phase LOM	Monthly or after a large rain event	Eng M EO
Impact on aquatic systems because of mining and infrastructure development	Demarcation of wetlands and the associated buffer zone of regulation	Prior to construction / mining	Ongoing auditing as part of monitoring programme	EO EMC
Product transport, increase in traffic	Initiate agreement with Mpumalanga Provincial Roads Department for upgrading of road intersections, product transport roads and road maintenance	Prior to mining	Once-off	GM Eng M
Product transport	Identify and clean-up of any spillages along access and product transport roads	Construction Phase LOM	Weekly	Eng M EO
Product transport	Identify and report any road maintenance issues	Construction Phase LOM	Ongoing discussions and auditing of road conditions	Eng M Roads Dept
Social aspects identified because of the proposed mining development	Develop and implement Social Management and Monitoring Strategies as per the SIA	Prior to and during construction LOM	Ongoing review	HRD TD EO
Health and safety risks to sensitive receptors and surrounding communities	Resettlement of sensitive receptors within Cumulative High Impact Zone	Prior to construction / mining	Once-off Ongoing review for additional resettlement based on monitoring results	GM HRD EO
Consultation	Develop Communication, Consultation & Awareness Management Plan and Complaints & Grievance Management Strategy	Prior to construction	Ongoing review through the EMC	HRD EO EMC

Source Activity / Impacts	Mechanisms / Actions Required	Time Period for Implementation	Frequency	Roles and Responsibility
Consultation	Establishment of EMC	Commencement of mining	Annual meetings	EO
Consultation	HSEC stakeholder meeting	Commencement of mining	Annually	GM EO
EMPr compliance review	Internal review of EMP compliance, conformance to environmental objectives and strategies and the implementation thereof	Commencement of mining	Annually	EO EMC
EMPr compliance review	EMP performance assessment to determine conformance with the EMPr, including effectiveness and appropriateness of EMP	Within first 2 years of mining	Biennially (every 2 years)	ES
EMPr compliance review	Environmental legal compliance audit	Commencement of mining	Annually	ES
EMPr compliance review	Revision of Rehabilitation, Decommissioning and Closure Plan and closure cost provision requirements	Commencement of mining	Annually	Rehab M Eng M ES

5 ENVIRONMENTAL MONITORING AND AUDITING

5.1 MONITORING

A comprehensive monitoring system was developed for the Rietkol Project in line with the proposals of the specialists – refer to Table 7. The objective of the environmental monitoring system is to:

- Prevent and/or minimise the environmental impact associated with the proposed mining operation;
- Ensure conformance with the management objectives and outcomes;
- Act as a pollution early-warning system;
- Obtain the necessary data required to address knowledge gaps;
- Check compliance with license requirements; and
- Ensure consistent auditing and reporting protocols.

Prior to commencement, a detail Monitoring Procedure will be developed for implementation. A proper data management system will be set up to facilitate trend analyses and preparation of reports. All the monitoring data will be collated and analysed on an annual basis and included in management reports. The results will be reviewed by the EMC.

It must be noted that the monitoring programme is a dynamic system changing over the different life-cycle phases of the mine. The programme will be reviewed on an annual basis by the EMC and revised, if necessary, i.e. increasing or reducing the monitoring points based on the monitoring data.

The environmental monitoring points are indicated in Figure 11.

Table 7: Environmental monitoring programme for the Rietkol Project

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling Method	Variables
Surface water	Surface water quality	To determine any deterioration in water quality because of the mining related activities	RK01-04	Quarterly	Grab sampling	EC, pH, TDS, total hardness, total alkalinity, calcium, magnesium, sodium, potassium, chloride, sulphate, fluoride, nitrate, iron, manganese, aluminium and turbidity
				Annually	Grab sampling	Analyses to 95% charge balance, including all metals and hydrocarbons
	Aquatic (wetland) systems	To determine the ecological state of the of the aquatic systems (wetlands) in the area	RK01-04	Annually	Biomonitoring	Ecological category (PES)
	Potable water	To determine quality of drinking water	Outflow of potable treatment facility	Weekly	Grab sampling	Turbidity and micro-biological constituents
	Sewage effluent	To determine water quality of sewage effluent (if applicable)	Outflow of septic tank	Weekly	Grab sampling	Turbidity and micro-biological constituents
	Water management infrastructure	Monitoring of infrastructure condition/ functionality, identifying areas that require maintenance	Along clean & dirty water canals, PCD and RWD	Monthly After a big rain event	Visual	Evidence of erosion, cracks, subsidence, overgrowth, etc.
	Dirty water systems	To determine the water quality and long-term chemical changes in the dirty water systems	PCD RWD	Quarterly	Grab sampling	EC, pH, TDS, total hardness, total alkalinity, calcium, magnesium, sodium, potassium, chloride, sulphate, fluoride, nitrate, iron, manganese, aluminium and turbidity
Annually				Grab sampling	Analyses to 95% charge balance, including all metals and hydrocarbons	
Groundwater	Groundwater quality	To determine any impact on the groundwater quality because of mining	RMBH01-04 219EW 222PK 278RR 278JDPO2 202Unex2 208BM 213JW2 148PB1	Quarterly	High integrity grab sampler (double valve), preferably made from PVC/Teflon	EC, pH, TDS, total hardness, total alkalinity, calcium, magnesium, sodium, potassium, chloride, sulphate, fluoride, nitrate, iron, manganese, aluminium and turbidity

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling Method	Variables
			Monitoring boreholes Hydrocensus (user) boreholes	Annually		Analyses to 95% charge balance, including all metals and hydrocarbons
	Groundwater levels	To determine any impact on the groundwater levels because of mining	As above	Monthly	Dip meter	Water level (mbs)
Mine water balance	Water levels in dams	To verify water balance and volume of water stored	PCD RWD	Monthly	Survey	Height (m)
	Dirty water recycled	To determine volume of dirty water abstracted & recycled for processing and dust suppression	Pit dewatering at the dewatering pumps Dust suppression abstraction points Discharge volumes (excess water)	Monthly reading	In-flow meters	Volume (m ³)
	Clean water abstraction	To determine volume of clean water abstracted	Water supply abstraction points (boreholes)	Monthly reading	In-flow meters	Volume (m ³)
	Process flow	To determine accurate process water balance	Inflows & outflows Moisture content of the product & residue	Monthly	Water meters	Volume (m ³)
Biodiversity / Land use management	Soil erosion	To pro-actively identify soil erosion to rectify prior to serious degradation	MRA area Clean water discharge points	Routinely (monthly)	Field survey	-
	Terrestrial ecological	To determine species composition & abundance and plant basal cover	Fixed point vegetation monitoring in MRA area Rehabilitated areas (North Block, construction site)	Bi-annually for 3 years after seeding, thereafter annually	Field survey	As per specialist advise
	Alien vegetation	To monitor conformance with alien and invasive eradication plan	MRA area	Monthly (during eradication programme)	Survey	Area (hectares)
	Land capability	To determine land capability over rehabilitated areas	Fixed point soil monitoring in rehabilitated areas (North Block, construction site)	Bi-annually for 3 years after seeding, thereafter annually	Soil sampling	Soil fertility analyses, as per specialist advise
Air quality	Dust outfall	To determine the levels of dust fallout because of the mining activities	MON 01 – MON 10, MON 12 monitoring points indicated in Figure 11	Monthly	Dust fallout buckets	Settleable particles (mg/m ² /day)
	Particulate matter	To determine the particulate matter levels for PM ₁₀ and PM _{2.5} and silica exposure	As above	Annually	PM monitor	µg/m ³
Environmental noise	Noise levels	To determine the noise levels within the communities and sensitive areas	MON 01 – MON 09, MON 11 monitoring points indicated in Figure 11	Quarterly	As required by GN R154 of 1992 and SANS 10103:2008	dBA

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling Method	Variables
Blasting	Ground vibration and air blast	To ensure adherence to blast design guidelines and blasting limits	MON 01 – MON 06, MON 08 – MON 12 monitoring points indicated in Figure 11	Permanent installation	Seismograph	Ground vibration (mm/s) Air blast (dB) Blast & meteorological information Video recording of blast Fly rock observations
	Structural monitoring	To measure crack changes on sensitive structures	Pre-selected sensitive structures within 1200m radius	As required	Photographic survey Gauge measurements	Crack changes
Waste	Waste generation & management	To determine volume of waste generated & disposed	Site	Weekly	Contractor report	Waste types
Heritage	Heritage/cultural resources	To capture all heritage/cultural resources exposed by development	Mining and Infrastructure area	As required	Archaeologist site visit	-
Palaeontology	Palaeontological resources	To capture all palaeontological resources exposed by development	Very High sensitivity areas	Once excavations reach a depth of 1.5m	Palaeontological site survey	-

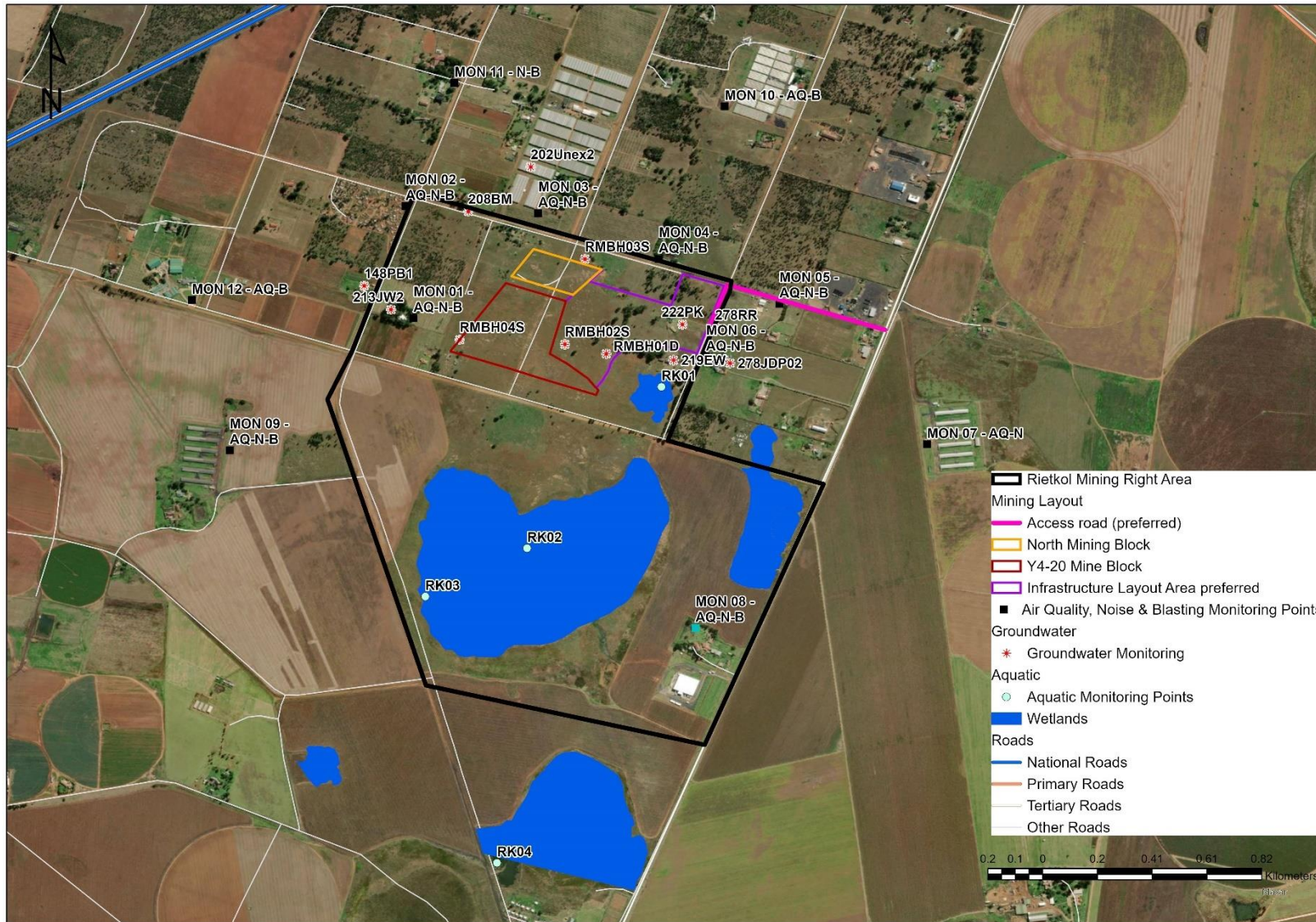


Figure 11: Rietkol Project monitoring plan

5.2 COMPLIANCE AUDITING AND REPORTING

To ensure compliance with this EMPr and to assess the continued appropriateness and adequacy of the report, Nhlabathi Minerals commits to:

- Regular monitoring of all the impact management actions and components shall be carried out by the mine to ensure that the provisions of this programme are adhered to.
- Compile and submit to the Director: Mineral Resources and Energy a report on the performance assessment of the EMPr, including the ongoing effectiveness and appropriateness thereof.
- The performance assessments of the EMPr and the compilation and submission of the reports will occur biennially (every 2 years).
- Nhlabathi will appoint a responsible person(s), in writing, who will monitor all environmental aspects of the site on a regular basis.
- Various points of compliance will be identified regarding the various impacts that the operations will have on the environment and the surrounding community. Inspections and monitoring shall be carried out on both the implementation of the programme and the impact on the community and the environment.

5.2.1 Internal Review

- Management meetings – The mine will conduct monthly meetings where relevant Health, Safety, Environmental, Community (HSEC) issues are discussed with the Management Team.
- Review meetings – The Management Team will provide feedback to the General Manager (GM) monthly and all HSEC issues will be included in these meetings.
- Perform annual internal audits as part of the HSEC reporting schedule to ensure conformance to environmental objectives and strategies and the implementation thereof.

5.2.2 External Review

- Environmental Management Committee (EMC) – The EMC will meet every year to review the implementation of the EMPr commitments, environmental monitoring results, the BAMP and the Rehabilitation, Decommissioning and Closure Plan, as appropriate at the time in the LOM.
- External EMPr performance assessments, as required in terms of the MPRDA, will be performed on a biennial (every 2 years) basis and submitted to the DMR for distribution to other relevant authorities.

6 ENVIRONMENTAL AWARENESS PROGRAMME

Environmental awareness communication and reporting forms an integral part of an EMP and includes social awareness programmes. For this reason, a procedure will be developed that will describe how the mine will communicate with its employees and with IAPs on environmental issues. The mine acknowledges the importance of effective internal and external communication and as such will maintain communication channels, both within the company and with the IAPs of the mine.

The awareness plan will be implemented at all employees' and contractors' levels, i.e. junior, senior and middle management levels (for unskilled, semi-skilled and skilled workforce). In general, the objectives of the environmental awareness plan will be to:

- Ensure that all employees/contractors understand the HSEC Objectives and Policies;
- Ensure that information regarding the environment is communicated effectively and is readily accessible to all relevant parties;
- Ensure feedback of operational and environmental performance to management;
- Provide for the establishment of forums to discuss environmental issues, allocate resources and ensure that adequate measures are being taken to address the environmental problems;
- Provide guidelines for communication with outside organisations and IAPs;
- Ensure effective and constructive response with IAPs; and
- Ensure that environmental communication and interactions are documented and recorded and accessible.

The formal training, awareness campaigns, sharing of environmental information in meetings and issuing of management instructions will be used to inform employees of potential environmental degradation, compliance levels and feedback on implementation of the required standards.

6.1 INDUCTION PROGRAMME

All new employees and contractors carrying out work on the entire mine property will undergo the environmental induction programme. Included in the programme will be all relevant environmental aspects and conditions of the Environmental Authorisation. All employees will as a condition of employment, be subject to undergo the annual environmental refresher programme.

6.2 ADVANCED TRAINING PROGRAMME

An advanced awareness programme will be conducted for all employees in line with the job descriptions or work specific tasks, after the initial environmental induction training has been conducted. The training will be applicable and specific to certain employees working in specialized areas of the operation and/or performing specific tasks (e.g. workshop workers) that have a high-risk potential to impact negatively on the receiving environment. The training will include, but not limited to waste management, spill kit training, conservation of water, soil, energy and oil, and fire-fighting.

6.3 INTERNAL COMMUNICATION AND AWARENESS CAMPAIGN

Internal communication will be conducted as follow:

- Notices – Awareness raising initiatives to capacitate both employees and communities and equip them with environmental knowledge will be implemented. Environmental news flashes with relevant messages will be distributed and placed at strategic sites monthly. The environmental news flashes will be discussed in employee’s HSEC forums and form part of the toolbox talks. Awareness raising intervention will further be conducted for specific employees in areas where constant environmental non-compliance activities are experienced. The most effective communication methods will be utilized to communicate environmental topics.
- Environmental information-sharing sessions on environmental risks and performance will be conducted. All employees will be afforded an opportunity to interrogate environmental issues. Monitoring and environmental performance reports will be made available to employees and managers of specific business units.

6.4 EXTERNAL COMMUNICATION AND AWARENESS CAMPAIGN

External communication will be conducted as follow:

- Stakeholder Register – The Rietkol Project has a comprehensive Stakeholder Register because of the EIA process. The register contains a list of all stakeholders and includes the name of the stakeholder organisation, contact details of the IAPs, such as the address (both physical and postal), e-mail address, telephone number, cell phone number and fax number. This register will be maintained and updated on an annual basis.
- Environmental Monitoring Committee (EMC) – The EMC will have representatives from the local communities and landowners, authorities and the mine. The objective of the EMC will be to review the monitoring data on an annual basis and to identify any issues that may be

reflected in the data. In addition, the EMC will review monitoring programme for compliance, as well as other aspects associated with the EMPr.

- Stakeholder Engagement Forums – Annual public meetings will be held with major stakeholders to present and discuss HSEC issues. A register of attendees will be completed, and minutes taken during the proceedings, which will be distributed to all the major stakeholders for information purposes, whether they attended the meeting or not. To encourage feedback and facilitate stakeholder participation, feedback sheets will be handed to each stakeholder upon registration and collected after the forum. This will allow the stakeholders to change their contact details, if necessary, and to comment on or enquire as to HSEC matters. Any feedback sheets received will be managed according to fixed operating procedures and any actions taken will be recorded for reference purposes.
- External Complaints Register – An external complaints register will be stationed at the mine security. If a complaint and/or concern are raised, a formal Incident Investigation will be opened, managed and investigated in accordance with the appropriate operating procedure. Records will be kept of the external complaints, as well as the follow-up investigation and actions taken. Regular contact will be kept with the complainant until the complaint has been suitably addressed.

7 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

7.1 FINANCIAL PROVISION

Refer to the Rehabilitation, Decommissioning and Closure Plan (Appendix 19) that details the annual and closure cost provision requirements.

As a minimum, the Rehabilitation, Decommissioning, and Closure Plan, together with the associated closure costs, will be updated on an annual basis once mining has commenced, as required in terms of the GN R.1147 Regulations. Auditing and review of the closure-related monitoring will be undertaken as part of this annual review.

7.2 OTHER MATTERS REQUIRED IN TERMS OF SECTION 24(4)(a) AND (b)

Not applicable.

8 UNDERTAKING

I, Maria Catharina Eksteen, herewith confirms:

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

Signature of EAP

Date: