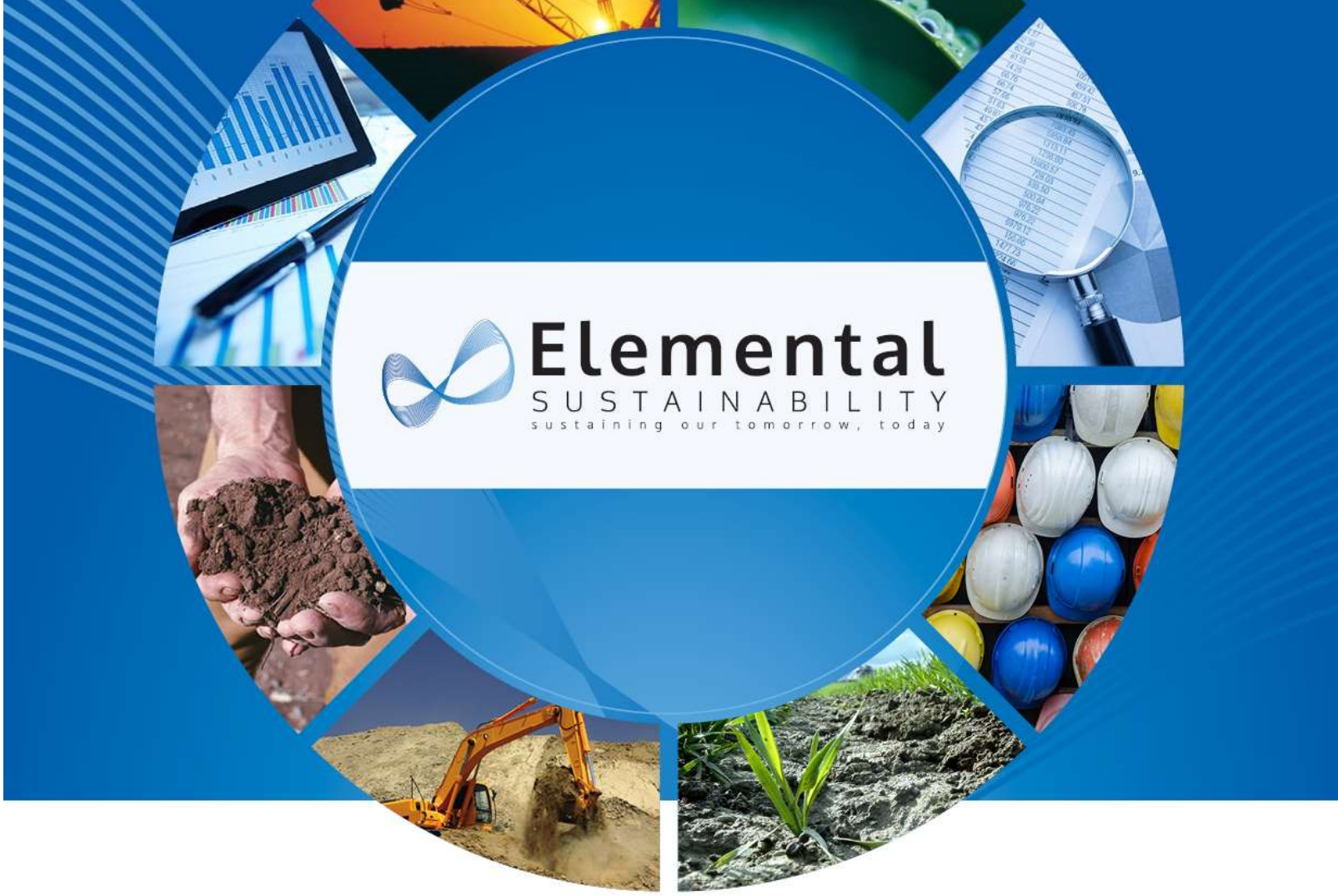

FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE PROPOSED BIRMINGHAM MINING PROJECT: MINING RIGHT Mpumalanga

DMR REF: MP 30/5/1/2/3/2/1 (10280) EM

9 November 2021

Submitted as part of an application process for environmental authorisation in terms of the National Environmental Management Act (Act 107 of 1998) [as amended] in respect of listed activities that have been triggered by application in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) [as amended]

DOCUMENT HISTORY

Document Control, Quality Control and Disclaimer

Report	Final Environmental Management Programme: Proposed Birmingham Mining Project		
Client	Canyon Resources (Pty) Ltd.		
Responsible Person	Responsible Person: Mr. Tshiyamo Rankali Position: Environmental Officer Tel: +27 11 783 7996 Email: t.rankali@canyoncoal.com		
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Responsible person	Date	Position
Sonja van de Giessen	3 November 2021	EAP – Senior Specialist (Pr.Sci.Nat & EAPASA)
Signature		
Responsible person	**Date**	**Position**
Du Toit Wilken	3 November 2021	Project Manager
Signature		

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH THE MINING RIGHT FOR BIRMINGHAM MINING PROJECT T4 MINE PROJECT, LOCATED IN THE MPUMALANGA PROVINCE

MP 30/5/1/2/3/2/1 (10280) EM

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	Canyon Resources (Pty) Ltd.
Project	Proposed Birmingham Mining Project
Contact person	Mr. Tshiyamo Rankali
Tel No	+27 11 783 7996
Email	t.rankali@canyoncoal.com
Physical Address	7th Floor, Fredman Towers, 13 Fredman Drive, Sandton, Johannesburg, Gauteng, SA
File Reference Numbers	

IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

(b) Describe the need and desirability of the activity, including the need and desirability of the activity in the context of the preferred location;

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

(d) Determine the—-

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

  (ii) Degree to which these impacts—

    (aa) can be reversed;

    (bb) may cause irreplaceable loss of resources, and

    (cc) can be avoided, managed or mitigated;

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

I Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(f) Identify suitable measures to manage, avoid or mitigate identified impacts; and

(g) Identify residual risks that need to be managed and monitored.

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ABBREVIATIONS

Abbreviation	Description
BoQ	Bill of Quantities
BPEO	Best Practicable Environmental Option
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DM	District Municipality
DMR	Department of Mineral Resources
DMRE	Department of Mineral Resources and Energy
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Assessment Report
EMPR	Environmental Management Programme
ESMS	Environmental and Social Management System
GNR	Government Notice Regulation
I&APs	Interested and Affected Parties
IDP	Integrated Development Programme
IEM	Integrated Environmental Management
IHAS	Invertebrate Habitat Assessment System
IHIA	Intermediate Habitat Integrity Assessment
IWUL	Integrated Water Use License
IWULA	Integrated Water Use License Application
LED	Local Economic Development
LM	Local Municipality
LOM	Life of Mine
MAMSL	Meter Above Mean Sea Level
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MRA	Mining Right Application
NAEIS	National Atmospheric Emission Inventory System
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMAQA	National Environmental Management: Air Quality Act, 39 of 2004
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NFA	National Forest Act (Act 84 of 1998)

NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PAIA	Promotion of Access to Information Act (Act 2 of 2000)
PAJA	Promotion of Administrative Justice Act (Act 3 of 2000)
PES	Present Ecological State
PGMs	Platinum-Group Metals
PM10	Thoracic Particulate Matter
PM2.5	Inhalable Particulate Matter
POI	Points of Interest (used in Blasting Assessment)
PPP	Public Participation Process
ROM	Run of Mine
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
SASS	South African Scoring System
SIA	Social Impact Assessment
SMME	South African Small, Medium and Micro Enterprise
TPA	Tons Per Annum
TSP	Total Suspended Particulates
WUL	Water Use License
WML	Waste Management License

INTRODUCTION

Elemental Sustainability (Pty) Ltd (ELEMENTAL) was appointed by Canyon Resources (Pty) Ltd. to undertake the environmental authorisation process in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended) and the National Environmental Management Waste Act, 2008 (Act 59 of 2008) for the proposed Birmingham Mining Project. The proposed mine is located near Hendrina, Mpumalanga.

PART B – ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1 DETAILS OF THE EAP

(Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

The information can be found in Part A, Section 1. Also refer to Appendix 1 and Appendix 2.

2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

Please refer to Section 3 in Part A, the EIAR.

2.1 COMPOSITE MAP

(Provide a map (Attached as an Appendix) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers)

Please refer to Appendix 3.

2.2 DETERMINATION OF CLOSURE OBJECTIVES

(ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

This section provides details on the closure cost. The outlined assumptions and limitations also underpin the basis of this closure cost determination. It is important to note that the estimation is based on existing information. The closure cost calculation has been performed in accordance with NEMA GNR 1147 financial provision.

EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED

For the development, the final rehabilitation cost was calculated, and no concurrent rehabilitation cost is included based on the mine schedule and how the waste rock dumps will be developed. Any concurrent annual environmental costs will be included into the operating budget of the mine. The closure costs of the aspects linked with the project have been determined using current contractor rates as provided in the Closure report.

Costing calculations refer to the specific rehabilitation actions, areas and type of disturbance that requires rehabilitation. The bill of quantities (BoQ) for each of the closure items have been developed based on information contained in the Design Report. The method employed is deemed acceptable for the level of accuracy required in terms of the regulations.

2.3 THE PROCESS FOR MANAGING ANY ENVIRONMENTAL DAMAGE, POLLUTION, PUMPING AND TREATMENT OF EXTRANEOUS WATER OR ECOLOGICAL DEGRADATION AS A RESULT OF UNDERTAKING A LISTED ACTIVITY

Refer to Table 154 in Part A: Environmental Impact Management Report for the mitigation measures. Any activity that results in damage or pollution to the environment will be rated and assigned a value to determine the associated risk. An environmental emergency is defined as an unplanned situation or event resulting in potential pollution of the environment. A pollution incident means an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring, or is likely to occur.

Canyon Resources is required to conform with the Polluter Pays Principle. This principle provides for “the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.” The Polluter Pays Principle must be rigorously applied throughout all phases of the waste rock dump project.

2.3.1 Roles and Responsibilities

In order to implement the environmental management programme (EMPr) and monitoring protocol Birmingham Mining Project need to provide human resources and an operational budget for environmental management. The following resources are required:

1. Environmental control officer during construction
2. Environmental manager during operations and closure

The environmental human resources will need to ensure the EMPr is implemented to manage environmental impacts. Birmingham Mining Project should also ensure these positions are filled by people with the necessary competence and experience to not only assist with the implementation of the EMPr but are also capable of interpreting environmental monitoring results to identify any impacts or incidents. Any environmental damage or pollution needs to be registered as an environmental incident and investigated. The investigation must focus on identifying the root cause of the incident and also consider how to ensure no-repeat of these incidents. The management of extraneous water will take place during operations but also post closure. The Birmingham Mining Project needs to identify a vehicle or entity capable of managing water treatment post closure. The rehabilitation plan must be updated annually to allow and plan for concurrent rehabilitation (annual rehabilitation). The financial provision must also be updated annually to cater of rehabilitation of the mine’s impacts.

All employees and its contractors working for the mine are responsible for reporting any accident/emergency to their supervisor immediately, and if required notifying the emergency response teams. Personnel must be nominated as response team members and must receive appropriate training to manage emergencies. All other personnel must be made aware of potential emergencies and trained in emergency response. Management must be aware of their responsibilities in case of emergency.

2.3.2 Response to Environmental Emergencies

2.3.2.1 Emergency Plan

The Birmingham Mining Project must identify potential emergencies and develop procedures for preventing and responding to them. There are several options for dealing with high priority impacts and risks, as the paradigm has two components, probability, and consequence. The design of control measures is a function of understanding the cause and effect. Best practise is to intervene with the ultimate factors where feasible, rather than treat the outcomes. Emergency response is therefore aimed to reducing the probability or reducing the consequence although reducing the probability of an emergency is the preferred option.

Residual impacts are those impacts that despite reducing the probability and consequence might still occur. In these cases, parties will have to be compensated, pollution cleaned up and damage to the environment remediated. Birmingham Mining Project shall be required to develop and implement an Emergency Preparedness and Response Plan prior to commencing work. The Emergency Preparedness and Response Plan should be based on a baseline Hazard and Risk Assessment and should provide for the following as a minimum:

- Risk assessment (identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted).
- Response procedures.
- Provision of equipment and resources.
- Designation of responsibilities.
- Communication and reporting (including that with potentially Affected Communities).
- Periodic training to ensure effective response; and
- Periodic review and revision, as necessary, to reflect changing conditions.

The Birmingham Mining Project must ensure that the Emergency Preparedness and Response Plan makes provision for environmental emergencies, including, but not limited to.

- Fire Prevention.
- Fire Emergency Response.
- Spill prevention.
- Spill Response.
- Contamination of a water resource.
- Accidents to employees; and
- Use of hazardous substances and materials, etc

The proposed Birmingham Mining Project must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the mine.

2.3.2.2 Classification of Emergencies

The following incidents will be classified as an emergency:

- Natural Disasters.
- Damage to radiological/nuclear sources equipment.
- Strikes, protest or unrest.
- Information Management System Failure (plc systems).
- Health and Disease Outbreaks.
- Serous Incident or Fatality.
- High Potential Risk Incidents (Fatality, serious environmental pollution); and
- Other emergencies.

2.3.2.3 Reporting Emergencies

Canyon Resources: Birmingham Mining Project will establish standard operating procedures (SOPs). These procedures will aim to identify the potential for, and response to, incidents and emergency situations and for preventing and mitigating the illness, injury or environmental hazard that may be associated with them. It will review its emergency preparedness and response plans and procedures, in particular, after the occurrence of incidents or emergency situations. The mine shall also periodically test such procedures where and when practicable.

In the event of a serious incident or fatality occurring it is of the utmost importance to not only ensure the Health and Safety of every person involved but also to ensure that certain evidence is protected and gathered for use, with the aim of the prevention of a similar incident/accident occurring in the future.

A “No Blame Fixing” approach to incident investigation will be implemented and it must be stressed that the gathering of information must be seen as preventative action and not as blame fixing. In light of the above, and in addition to the emergency procedure that is relevant to the specific area where the incident/accident occurred, and in relation to the notifying of person and first aid treatment/safety of any person involved, the following steps must be taken immediately after an incident/accident classified above has occurred.

In the event of a reportable/major environmental incident that could lead to danger to the public or the environment (death or sustaining impact on the environment) the appointee of that specific section, in consultation with Environmental Manager, is responsible for communicating with and drafting an external report (in terms of Section 30 of National Environmental Management Act, 1998 (Act No. 108 of 1998) and Sections 19 and 20 of the National Water Act, 1998 (Act No. 36 of 1998) to the national and provincial department and the municipality containing the:

- Nature of the incident.
- Substances and quantities and accurate effect on persons and environment.
- Initial measures to minimise impacts.
- Causes of the incident.
- Accordance measures.

- When an environmental incident occurs, the following should be adhered to:
    - Report incident as per Incident Reporting Flow Diagram.
    - Measures to clean up any spillage/pollution must be taken as per Emergency Procedure.
    - It is important to ensure that no secondary pollution is caused by incorrect handling of an environmental incident, e.g., incorrect disposal of absorbent material use to clean up a spill; and
- For high potential risk incident (HPRI) / reportable environmental incidents, the Environmental Manager will conduct a closeout investigation prior to closure of the incident. This will be done one month after all actions have been completed to verify the effectiveness of the actions.

2.3.2.4 Formalise Policies

The following layout is recommended:

Objectives

To formalise and sign off on company policies.

To include all proposed infrastructure as presented within this document into policies. Make sure the policies are updated on an ongoing basis to ensure validity.

Actions

Compile Health and Safety Policy; and

Compile Environmental Policy.

When

Before construction/operational phase starts for the Birmingham Mining Project area.

The notification process has six main steps in managing an emergency, from the identification of the situation to final close off. These are as follows:

- Find and identify.
- Ensure human safety.
- Reporting.
- Containment and clean-up.
- Corrective action; and
- Monitoring.

2.3.2.5 Environmental Emergency Incidents

The Environmental Manager must, within 14 days of the incident, report information on the incident to enable initial evaluation to the following:

- Director-General of Environmental Affairs.
- Provincial Head of Department (DMRE).
- Provincial Head of Department (DWS); and

- Local Municipality.

The report must include:

- Nature of the incident.
- Substance involved and an estimation of quantity released and their possible acute effects on persons and the environment.
- Initial measures taken to minimise impacts.
- Cause of incident, whether direct or indirect; and
- Measures taken to avoid recurrence of such incident.

2.3.2.6 Water Pollution Emergency Incident

Water Pollution Emergency Incident is any accident /incident in which a substance pollutes or has the potential to pollute a water resource or a substance that has or is likely to have a detrimental effect on a water resource. The responsible person who was in control of the substance involved in the incident at the time or responsible for the section the incident occurred will immediately inform the superior of the area where the incident occurred. The information with regard to the incident is communicated to the Business Manager, Environmental Manager and Security Personnel immediately by the superior of the area. The Environmental Manager and the General Manager must, as soon as reasonably practicable after obtaining the knowledge of the incident, (i.e., within 14 days) report to:

- DWS (Regional Manager).
- South African Police Services or relevant fire department.
- The Catchment Management Agency; and
- The Environmental Manager and crisis management team must:
    - Take all reasonable measures to contain and minimise the effects of the incident.
    - Undertake clean-up procedures.
    - Remedy the effects of the incidents; and
    - Sample the water together with the responsible person of the area.

2.3.2.7 Fire

Fires represents a significant risk to mining operations and requires special attention in the Emergency Response Plan. Sparks generated during welding, spontaneous combustion, cutting of metal or gas cutting can result in fires. Every possible precaution shall therefore be taken when working with this equipment near potential sources of combustion. The proposed Birmingham Mining Project must take all reasonable measures to ensure that fires are not started as a result of activities on site. No smoking is allowed near containers with flammable contents or in proximity of areas that are highly flammable. Smoking is only permitted at areas designated for smoking. No open fires are permitted on site and no burning of waste is to be allowed on site. The proposed Birmingham Mining Project shall ensure that there is sufficient firefighting equipment available on site at all times. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities. The proposed Birmingham Mining Project is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. Appropriate and correctly serviced equipment must

be available for all activities that are likely to generate fire. It is further anticipated that firebreaks will be required around the site perimeter. It is recommended that such fire prevention measures are implemented in consultation with adjacent landowners and where necessary coordinate fire prevention efforts with local Fire Protection Agency (FPA).

2.3.2.8 Spill Response Procedure

All employees, staff and labourers must be instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply, and the detailed spill procedure must cater for these requirements:

- Immediately reporting of spills by all employees and/or visitors to the relevant supervisor and ECO (this requirement must be including in induction training).
- Take immediate action to contain or stop the spill where it is safe to do so.
- Contain the spill and prevent its further spread (e.g., earth berm or oil absorbent materials for spill to land or by deploying booms and/or absorbent material for a spill to water).
- Dispose of any contaminated soil or materials according to appropriate waste disposal procedure (waste from spills of hazardous materials shall be disposed of as hazardous waste at a suitably licensed waste disposal facility).
- The Mine EO shall record details of the spill in their respective incident registers; and
- Photographic evidence shall be obtained of the spill clean-up.

In the case of large spills, the services of a specialist spill response agency shall be required, who shall advise on appropriate clean-up procedures and follow-up monitoring (if required). In the event of any spills which are classified as medium or major incidents, the Mine supervisor shall immediately inform the ECO/EM. The ECO/EM shall record the incident in the non-conformance and incident register and advise on the appropriate measures and timeframes for corrective action. Environmental incident reports shall be completed and submitted to the Mine Manger and ECO/EM within 5 working days for all medium and major incidents. If there is a requirement to report the incident to the authorities, this shall be done in consultation with the ECO/EM. The Applicant must also, (as per Section 30 of the NEMA) notify the Director-General (DHSWS, DFFE and DMRE), South African Police Services and Local Municipality and any persons whose health may be affected of the nature of an incident including:

- Any risks posed to public health, safety, and property,
- Toxicity of the substance or by products released by the incident; and
- Any step taken to avoid or minimise the effects of the incident on public health and the environment.

The proposed Birmingham Mining Project must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.

2.3.2.9 Air Pollution Emergency Incidents (If relevant)

- Record of any non-compliance must be kept.

- The non-compliance with conditions will be reported telephonically, by fax or by email to the Chief Air Pollution Control Officer as soon as possible but not later than 24 hours after violation will start to occur. The particulars of such violation, including details of measure is put in place to prevent it happening in the future, will be included respective or in the weekly or monthly report.
- If the utilization and/or efficiency of air pollution control fail to meet requirements as specified in the certificate, then the process is managed under emergency procedures until such time as it will be possible to operate in compliance with the conditions of this certificate; and
- Record is kept of periods of upset and abnormal emissions, e.g., off-gas vented directly to the atmosphere or excess thereof due to the faults or limited capacity of air pollution control equipment or limits for process parameters being exceeded, etc. and the Chief Air Pollution Control Officer is notified immediately should it occur.

2.3.2.10 Environmental Impact Register

All non-conformances pertaining to safety, health, environmental, quality of project activities and employees shall be documented as identified by according to documented procedures. The mine will make provision for recording and reviewing the nature and extent of any non-conformance that may be encountered during the Project Execution phase.

2.3.2.11 Records

Records must be kept of all environmental emergencies and non-conformances.

3 WASTE CLASSIFICATION

Section 7 of the National Norms and Standards for the Assessment of Waste for Landfill Disposal Regulations (Government Notice 635 as listed in Government Gazette No 36784), lists the conditions to which the results must be compared to determine the type of waste to ultimately determine the barrier requirements for landfill disposal, for the specific waste type.

Regulation 636 of the National Norms and Standards for the Assessment of Waste for Landfill Disposal contains the standard containment barriers for the various waste types, namely Types 1 to 4.

Based on the above and the prescriptions for containment barriers contained in Article 636 of Regulation 36784, the specified barrier for Waste Type 3 waste is a Class C Liner.

Type 3 waste may only be disposed of at a Class C landfill designed in accordance with Section 3(1) and (2) of these Norms and Standards, or, subject to section 3(4) of these Norms and Standards, may be disposed of at a landfill site designed in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).

According to GNR 635 all the chemicals that could reasonably be expected to occur in the waste should be tested for:

"The TC of all the elements and chemical substances specified in section 6 of these Norms and Standards that are known to occur, likely to occur or can reasonably be expected to occur in the waste must be determined".

According to GNR 635 the test results should be compared to the total and leachable concentration thresholds as follows: *"The total concentration (TC) and leachable concentrations (LC) limits of the chemical substances in the waste must be compared to the threshold limits specified in section 6 of these Norms and Standards for total concentrations (TCT) and leachable concentrations (LCT) of specific elements and chemical substances. Based on the TC and LC limits of the elements and chemical substances in the waste exceeding the corresponding TCT and LCT limits respectively, the specific type of waste for disposal to landfill must be determined in terms of section 7 of these Norms and Standards"*.

A waste classification assessment was undertaken by Red Kite Consulting (refer to Appendix 24). The test results for the total concentrations (TC) are summarised in Table 1. From the table it can be seen that barium, cobalt, mercury, and lead exceed the TCT0 in the overburden sample. Barium and lead exceed the TCT0 in the waste rock sample. Only barium exceeds the TCT0 in the ROM sample. All three samples comply with the TCT1 guidelines.

Table 1: Total concentration test results compared to TCT guideline values

Constituent	Units	TCT Guideline Values			ROM sample	Waste rock sample	Overburden sample
		TCT0	TCT1	TCT2			
Arsenic (As)	mg/kg	5.8	500	2 000	2.80	<0.400	<0.400
Boron (B)	mg/kg	150	15 000	60 000	<10	64	21
Barium (Ba)	mg/kg	62.5	6 250	25 000	286	89	700
Cadmium (Cd)	mg/kg	7.5	260	1 040	<0.400	<0.400	<0.400
Cobalt (Co)	mg/kg	50	5 000	20 000	<10	<10	132
Total chromium (Cr)	mg/kg	46 000	800 000	N/A	139	92	36
Copper (Cu)	mg/kg	16	19 500	78 000	<4.00	5.60	<4.00
Mercury (Hg)	mg/kg	0.93	160	640	<0.400	<0.400	1.60
Manganese (Mn)	mg/kg	1 000	25 000	100 000	110	82	385
Molybdenum (Mo)	mg/kg	40	1 000	4 000	<10	<10	<10
Nickel (Ni)	mg/kg	91	10 600	42 400	29	35	89
Lead (Pb)	mg/kg	20	1 900	7 600	18	23	22
Antimony (Sb)	mg/kg	10	75	300	<0.400	<0.400	<0.400
Selenium (Se)	mg/kg	10	50	200	<0.400	<0.400	<0.400
Vanadium (V)	mg/kg	150	2 680	10 720	<10	116	<10
Zinc (Zn)	mg/kg	240	160 000	640 000	28	92	18
Cr(VI), Chromium (VI) Total	mg/kg	6.5	500	2 000	<2	<2	<2
Fluoride (F)	mg/kg	100	10 000	40 000	7.68	28.57	46.63
Total cyanide (CN)	mg/kg	14	10 500	42 000	<0.5	<0.5	<0.5

The leachable concentration test results are summarised in Table 2 below. From the table it can be seen that all constituents analysed for the three samples comply with the LCT0 guidelines.

Table 2: Leachable concentration test results compared to LCT guideline values (reagent water leach)

Constituent	Units	LCT Guideline Values				ROM sample	Waste rock sample	Overburden sample
		LCT0	LCT1	LCT2	LCT3			
Total Dissolved Solids (TDS)	mg/L	1 000	12 500	25 000	100 000	170	55	53
Chloride (Cl)	mg/L	300	15000	30000	12000	26	3	2
Sulphate (SO_4)	mg/L	250	12500	25000	100000	48	8	<2
Nitrate (NO_3)	mg/L	11	550	1100	4400	<0.1	0.1	<0.1
Fluoride (F)	mg/L	1.5	75	150	600	<0.2	0.5	<0.2
Total cyanide (CN)	mg/L	0.07	3.5	7	28	<0.02	<0.02	<0.02
Arsenic (As)	mg/L	0.01	0.5	1	4	<0.001	0.003	0.003
Boron (B)	mg/L	0.5	25	50	200	<0.025	0.035	<0.025
Barium (Ba)	mg/L	0.7	35	70	280	0.199	<0.025	<0.025
Cadmium (Cd)	mg/L	0.003	0.15	0.3	1.2	<0.001	<0.001	<0.001
Cobalt (Co)	mg/L	0.5	25	50	200	<0.025	<0.025	<0.025
Total chromium (Cr)	mg/L	0.1	5	10	40	<0.025	<0.025	<0.025
Hexavalent chromium (Cr^{6+})	mg/L	0.05	2.5	5	20	<0.010	<0.010	<0.010
Copper (Cu)	mg/L	2	100	200	800	<0.010	<0.010	<0.010
Mercury (Hg)	mg/L	0.006	0.3	0.6	2.4	<0.001	<0.001	<0.001
Manganese (Mn)	mg/L	0.5	25	50	200	0.215	<0.025	0.025
Molybdenum (Mo)	mg/L	0.07	3.5	7	28	<0.025	<0.025	<0.025
Nickel (Ni)	mg/L	0.07	3.5	7	28	0.027	<0.025	<0.025
Lead (Pb)	mg/L	0.01	0.5	1	4	<0.001	0.001	0.001
Antimony (Sb)	mg/L	0.02	1	2	8	<0.001	0.001	<0.001
Selenium (Se)	mg/L	0.01	0.5	1	4	<0.001	<0.001	<0.001
Vanadium (V)	mg/L	0.2	10	20	80	<0.025	<0.025	<0.025
Zinc (Zn)	mg/L	5	250	500	2000	<0.025	<0.025	<0.025

From the results of the analysis performed on the ROM, overburden, and waste rock samples, all three materials are classified as Type 3 Wastes following the GN 635 classification system. However, the material also does not meet the requirements for Type 3 waste in terms of the Leachable Concentration Threshold (all parameters LC≤LCT0).

Based on the results of the waste classification assessment, the following conclusions regarding the RoM, overburden and waste rock proposed to be stockpiled at the Birmingham mining project could be made:

- All analysed elements comply with the LCT0 guidelines. Therefore, in terms of LCT the material is considered Type 4 Waste.
- Barium, cobalt, mercury, and lead exceed the TCT0 in the overburden sample. Thus, the overburden material is classified as Type 3 waste.
- Barium and lead exceed the TCT0 in the waste rock sample. Thus, the waste rock material is classified as Type 3 waste.

- Only barium exceeds the TCT0 in the ROM sample. Thus, the ROM material is classified as Type 3 waste.
- Although the ROM, overburden and waste rock might be considered as Type 3 for the purpose of barrier design (in terms of GN R. 635 Regulation 7(6)), the environmental risk associated with drainage from these materials is similar to that of a Type 4 waste due to low concentrations of leachable constituents.
- It is recommended that the ROM, waste rock and overburden proposed to be stockpiled at the Birmingham mining project be stored on a Class D liner.

Based on the Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation of July 2015 (GN632 of 24 July 2015), a risk-based approach can be undertaken, whereby source-pathway-receptor modelling can be conducted to determine the barrier requirements for residue stockpiles and deposits.

4 ACID MINE DRAINAGE

(Indicate whether or not the mining can result in acid mine drainage)

4.1 POTENTIAL RISK OF ACID MINE DRAINAGE

As the proposed Birmingham Mining Project is a coal mine there is potential for Acid Mine Drainage (AMD) from pyrite coal being exposed to oxygen and water. The potential contaminants that may emanate from the mining activities are Ca, Mg, Cl and SO_4. There may be a possibility of acid generation. This can be confirmed or disproved by performing geochemical sampling and analysis as well as constructing a geochemical model

Sulphate is probably the most reliable indicator of pollution emanating from coal mining. Sulphate concentrations can however increase due to mobilisation during the mining process. The chemistry analyses supplied within this report should henceforth serve as baseline water quality throughout the life of the proposed mining operations. The following few paragraphs contains a brief overview of acid mine drainage (AMD) formation.

The reactions of acid and sulphate generation from sulphide minerals are discussed according to the three-stage stoichiometric example of pyrite oxidation after James, (1997) and (Ferguson & Erickson, 1988) in which one mole of pyrite oxidized forms two moles of sulphate:

Reaction (2.1) represents the oxidation of pyrite to form dissolved ferrous iron, sulphate, and hydrogen. This reaction can occur abiotically or can be bacterially catalysed by *Thiobacillus ferrooxidans*.

$$FeS_2 + 7/2\ O_2 + H_2O \rightarrow Fe^{2+} + 2SO_4^{2-} + 2H^+ \qquad (2.1)$$

The ferrous iron, (Fe^{2+}) may be oxidised to ferric iron, (Fe^{3+}) if the conditions are sufficiently oxidising, as illustrated by reaction (2.2). Hydrolysis and precipitation of Fe^{3+} may also occur, shown by reaction (2.3). Reactions (2.1), (2.2) and (2.3) predominate at pH > 4.5.

$$e^{2+} + 1/4O_2 + H^+ \rightarrow Fe^{3+} + 1/2H_2O \quad (2.2)$$

$$Fe^{3+} + 3H_2O \rightarrow Fe(OH)_3\,(s) + 3H^+ \quad (2.3)$$

Reactions (2.1) to (2.3) are relatively slow and represent the initial stage in the three-stage AMD formation process. Stage 1 will persist as long as the pH surrounding the waste particles is only moderately acidic (pH > 4.5). A transitional stage 2 occurs as the pH decreases and the rate of Fe hydrolyses (reaction 2.3) slows, providing ferric iron oxidant. Stage 3 consists of rapid acid production by the ferric iron oxidant pathway and becomes dominant at low pH, where the Fe^{2+} (ferric iron) are more soluble (reaction 4):

$$FeS_2 + 14\,Fe^{3+} + 8H_2O \rightarrow 15Fe^{2+} + 2SO_4^{2-} + 16H^+ \quad (2.4)$$

Without the catalytic influence of the bacteria, the rate of ferrous iron oxidation in an acid medium would be too slow to provide significant AMD generation. As such the final stage in the AMD generation process occurs when the catalytic bacteria *Thiobacillus ferrooxidans* have become established. Reactions (2.2) and (2.4) then combine to form the cyclic, rapid oxidation pathway mainly responsible for the high contamination loads observed in mining environments.

According to the SANS Guidelines for Drinking Water, high concentrations of sulphate exert predominantly acute health effects. Sulphate also imparts a salty or bitter taste to water. The taste threshold for sulphate falls in the range of 200 – 400mg/L. Above 400mg/L diarrhoea occurs in most individuals and user-adaptation does not occur. It is also important to note that adverse chronic effects may occur in livestock if sulphate levels exceed 1000mg/L, such as diarrhoea and poor productivity. This potential situation should be managed during mining to minimise the impact on water resources.

4.1.1 Steps Taken to Investigate, Assess, and Evaluate the Impact of Acid Mine Drainage

Geochemical analyses should be conducted on the waste as well as acid-base accounting on the coal seam materials during operations in order to update the numerical flow model in terms of the acid generation potential of the coal.

4.1.2 Engineering Or Mine Design Solutions To Be Implemented To Avoid Or Remedy Acid Mine Drainage

Acid Mine Drainage should be monitored for. As this is a standard Coal Mining operation, standard methods will be utilised to manage, prevent, and detect AMD from the onset of the operation and well after closure. Both active and passive measures will be devised if and when AMD presents itself. A groundwater model should be developed and updated to ensure monitoring and management of acid mine drainage begins with the onset of the project.

4.1.3 Measures That Will Be Put In Place to Remedy Any Residual or Cumulative Impact That May Result From Acid Mine Drainage

If AMD occurs in the future, the responsibility will be with the Canyon Resources (Pty) Ltd: Birmingham Mining Elemental Sustainability (Pty) Ltd.

Project to implement management measures.

- Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWWMP;
- Areas that may have subsided or areas of depressions and/or sinkholes should be filled to create free draining surfaces. Where leachate is generated, it must be contained separately from water which is only slightly polluted through contact with the waste.
- Surface and groundwater quality and quality monitoring should be continued until a steady state is reached. If required, A pollution control dam could be used to intercept polluted seepage water stemming from the activities. An interception trench is an additional option to treat the contaminated discharge.
- Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine.
- Mining should remove all ore from the opencast and separate acid forming and non-acid forming material.

The hydrogeological report and model should be updated regularly to ensure that the best preformance is envisaged.

5 WATER

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

The water uses listed in terms of section 21(a), (b), (c), (g), (i) and (j) of the National Water Act, 36 of 1998, as amended (“NWA”) will be applied for. A WULA is underway and has been initiated on the eWULAAS system. The water balance will be included in the Integrated Water and Waste Management Plan.

5.1.2 Has a water use licence been applied for?

A water use licence is currently being applied for with the DWS on the online eWULAAS system. The proposed Birmingham Mining Project triggers the following water uses in terms of the NWA:

- Section 21 a: Taking water from a water resource
- Section 21 b: Storing water
- Section 21 c: Impeding or diverting the flow of water in a watercourse
- Section 21 g: Disposing of waste in a manner which may detrimentally impact on a water resource
- Section 21 i: Altering the bed, banks, course, or characteristics of a watercourse
- Section 21 j: Removing, discharging, or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

6 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

Measures to rehabilitate the environment affected by the undertaking of any listed activity

Table 3: Mitigation Measures to rehabilitate the environment

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
No-go Option					
No-go option	Reduced period of development and upliftment of the surrounding communities and infrastructure.	No Additional Management Objectives if Project does not proceed	N/A	N/A	N/A
No-Go Option	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	No Additional Management Objectives if Project does not proceed	N/A	N/A	N/A
No-Go Option	**Positive:** No additional negative impacts on I&APs or surrounding land users	No Additional Management Objectives if Project does not proceed	N/A	N/A	N/A
No-Go Option	**Positive:** No additional negative impacts on the environment	No Additional Management Objectives if Project does not proceed	N/A	N/A	N/A
Hydrogeological					
Underground mining	Underground mining may result in spread of pollution	Prevent hydrological impacts and prevent contamination of water resources	• Identify and where possible, maximise areas of the mine that will result in clean storm water runoff (for example open veld areas) as well as infrastructure associated with the mine (for example office areas) and ensure that runoff from these areas is routed directly to natural watercourses and not contained or contaminated. • Ensure that clean storm water is only contained if the volume of the runoff poses a risk, if the water cannot be discharged to watercourses by gravitation, for attenuation purposes, or when the clean area is small and located within a large dirty area. This contained clean water should then be released into natural watercourses under controlled conditions.	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	• Continuous
Underground mining	Dewatering due to underground mining may lower water table	Keep record of the dewatering volumes and water levels of the aquifer			

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			• Ensure the minimisation of contaminated areas, reuse of dirty water wherever possible and planning to ensure that clean areas are not lost to the catchment unnecessarily. • Ensure that seepage losses from storage facilities (such as polluted dams) are minimised and overflows are prevented. Ensure that all possible sources of dirty water have been identified and that appropriate collection and containment systems have been implemented and that these do not result in further unnecessary water quality deterioration. • Ensure that less polluted water or that: moderately polluted water is not further polluted. Where possible less and more polluted water should be separated. This will assist in the reuse water strategy and improve possibilities for reuse based on different water quality requirements by different mine water uses. • Where contaminants are transported along construction roads, emergency containment and mitigation measures must be developed to minimize impacts should accidental spillages occur along the transport routes. • Store all potential sources of contamination in secure facilities with appropriate Storm Water management systems in place to ensure that contaminants are not released to the water resource through Storm Water runoff. • Separate and collect all storm water that has a quality potentially poorer than the water quality specified and negotiated for the specific catchment into dirty water storage facilities for reuse within the mining operations. • Ensure that all storm water structures that are designed to keep dirty and clean water separate can accommodate a defined precipitation event. (The magnitude of the precipitation event used in		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			such an objective statement must, as a minimum, adhere to the relevant legal requirements.) • Route all clean storm water directly to natural watercourses without increasing the risk of a negative impact on safety and infrastructure, e.g., loss of life or damage to property due to an increase in the peak runoff flow. • Ensure that the maximum volume of clean water runoff is diverted directly to watercourses and the minimum amount of storm water reports to the pit floor of an open cast mine. • Develop and implement proper environmental management and auditing systems to ensure that pollution prevention and impact minimisation plans, and measures developed in the design and feasibility stages are fully implemented. • The size of unrehabilitated areas (pit, spoils, unvegetated areas) that produce contaminated runoff should be minimised. • Rehabilitation should be planned to promote free drainage and to minimise or eliminate ponding of storm water. On-going rehabilitation as mining operations progress is required. • The clean and dirty water flow areas on a mine site should be identified. • Every effort should be made to maximise the clean area and minimise the dirty area when locating the diversion berms, channels, and dams. In the case of a new mine, the maximisation of the clean areas should have an influence in overall mine planning and the location of the mine infrastructure. • The mine planning should consider concurrent rehabilitation of mine workings and waste management facilities, to maximise the areas of clean runoff that can be discharged to the natural watercourses. • Monitoring of water storage facilities, particularly pollution control dams, is imperative to manage		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			the risk of spillage from the dams. Stage-storage (elevation-capacity) curves are useful tools to monitor the remaining capacity within a water storage facility. • Prevent the erosion or leaching of materials from any residue deposit or stockpile from any area and contain material or substances so eroded or leached in such area by providing suitable barrier dams, evaporation dams or any other effective measures to prevent this material or substance from entering and polluting any water resources. • Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA. • Water that has been in contact with residue, and must therefore be considered polluted, must be kept within the confines of the MRD until evaporated, treated to rendered acceptable for release, or re-used in some other way. • All water that falls within the catchment area of the MRD must be retained within that area. • The design, operation, and closure of MRDs should incorporate consideration of the risk of changes in the mining and plant operations, and hence the mine water balance, through the life cycle of the mine. • A system of storm water drains must be designed and constructed to ensure that all water that falls outside the area of the MRD is diverted clear of the deposit. Provision must be made for the maximum precipitation to be expected over a period of 24 hours with a probability of once in one hundred years. A freeboard of at least 0.5 m must be		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			provided throughout the system above the predicted maximum water level. This requirement applies to all MRDs, both fine and coarse grained MRDs. • Ensure that the water use practices on and around the MRD do not result in unnecessary water quality deterioration, e.g., use of the return water dam for storage of poorer quality water. • All openings to the mine need to be sealed or have adequate berms surrounding the openings to prevent surface water entering. • All boreholes drilled into the mine workings should be sealed from the bottom to the top to prevent groundwater entering the hole and feeding into the mine workings. • All depressions created by mining need to be profiled for self-drainage of surface water away from the workings. • Should depressions created by mining not be able to be filled, then the areas need to be surrounded by berms to prevent surface water ingress to the mine workings. • Where significant water ingress cannot be prevented, measures should be put in place to intercept ingress water as close as possible to the source in order that it can be pumped out of the mine before its quality can deteriorate through contact with sulphide minerals. • Properly mark all significant water ingress points encountered during mine construction and development and ensure that their physical location, flowrate, and water quality are recorded and incorporated into the existing groundwater model and the mine water and salt balance. • Properly seal all major water ingress points and ensure that the details of the sealing operation are recorded.		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			• Ensure that all approved design measures are properly implemented and modify mine plans and drawings to indicate 'as-built' systems wherever they deviate from the original designs, together with motivations on the design variation. Institute appropriate water level and water quality monitoring programmes to confirm rate of water rise and water quality as the mine floods. Maintain an ability to access the underground workings until long term discharge and quality predictions have been confirmed. • A particular concern when storing water underground where it is likely to be in contact with sulphide minerals is to manage the storage systems in a manner that absolutely minimizes the potential for water quality deterioration to occur. This would imply that storage reservoirs must be filled as quickly as possible and that measures must be put in place to prevent regular fluctuation of the stored water level as it is this wetting and drying cycle on the exposed surfaces that will enhance the rate of sulphide oxidation and lead to water quality deterioration. • Water quantity and quality data should be collected on a regular, ongoing basis during mine operations. These data will be used to recalibrate and update the mine water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA. Areas that may have subsided or areas of depressions and/or sinkholes should be filled to create free draining surfaces.		
Closure of underground mine	Spread of pollution	Prevent hydrological impacts and prevent contamination of water resources	• Institute water level and water quality monitoring programmes to confirm rate of water rise and water quality as the mine floods. Maintain an ability to access the underground workings until long	GNR 704 Water Use Licence Groundwater monitoring program	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			term discharge and quality predictions have been confirmed. • Service boreholes need to be plugged from the bottom where they intersect the workings and then grouted through to surface. It would be advantageous if the bord can be backfilled (e.g., with ash) to give further support to the roof to reduce the risk of bord failure which could destroy the plug and grouting thus allowing water to ingress into the workings. • Shafts should be sealed		
Closure of underground mine	Subsurface Seepage	Prevent and monitor seepage	• Monitoring of the water quality and volumes on frequency high enough to establish seasonal trends. Risk assessment on the effect of the water qualities on the most critical receptor must be done to establish if passive treatment such as a wetland or active treatment processes is required.	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	• Continuous
Surface Water					
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Surface water quality - Sedimentation and pollution of surface water resources resulting in the deterioration of water quality	Prevent hydrological impacts and prevent contamination of water resources	• Development of the storm water management structures to ensure that sediment generated during the construction phase is conveyed to the silt trap, and clean water is diverted away from dirty water areas. • Soils compacted by heavy machinery in areas that are not utilised post construction can be ripped to allow infiltration. • Roads should be maintained regularly to ensure that surface water drains freely off the road preventing erosion. • Ensure that storm water management structures are in good working condition through regular inspection, especially after large storm events. • Limit refuelling and maintenance of machinery and vehicles to specified locations and ensure the	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			appropriate spill prevention and incident management measures are in place. • Avoid encroaching on natural areas directly adjacent to proposed activities. • Proliferation of alien and invasive species is expected within any disturbed areas. AIP species should be eradicated and controlled to prevent their spread within or beyond the footprint. An AIP Control Plan should be compiled and implemented for the proposed project. • Where feasible, rehabilitate disturbed areas as soon as possible after construction and include the areas where river-crossings have taken place. • River crossings (if necessary) should be designed by an engineer to prevent impacts and failing structures. • If excessive erosion is observed, soil management and erosion protected structures and measures should be implemented.		
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained in the PCD.	Prevent hydrological impacts and prevent contamination of water resources	• Ensure that effective separation of clean and dirty water systems is implemented, as designed by an engineer. No contaminated ("dirty") water should be allowed to enter the natural environment, clean water systems or water resources. • Ensure that all the dirty water emanating from the dirty water areas is collected via silt traps before entering the PCD for re-use within the	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related waste water and residue materials; and Water use and storage on-site; Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and subsequent general surface rehabilitation. Updating and implementing a monitoring programme appropriate for the closure phase.	Surface water quality - Deterioration of surface water quality as a result of Acid Mine Drainage.	Prevent hydrological impacts and prevent contamination of water resources To limit the impact of infiltration of potentially contaminated leachate to the underlying aquifers.	mine, to prevent unnecessary discharge into the environment. • The dirty water collection trenches should be cleaned regularly to reduce the build-up of coal material and to ensure they are able to accommodate and convey the 1:50 year peak flows. This material should be disposed to an appropriately licenced facility. • Stockpiling should be monitored so that the side slopes do not encourage erosion of the slopes resulting in silt transported into the trenches from the stockpiles. • Stockpiling areas need to be licenced and constructed as per the requirements of the Competent Authority. • Water quality in the PCDs should be monitored. This ensures that pollution sources are monitored during the operational phase and in the unlikely event of any spillages the downstream impacts can be estimated. The main constituents to check would be the TDS, EC, salts, and some chemical parameters such as (pH, SO_4 and other metals). • Seepage or discharge of wastewater from the wastewater containment facilities should be prevented to reduce pollution of surface water resources as well as to improve water conservation. Dirty water containment facilities and residue stockpiles should be appropriately lined as per the recommendations of the Geohydrological and/or Waste Classification Study. • Corridor movement associated with water resources should not be hampered by the development. No sections of the river should be cordoned off. • Ongoing implementation of the recommended monitoring plan to ensure that impacts to the surface water environment are detected timeously.		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			• Implement erosion prevention measures and structures. • Avoid contamination of soils and implement appropriate remedial measures if incidents of spillage occur. • Concurrent rehabilitation to be implemented, specifically revegetation of disturbed areas. • The water balance for the project should be updated on an annual basis. • Monitor amount of water abstracted and keep a record of daily abstractions. • Flow meters should be installed in the mine water circuit to enable refinement of the water balance.		
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and subsequent general surface rehabilitation. Updating and implementing a monitoring programme appropriate for the closure phase.	<u>POSITIVE:</u> Surface water quantity Reinstatement of surface drainage patterns	Prevent hydrological impacts and prevent contamination of water resources	• Leaving the storm water management structures in place during the decommissioning and post closure phase until the rehabilitation process is completed. This will ensure that sediment generated during this phase is captured. • Storm water management structures should be inspected after large storm events to ensure that there are no blockages or damage. Should blockages or damage occur, immediate action should be undertaken to remove debris or to repair damaged areas. • Soils compacted by heavy machinery can be ripped to allow infiltration. • Rehabilitation processes such as restoring the topography to a pre-activity state, and re-vegetation of disturbed areas will assist in returning natural surface water drainage patterns. • Establish free-draining final landform. • Undertake AMD modelling for the post-closure phase of the project to understand potential impacts. Closure Planning should cater for the isolation of seep zones with clay material and compaction.	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	• Continuous until closure is achieved

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Aquatic Ecology					
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Construction impacts resulting in impacts to biodiversity and ecological function	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. .	• Avoidance of unnecessary disturbance or destruction of natural habitat is an important mitigation tool for flora and thereby associated fauna. • Avoid encroaching on natural areas directly adjacent to proposed activities in close proximity or within buffer areas. • Rehabilitation must include planting of indigenous local species, preferably suitable riparian species if banks and beds are affected and as per approved rehabilitation plan for Section 21 (c) & (i) activities - focusing on species native to the river. • Appoint a specialist to assist in riverbank or wetland rehabilitation, as necessary. All river (including non-perennial) crossings will need to be authorised and remediated in accordance with approved WUL and Section 21(c) &(i) rehabilitation for beds and banks. • Implementation of recommendations from the wetland assessment is recommended, as some of the non-perennial drainage lines are separated by dams, which may indicate seepage along and between and therefore the occurrence of wetlands, which was prevalent in the field during the assessment.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	• Continuous
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and	Loss of biodiversity and ecological function. Impacts to ecological corridor functioning due to prolonged activity in proximity to watercourses	Prevent hydrological impacts and prevent contamination of water resources in order to ensure aquatic ecology is not negatively impacted on.	• Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread within or beyond the footprint. • A management plan and proper follow-up strategy for the prevention of the establishment and/or further spread of new populations of such species should be developed and enforced. • Rehabilitate affected areas as soon as possible after construction and include the areas where	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
storage of related wastewater and residue materials; and Water use and storage on-site.			river-crossings have taken place. The crossings (if necessary) should be designed by a suitable engineer to prevent impacts and failing structures. • To prevent the erosion of soil, management measures may include structures to protect areas and soil from areas susceptible to erosion. Water control structures should be constructed and well maintained to minimize erosion and to create a favourable habitat for the establishment of vegetation.		
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Alteration of drainage patterns leading to decrease and changes in water quantity and availability		• Corridor movement associated with water resources should not be hampered by the mining project. No sections of the river should be cordoned off (only during construction if it will help prevent access and impacts). • Unnecessary movement of workers need to be prevented at the site during all phases of the mining project. • Continuous monitoring is important to ensure the baseline environmental condition is not impacted. • To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed, or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees. • No fishing, hunting, or trapping should be allowed by the employees or other parties on the Mining Right footprint. • No waste will be disposed of in or around the mining project area, which can attract rodents or other types of fauna; waste will be managed correctly. • Define the runoff/flood characteristics of the study site floodline analysis accordingly.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	• Continuous
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Deterioration of water quality in the Bosmanspruit and Klein-Olifants River due to polluted water runoff, affecting aquatic communities				

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal. Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site. Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Nutrient enrichment due to sedimentation, leading to decline of Dissolved Oxygen (DO), thereby impacting aquatic invertebrate communities		• Adherence to the Engineered Storm Water Management Plan as compiled by an accredited engineer is crucial. • Erosion protection and appropriate energy dissipation structures should be implemented at the stretch where crossings and diversions are proposed, thereby stabilising, and protecting the banks. • Prevent any over abstraction of either ground or surface water (depending on where water will be obtained) as this will negatively impact water quality (surface water) and/or quantity (surface- and groundwater). • Decreased Dissolved Oxygen will also result if nutrients increase and impacts reach water resources, leading to possible eutrophication and algae and a decline in PES, which will decrease the aquatic ecology integrity and thereby further affecting the streams. • Monitor Water Quality (monthly) and Aquatic Health (Biomonitoring) bi-annually (wet and dry season). • Protect soil resource, beds and banks therefore preventing erosion and increased sedimentation in the resource. This will prevent increased sedimentation and smothering of aquatic ecosystems. • Implement appropriate Stormwater Management Plan, which will include erosion prevention measures and sediment trapping systems or measures. • There will be no discharges of dirty water from the construction site and mobile chemical toilets to be provided for workers during construction. • Avoid contamination of soils and implement appropriate remedial measures if incidents of spillage occur. • Protect and prevent unnecessary impacts within the riparian and 32m zone (or otherwise		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			delineated buffer as per surface water assessment) of the watercourse. • Rehabilitate affected areas immediately to prevent sedimentation and protect against erosion. • Monitor amount of water abstracted carefully and keep a record of daily abstractions. • Flow meters will be installed in the mine water circuit to enable refinement of the water balance. • A wet and dry season water balance should be developed and updated on an annual basis based on water levels observed and monitored in the specific section of river utilised. • Protect and prevent or license impacts to wetlands, to ensure proper management and prevention of unnecessary impacts. • Optimise water use by means of reuse and recycling. • Implement divergences or impedances (crossings specifically) as per designs and formal management plans. • Ensure water is available in the resource to protect aquatic ecological integrity.		
Wetlands					
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Deterioration of surface water quality may lead to a deterioration of the Present Ecological Status (PES).	To limit impacts on wetlands and prevent contamination of water resources	• Ensure that all non-linear mining infrastructure is located outside of the 100m buffer zone of all wetlands and if this cannot be adhered to then ensure a 65m buffer is implemented. • Ensure a stormwater management plan is implemented. • Discard dump must adhere to all regulations and best practice guideline. • Discard dump must be lined with suitable stormwater management infrastructure implemented. • All vent shafts must be protected from the ingress and interception of surface runoff and	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Direct impacts: Accidental direct impacts to wetland vegetation and habitat by heavy machinery during construction and site establishment. Wetland fauna fatalities.	To limit impacts on wetlands and prevent contamination of water resources	subsurface interflow through the establishment of adequate berms and subsoil drains. • The vent shaft walls should be sealed to minimise interflow and groundwater interception. • Best practice underground pillar safety factors must be applied to ensure that void collapse and subsidence risks are reduced. Total extraction should not occur. The design of the underground pillars will have to have a safety factor that will ensure no collapse of pillars or surface subsidence is anticipated. • Where significant water ingress cannot be prevented, measures should be put in place to intercept ingress water as close as possible to the source in order that it can be pumped out of the mine before its quality can deteriorate through contact with sulphide minerals. • Minimise powerline crossings over wetland areas. • All service roads should follow the existing road network as far as practically possible. • Where new service roads are aligned near wetlands and streams / rivers, a minimum buffer of 30m should be maintained between the	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	• Continuous
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Indirect hydrological and geomorphological impacts: Erosion and/or sedimentation of wetlands due to catchment land clearing and landcover disturbance during construction and site establishment. Reduced water inputs to the wetlands due to surface flow and subsurface interflow interception and diversion				
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Water quality impacts: Pollution of wetlands due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g., oil and diesel leaks and spills, spills and leakages from ablutions.	To limit impacts on wetlands and prevent contamination of water resources			

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Indirect ecological process impacts: Increased alien invasive plant invasion. Noise pollution and vibrations associated with earthworks and the use of heavy machinery. Light pollution associated with camp site and the use of heavy machinery use at night. Reduced ecological connectivity as a result of increased wetland fragmentation and/or expanded / more intense edge impacts.	To limit impacts on wetlands and prevent contamination of water resources	wetland / riparian edge and the edge of the road as far as practically possible. • Where new wetland and stream / river crossings are required, every effort should be made to minimize the impacts by correct culvert implementations, minimising length of crossings, utilising existing crossings where possible. • Implementation and management of suitable stormwater management plan for roads. • If applicable, flight diverters should be installed along entire length of the alignments that cross wetlands and buffer zones. • Tall trees should be planted along the south-western and south-eastern boundary of the mining footprint area to act as a visual screen to Wetland Units S1 and D3 with the intention of reducing impacts to the avifauna that use and inhabit the wetlands. • Demarcation of no-go areas. • Correct storage of hazardous material. • Use of drip trays for servicing vehicle. • Alien invasive plant control implementation. • Minimising noise, dust, and light pollution.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Direct impacts: Accidental direct impacts to wetland vegetation and habitat by heavy machinery during operation activities i.e., repair and maintenance activities. Wetland fauna fatalities.				

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Indirect hydrological and geomorphological impacts: Erosion and/or sedimentation of wetlands due to catchment land clearing and landcover disturbance operation i.e., ongoing stockpile area expansion. Erosion and/or sedimentation of wetlands due to pollution control dam and/or slurry dam failure and/or spill over. Reduced water inputs to the wetlands due to surface flow and subsurface interflow interception and diversion.	To limit impacts on wetlands and prevent contamination of water resources			
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Water quality impacts: Pollution of wetlands due to contaminated runoff and interflow from the dirty water areas and/or mine residue deposits seeping into the surrounding environment. • Pollution of wetlands due to pollution control dams and/or slurry dams' failure and/or spill over. Pollution of wetlands due to leakages from and/or failure of septic tank systems. Contaminants include bacteria, viruses, ammonia, phosphate, sulphate, nitrate, and organic matter that lead to elevated chemical oxygen demand (COD) and biological oxygen demand (BOD) in surface and ground water. Pollution of wetlands due to the leakages and spillages from workshops and hazardous material storage areas. e.g., oil and diesel leaks and spills. Pollution of wetlands due to the	To limit impacts on wetlands and prevent contamination of water resources		NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	mishandling of hazardous substances and/or improper maintenance of machinery during repair and maintenance. e.g., oil and diesel leaks and spills.				
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Indirect ecological process impacts: Increased alien invasive plant invasion. Noise pollution and vibrations associated with earthworks, the use of heavy machinery and blasting. Light pollution associated with camp site and the use of heavy machinery use at night. Reduced ecological connectivity as a result of increased wetland fragmentation and/or expanded / more intense edge impacts.	To limit impacts on wetlands and prevent contamination of water resources		NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and sub	Direct impacts: Accidental direct impacts to wetland vegetation and habitat by heavy machinery during decommissioning.			NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and sub	Indirect hydrological and geomorphological impacts: Erosion and/or sedimentation of wetlands due to catchment land clearing and landcover disturbance during decommissioning.			NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and sub	Water quality impacts: Pollution of wetlands due to the mishandling of hazardous substances and/or improper maintenance of machinery during decommissioning. Pollution of wetlands due to contaminated runoff and interflow from the rehabilitated mine residue deposits seeping into the surrounding environment. • Pollution of wetlands due to pollution control dams and/or slurry dams' failure and/or spill over.	To limit impacts on wetlands and prevent contamination of water resources To limit impacts on		NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines Rehabilitation and closure plan	Continuous
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and sub	Indirect ecological process impacts: increased alien invasive plant invasion. • Noise pollution and vibrations associated with earthworks and heavy machinery. • Light pollution associated with camp site and heavy machinery use at night.				
Underground mining	Indirect hydrological and geomorphological impacts: Reduced water inputs to the wetlands fed by springs due to the drawdown of the weathered aquifer during the dewatering of the underground workings. Erosion and/or sedimentation of wetlands due to dewatering discharges.	To limit impacts on wetlands and prevent contamination of water resources		NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines Rehabilitation and closure plan	Continuous
Underground mining	Indirect ecological process impacts: Noise pollution and vibrations associated with earthworks, the use of heavy machinery, and blasting.				
Decommissioning of underground mining (including post-closure)	Indirect hydrological and geomorphological impacts: Reduced water inputs to the wetlands fed by				

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	lateral subsurface interflow and perched aquifers due to the disruption of interflow soils and perched aquifer lateral movement as a result of land subsidence. Erosion and/or sedimentation of wetlands as a result of mine decant discharges once the water levels are reinstated.				
Decommissioning of underground mining (including post-closure)	Indirect hydrological and geomorphological impacts: Reduced water inputs to the wetlands fed by lateral subsurface interflow and perched aquifers due to the disruption of interflow soils and perched aquifer lateral movement as a result of land subsidence. Erosion and/or sedimentation of wetlands as a result of mine decant discharges once the water levels are reinstated.	To limit impacts on wetlands and prevent contamination of water resources	• All vent shafts must be protected from the ingress and interception of surface runoff and subsurface interflow through the establishment of adequate berms and subsoil drains. • The vent shaft walls should be sealed to minimise interflow and groundwater interception. • Best practice underground pillar safety factors must be applied to ensure that void collapse and subsidence risks are reduced. Total extraction should not occur. The design of the underground pillars will have to have a safety factor that will ensure no collapse of pillars or surface subsidence is anticipated. • Where significant water ingress cannot be prevented, measures should be put in place to intercept ingress water as close as possible to the source in order that it can be pumped out of the mine before its quality can deteriorate through contact with sulphide minerals.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	• Continuous
Decommissioning of underground mining (including post-closure)	Water quality impacts: Wetland pollution due to mine decant water once the water levels are reinstated. Sulphate is normally a significant solute in drainage from mines.			NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	• Continuous until closure certificate is issued
Agriculture, Soil and Land Capability					

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Soil Erosion: Vegetation will be removed from all areas where infrastructure will be constructed. This includes the office and ablution areas, discard dump and slurry dams as well as haul roads and parking areas. This will expose the soil surfaces to soil erosion. Both wind and water erosion are a risk and once the soil surface is exposed, the intensity of single rainstorm may result in soil particles being transported away.	To avoid the onset of soil erosion that can spread into other areas	• Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint. • Unnecessary land clearance must be avoided. • All topsoil removed from its in-situ position during vegetation clearance and excavation of adit, must be stored on topsoil stockpiles. • Trucks, equipment, and other vehicles must park on designated parking areas and not create additional areas at risk of soil erosion by parking outside of the demarcated areas. • Where possible, conduct the construction activities outside of the rainy season.	• CARA	• Continuous
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Soil Compaction: All areas where vehicles and equipment will traverse during the construction phase to deliver materials, prepare the terrain, and construct the infrastructure be at risk of soil compaction. Several areas such as the haul roads, dump areas, slurry dam and product stockpile areas will be deliberately compacted during the construction phase to stabilise the surface following engineering specifications. Similarly, trucks and vehicles traversing the haul roads between the different infrastructure components, will increase the existing compaction. During the decommissioning phase, the movement of vehicles and equipment will again result in soil compaction	To limit compaction of soil.	• Vehicles and equipment must travel within demarcated areas and not outside of the construction footprint. • Materials must be delivered to a designated laydown area. • Revise infrastructure layout to reduce the space between infrastructure components and minimise the length of haul roads required. • Develop a designated parking area for coal trucks that will be queuing to collect coal in order to avoid trucks parking in nearby agricultural areas; and • Use deep ripper equipment during the decommissioning and rehabilitation phase to alleviate deep compaction as effectively as possible.	Principles of CARA Rehabilitation and Closure Plan	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Soil Pollution: During the construction phase, oil and fuel spills and leaks from construction vehicles and equipment as well as waste generation on site, can result in soil pollution. The mixing of concrete on site can also be a source of soil pollution. During the operational phase, dust suppression of haul roads will increase the pollutant load of soil at and around the haul roads. Any spills from the slurry dam and rainwater seepage and runoff from the product stockpile, can cause soil pollution. During the decommissioning phase, the preparation of the site and the materials that are decommissioned will be additional source of soil pollution and the preparation of the site, may result in pollution.	To avoid soil pollution that can harm the surrounding environment and human health.	• Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills. • Any waste generated during construction, must be stored into designated containers, and removed from the site by the construction teams. • Any left-over construction materials must be removed from site. • Soil pollution monitoring must be conducted bi-annually around all possible sources of soil contamination on site such as the stockpiles, discard dump and along the haul roads.	CARA Hazardous Substances Act NWA NEMA Duty of Care NEMWA Incident Reporting	• Continuous
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Loss of soil quality: The stripping and stockpiling of topsoil prior to construction of infrastructure, will disturb the in-situ profiles drastically. Even though care might be taken to strip topsoil effectively from the underlying material, soil stockpiles will become a soil mixture with altered properties. Soil porosity and water-holding capacity will be affected, and the lengthy storage of topsoil (for the life of mine of 27 years) will destroy the soil microbiology and the nutrient cycles it maintains. This impact will remain unchanged during the operational phase. During the rehabilitation phase, topsoil will be used to cover areas where vegetation needs to re-establish. The soil that	To limit impacts on soil quality.	• Vehicles and equipment must travel within demarcated areas and not outside of the construction footprint. • Materials must be delivered to a designated laydown area. • Revise infrastructure layout to reduce the space between infrastructure components and minimise the length of haul roads required. • Develop a designated parking area for coal trucks that will be queuing to collect coal in order to avoid trucks parking in nearby agricultural areas; and • Use deep ripper equipment during the decommissioning and rehabilitation phase to alleviate deep compaction as effectively as possible.	CARA	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	might develop there will have different physical and chemical properties and will also be highly compacted				
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Loss of food production: Once the mining commences, the surface footprint of the mining area will be fenced off and the areas currently used for production of grain crops (soybean and maize), will be lost from agricultural production. Since crop rotation is practiced, the annual losses in the best-case scenario (see Section 12.3) will be 428.3 tonnes/year soybean or 1208.7 tonnes/year maize, depending on what is cultivated that year. Similarly, the forage available for livestock farming will be reduced, thereby reducing the number of weaners produced by 37 animals per year.	To limit impacts on agricultural activities.	• Revise infrastructure layout to reduce the areas where crop fields will impact on by the surface infrastructure.	CARA	• Continuous
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Fragmentation of agricultural land in a Priority B Protected Agricultural Area: Once the mining commences, the surface footprint of the mining area will be fenced off. The development footprint boundaries will impact on high potential agricultural soil with high crop yield potential as well as grazing veld with good grazing capacity. The change of the land use from agriculture to mining will fragment the Central Mpumalanga Protected Agricultural Area that was gazetted through CARA in 2021	To reduce areas used for construction of infrastructure.	• Revise infrastructure layout to reduce the areas where crop fields will impact on by the surface infrastructure. • Consider moving the surface infrastructure outside of the Central Mpumalanga Protected Agricultural Area.	CARA	• Continuous
Underground mining	Reduction of drinking water available for livestock grazing	To limit the impact of the mining on the groundwater	• Monitor the quantity and quality of livestock drinking water on the farms affected by the underground mining. Any decline in quality must immediately be addressed by the measures stipulated in the Groundwater Management Plan.	DWS best Practice Principles Water Use Licence CARA	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Topography and Geology					
Underground mining	Subsidence of surface due to failure of pillars	To ensure that subsidence does not occur.	Ensure the underground mining implements the correct mining methods and leaves sufficient pillars.	Closure and Rehabilitation Plan Original topography and landform serve as a reference for rehabilitation	Continuous until closure certificate has been received
Terrestrial Ecology					
Construction activities (office, workshop, haul roads, slurry damps, discard dump)	The proposed northern mining infrastructure site has sections which are slightly/moderately degraded, and habitat has been transformed to an extent due to farming activities in the area. However, the onset of additional activities might result in impacts to the natural environment due to increased movement, traffic, and large machinery to the area. Heavy machinery and vehicles might result in compaction of the soil and destruction of vegetation habitat which in turn will also impact on the animals that use the area as habitat	Early detection of impacts and remediation thereof.	• Demarcate specific areas to be developed and remain clear of other areas where activities are not necessary. • Adhere to all management and mitigation measures as prescribed within other specialist reports and the Environmental Management Programme (EMPr). • To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed, or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees. • Continuous rehabilitation of the area should occur, immediate closure and rehabilitation. This	NEMBA, TOPS Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011) IUCN Red List of Threatened Species South African Red List of Species	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump)	Mining related activities may lead to the loss of faunal and floral species of conservation concern within the northern mining infrastructure area. Avifaunal red listed species was confirmed during the field assessment within the vicinity of the northern development area. In the desktop floral assessment, three (3) species listed by POSA for the area are classified as species of conservation concern (SCC), one (1) of which may potentially occur on the northern project footprint. Also, during the field assessment, the MNCA protected species, Cyrtanthus tuckii (Pempempie), was confirmed to occur on areas outside the northern development footprint (but within the Mining Right applied for) and could potentially spread to occur within the footprint site as well before mining commences. Species (both floral and faunal) are not static entities and work in terms of movement within and between suitable habitat types and by means of range requirements, migration, and dispersal. Mining of the northern section (where the infrastructure is proposed) and related activities could still impact on the sensitive habitats, such as riparian and wetland areas, situated around the northern mining footprint, although these will not be developed directly.		will entail the spreading of topsoil, revegetation, and management of invasive species. • All footprint areas should remain as small as possible. This can be achieved by fencing infrastructure areas to contain all activities within designated areas. • Implement the prescribed buffers around water resources and wetlands as delineated by the specialists. • A site walkover on the infrastructure area should be undertaken by a suitably qualified specialist or ECO prior to the start of construction. If any SCC are encountered or found within the infrastructure footprint in the future, the following should be ensured: o If any threatened species will be disturbed, ensure effective relocation of individuals to suitable offset areas or within designated open space on the subject property. o All rescue and relocation plans should be overseen by a suitably qualified specialist. o Obtain relevant permits/consent, if applicable, for each protected or endangered floral species identified within the proposed development area that will be destroyed. o Human and vehicle movement should be restricted from taking place in sensitive habitats. Areas to be fenced if necessary. • Implement an Alien and Invasive Management Programme, which will aim to remove and manage the plants recorded during the field survey, since most of these species are already listed on the Alien and Invasive Species list as	NEMBA Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) TOPS Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011) IUCN Red List of Threatened Species South African Red List of Species	

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump)	Construction and operational impacts may lead to the further increase of invasive species from the surrounding areas and may change the vegetation structure and composition found at the proposed northern mining infrastructure site. It may also result in the spread of the invaders already found on-site to surrounding natural areas	Early detection of impacts and remediation thereof.	published in 2016 (Department of Environmental Affairs, 2016). • Ensure awareness amongst all staff, contractors, and visitors to site to not needlessly damage flora. • To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed, or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees. • Demarcate specific areas to be developed and remain clear of other areas where activities are not necessary. • Adhere to all management and mitigation measures as prescribed within the wetland specialist report. • The wetlands or associated buffer should be sufficient to protect ecological functioning of the area. • Keep spill kits and hazmat prevention kits on-site to remediate any spill immediately before reaching the natural environment. • Adherence to the WUL, as well as monitoring as prescribed. • Ensure proper stormwater management and maintenance of this system. Stormwater management will prevent impacts reaching the natural environment.	NEMBA Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)	
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump)	Impacts on the aquatic ecology and species dependant on habitats associated with water resources and wetlands (located in close proximity to the northern mining surface infrastructure, although these are not to be developed). This may be due to pollutants directly or indirectly entering the water resource, during construction or during operational phase from sources associated with the mine.			NEMBA TOPS Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011) IUCN Red List of Threatened Species South African Red List of Species	

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Decommissioning of infrastructure	Rehabilitation could be ineffective if measures are not appropriately complied to (revegetation and monitoring until self-sustaining). The possibility of subsidence for underground mining should be managed and stability of pillars ensured, and a stability report had been completed to assess this risk by the client. Although not expected, if subsidence ever occurs, it should be rehabilitated properly to prevent impacts to faunal species that might fall into these depressions, leading to serious injury, entrapment, and death. Without mitigation the alien invasive species will increase and result in a degraded veld condition making the property less viable for post-closure land use activities such as wilderness, grazing and agriculture.	Early detection of impacts and remediation thereof.	• A management plan for control of invasive/exotic plant species needs to be implemented for all footprint and surrounding areas. This will be ongoing until the end of the mining closure phase. • Rehabilitation plans of surface infrastructure (which impacted on ecology) should be planned long before the closure phase is due. Continuous rehabilitation should also take place during the operational phase. • This includes the process of replanting the vegetation. Rehabilitation plans should be compiled with the use of a specialist and the correct seeding techniques and mixtures should be applied. • Close monitoring of plant communities to ensure that ecology is restored and self-sustaining. The monitoring of the flora should be conducted annually by the environmental practitioner, until a suitably qualified specialist deems the monitoring to no longer be necessary.	NEMBA Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) TOPS Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011) IUCN Red List of Threatened Species South African Red List of Species	• Continuous until closure certificate is issued
Blasting and Vibration					
Blasting for north adit	Blasting may result in ground vibrations which could impacts on various farm buildings, boreholes, graveyards, and ruins	To prevent impacts on people and animals and to avoid damage to structures. .	• Air blast and fly rock can be controlled using proper charging methodology irrespective of the blast hole diameter and patterns used. The only way to mitigate air blast is the design of the stemming length and stemming material. This will require changed blast design to ensure energy levels remain as expected but with increased stemming lengths and the use of proper stemming material. The used of a crushed product with size	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	• As needed

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Blasting for north adit	Blasting may result in air blast which could negatively impact on farmsteads, buildings, farm buildings and boreholes		of 10 % of the blasthole diameter is the recommended material. • Do blast design that considers the actual blasting, and the ground vibration levels to be adhered too. • Change the initiating system to facilitate less blast holes detonating simultaneously making using of electronic initiation that allow for single hole firing. The single blast hole charge mass showed no concerns. • Do design for smaller diameter blast holes that will use less explosives per blasthole.	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	As needed
Blasting for north adit	Blasting may result in fly rock which could negatively impact on farmsteads, buildings, farm buildings and boreholes			Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	As needed
Traffic					
Use of roads for transporting material for construction of infrastructure, coal product, workers during construction, operational and decommissioning and closure	Additional traffic on road network	To limit the impacts on traffic.	• Road D622: The section between the N11 and the mine access (approximately 1.2km long) should be surfaced.	National Road Traffic Act OHSA MHSA	• Continuous
Air Quality					
Site Clearing, removal of topsoil and vegetation	A number of operations take place such as land clearing, topsoil removal, loading of material, hauling, grading, stockpiling, bulldozing and compaction. Initially, topsoil and subsoil will be removed with large scrapers. The topsoil will be stockpiled for	To decrease air quality as a result of the project.	• Air quality monitoring be established to get a baseline condition prior to the onset of the operations and in order to establish the level at which the proposed operations are noted to impact on the ambient air quality. • Fallout monitoring should be continued for the life of mine to better assess the level of nuisance	NEMAQA Dust regulations	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	rehabilitation in the infrastructure area. It is anticipated that each of the above-mentioned operations will have its own duration and potential for dust generation. Fugitive dust (containing TSP (total suspended particulate, will give rise to nuisance impacts as fallout dust), as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns giving rise to health impacts)) It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity, the specific operations, and the prevailing meteorological conditions. This activity will be short-term and localised, seizing after construction activities. Material will be removed by using a bulldozer and then storing this material separately for use during rehabilitation at end of life of mine when the operation cease. These construction sites are ideal for dust suppression measures as land disturbance from clearing and excavation generates a large amount of soil disturbance and open space for wind to pick up dust particles and deposit it elsewhere (wind erosion). Issues with dust can also arise during the transportation of the extracted material, usually by truck and shovel methods, to the stockpiles. The dust can further be created by the entrainment from the vehicle itself or due to dust blown from the back of the bin of the trucks during transportation of		dust associated with both mining and process related operations. Sampling of fallout should be undertaken within the neighbouring areas as well as on-site. • If it is found that dust and PM10 levels are measured to be exceeding limits, a Real-Time indicative monitoring network should be implemented to quantitatively help identify the sources and to assist in the management of the mitigation of these sources. • Dust suppression must be implemented for all roads, stockpile and at the plant area. • Topsoil stockpile should be vegetated		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	material to and from stockpiles.				
Construction of surface infrastructure (e.g., access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, drilling blasting and development of adit for mining, etc.)	The construction of infrastructure. This will include, access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, blasting and development of the decline for mining, etc. Activities of vehicles on access roads, levelling and compacting of surfaces, as well localised drilling and blasting will have implications on ambient air quality. The above-mentioned activities will result in fugitive dust emissions containing TSP (total suspended particulate, giving rise to nuisance impacts as fallout dust). Underground mining will commence with the stripping of the vegetation for the initial shaft development. The construction of roads take place through removing the topsoil and then grading the exposed surface in order to achieve a smooth finish for vehicles to move on. Temporary stockpiles will be created close to the edge of the road in order to be backfilled easily once the road has expired or need to be rehabilitated				
General transportation, hauling and vehicle movement on site	Transportation of the workers and materials in and out of mine site will be a constant feature during the construction phase. This will however result in the production of fugitive dust (containing TSP, as well as PM10 and PM2.5) due to suspension of friable materials from earth roads. It is anticipated this activity will be short-			NEMAQA Dust regulations	Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	term and localised and will seize once the construction activities are finalised. Haul trucks generate the majority of dust emissions from surface operations. Observations of dust emissions from haul trucks show that if the dust emissions are uncontrolled, they can be a safety hazard by impairing the operator's visibility. Substantial secondary emissions may be emitted from material moved out from the site during grading and deposited adjacent to roads. Passing traffic can thus loosen and re-suspend the deposited material again into the air. In order to minimize these impacts the stockpiles should be vegetated for the duration that it is exposed.				
Use and maintenance of the access road. Dust from material handling and wind erosion from stockpiles.	Use and maintenance of the access road. Dust from material handling and wind erosion from stockpiles may result in increased fugitive emission sources and may impact on the ambient air quality specifically an increase in daily PM10 concentrations and TSP concentrations			Road Traffic Act NEMAQA Dust regulations	Continuous
Demolition & Removal of all infrastructure (incl. transportation off site) and	Demolition of buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply, removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric				

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting, and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions. The impacts will be short-term and localised. Any implication or implications this phase will have on ambient air quality will seize once the activities are finalised.				
Rehabilitation (spreading of soil, revegetation & profiling/contouring	During this activity, there is the reshaping and restructuring of the landscape. Since this is an underground operation mainly, the area to be reconstructed will be limited to the decline shafts and discard dump. Topsoil can be imported to reconstruct the soil structure. There is less transfer of soil from one area to other therefore negligible chances of dust through wind erosion. Profiling of dumps to enhance vegetation cover and reduce wind erosion from such surfaces post mining.			NEMAQA Dust regulations	• Continuous until Closure Certificate is received
Noise					
Construction of surface infrastructure (e.g., access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, drilling blasting and development of adit for mining, etc.)	Equipment and vehicles used for construction of infrastructure will result in increased noise levels.	To limit the nuisance of noise pollution.	• Construction crew must conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise. Should a noisy construction activity occur off the project footprint and near a receptor, the Environmental Coordinator should inform the receptor prior to the activity. Should noisy night-	ECA noise regulations SANS 10103 OHSA MHSA	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			time activity occur (after 9pm, e.g., concrete pouring) the Environmental Coordinator should make receptors aware of the activity prior to the occurrence. • The construction team should make use of equipment that has lower SPL or is designed to produce lower SPL (heavy equipment operating within 300m of a receptor).	Blasting Regulations Vibration management plan Noise Management Plan ECA noise regulations	
Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of workshop and office.	Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of workshop and office will all increase noise level in the project area.		• The developer must implement acoustical mitigation regarding any external mounted ventilation stacks/exhaust stacks or fans (should a proposed underground ventilation be within 2,000m of a receptor). The reason why these stacks are so important for further mitigation consideration is that: • Ventilation/exhaust stacks are externally mounted (i.e., their exit port is open and not covered within a building). • Stacks are mounted high up and can have a direct line of sight to receptors within a free field environment. • Aerodynamic noises are usually constant and have a higher low frequency content to them. Low frequency has the potential to travel further and "over" barriers easier than higher frequencies. • Stacks (depending on design) has the potential to be amplified. • Loud noise sources have the potential to curve downwards back towards a receptor. Even stacks pointing upwards can refract back to a receptor. • An acoustical consultant/specialist or engineer can be consulted on mitigation. The following could be considered: • Sonic lining - Sonic Liner reduces the sound transmission along the vent duct. • Sound maze – Constructed with sonic lining or absorption foam.		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			• Silencers / sound attenuator, duct silencer, sound trap, muffler - Noise can be redirected or lowered by means of above-mentioned designs. • Design - Blow downs can expel gases or vapours that could cause impulsive events. Should this be the case, a specialist engineer should be considered to assess minimising the noise. • A berm/barrier is required on the plant footprint near receptor R2 and R4. The following berm/stockpile specifications should be noted: • The berms should be solid (aggregate, brick etc. no foliage e.g., trees). • The height should be a minimum of two (2) meters higher than the highest noise source from the noise area to the receptors visual. • The berm should be fully enclosed the crushing area. • Where feasible noisy equipment should be enclosed. These enclosures could be double brick building units, concrete or steel. Units that are enclosed should have minimal apertures (openings) facing receptors (receptors R2 and R4). The building should have a roof enclosure as well. Equipment that should be considered for some enclosures are the crushers, screening plant, screen and feed conveyor area, emergency loading hopper (if feasible). • Where feasible, noisy equipment and areas (crushing, screening and specifically tipping points and conveyor feeds) should not be raised at high elevations. The noisy equipment and areas should be considered as low as possible for acoustical berms and surrounding buildings/stockpiles to act as noise shields. • Should the project operations require alarms (e.g., when an operation ceases), an acoustical consultant/engineer should be consulted to ensure minimal alarm noise direction into the direction of receptors (north-west direction).		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			Although these alarms are exempt from this acoustical assessment (see above point) these alarms (should they go off frequently) have a potential to cause a noise nuisance should it be measurable/audible at receptors. • It is highly recommended that the Environmental Co-ordinator keep continuous communication with regarding noises and potential loud noise events (a potential situation whereby some noisy activity will commence near a receptor for some unforeseen circumstance). Prior knowledge of a noise event will be far more ideal than a receptor been unaware of a loud noise circumstance. Various communication tools are available for consideration, the platform of choice up to the developer to consider. • A contact line should be made available to receptors should a valid noise complaint arise whereby receptors could lodge a complaint (and documented). • If the project proposes to extend or expand on local municipality routes, a noise assessment should be conducted (GN R154 legislation requirement). Expansion or extend refers to a municipal road that the project engineers require to add an extra lane or change the specifications of the road paving. • The project should consider reverse alarms that do not generate a high noise nuisance due to its tonality. • Onsite noise measurements should be considered on a frequent basis, to help identify any fault or loud equipment that may require enclosures or maintenance.		
Demolishing of surface infrastructure	Equipment and vehicles used for demolishing and rehabilitation of infrastructure will result in increased noise levels.		• The demolition crew must conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise. Should a noisy construction activity occur off the project footprint and near a receptor, the Environmental Coordinator should inform the	ECA noise regulations SANS 10103	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			receptor prior to the activity. Should noisy night-time activity occur (after 9pm, e.g., concrete pouring) the Environmental Coordinator should make receptors aware of the activity prior to the occurrence. • The team should make use of equipment that has lower SPL or is designed to produce lower SPL (heavy equipment operating within 300m of a receptor).	OHSA MHSA	
Visual					
Construction of surface infrastructure (e.g., access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, drilling blasting and development of adit for mining, etc.)	Construction of surface infrastructure on surrounding receptors	To limit the visual impact of the project on the surrounding areas.	• Reduce the construction period through careful planning and productive implementation of resources. Clearly define areas to be cleared. Do not clear past designated areas. Retain natural vegetation outside of clearance zone. • Plan the placement of lay-down areas and any potential temporary construction camps to minimise vegetation clearing. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way. Use material with colours that will visually blend with the natural environment. Screen the whole construction site via fence cover. • Reduce and control construction dust using approved dust suppression techniques. Implement daily dust suppression and pave roads where possible to avoid transport related dust pollution. • Restrict construction activities to daylight hours to negate, or reduce, the visual impacts associated with lighting. Direct light downwards to avoid illumination to the sky. Use motion light sensor to avoid lighting unused places.	Security specifications Rehabilitation and Closure Plan Final land use objectives	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of workshop and office.	Operational phase including the use of the various stockpiles, the plant operational activities the movement of vehicles, use of workshop and office will all increase visual level in the project area.		• Planning mining areas in accordance with the topography to limit visual impact on surrounding residential communities. • Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way. Use material with colours that will visually blend with the natural environment. • Vegetate and maintain stockpiles to the recommended minimum height. Revegetate soon after stockpiling to avoid erosion and a drainage pattern forming on the stockpile. • Rehabilitation of disturbed areas and re-establishment of vegetation. • Restrict mining activities to daylight hours to negate or reduce the visual impacts associated with lighting. Keep lighting to minimum. Direct light downwards to avoid illumination to the sky. Use motion light sensor to avoid lighting unused places. • Planting / avoid removal of indigenous trees to create a visual barrier for the surrounding residential areas. • Backfill and reshape with a surveyor. Reshape to create a gentle slope of free-draining topography. • Dust suppression measures must be implemented on roads and in stockpile areas to prevent excessive dust. • Blasting must be done under controlled conditions (i.e., Windy days must be avoided) and must be done in such a way that dust is minimised. • Blasting should not take place before 08:00 and after 16:00.		
Heritage					

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Construction of surface infrastructure (e.g., access and haul roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, blasting and development of adit for mining, etc.)	Construction surface infrastructure may result in potential damage to subsurface culturally significant material	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements. Apply for Section 38 Permit for Graves identified, Conduct Risk Assessment in terms of MHSA, Section 17.7(a)	• Site B51 and the associated 'sensitive' area are considered potentially significant from a heritage perspective as this area is associated with structures and buildings dating to historical times. Even though surface structures are no longer present, subsurface cultural material might exist and care should therefore be exercised during construction and mining phases. Should culturally significant material be unearthed during these processes, it is advised that a qualified archaeologist be contacted. • Site B52 falls within the boundary of the proposed underground section and consists of intact buildings/ structures. It is therefore recommended that the mine's ECO inspect these buildings/structures on a quarterly basis, as well as pre- and post-blasting. Should any impact be observed, or if impact cannot be avoided, all buildings and structures associated with the demarcated area must be adequately recorded by a qualified archaeologist and destruction permits be obtained from the relevant heritage authority. • Sites B49 and B72 fall within the boundary of the proposed underground section and consist of building ruins. No further action is required as the recording done during this study is regarded as sufficient. • Ensuring the implementation of buffers around heritage features. • The above recommendations are based on the specific project activities, as well as surface and underground mining boundaries as indicated in this report. Should the proposed development expand to any area outside of the proposed surface or underground boundaries, a qualified archaeologist must revise the recommendations made in this report to ensure the safeguarding of heritage sites. Also, should the proposed surface impact areas be changed, a qualified	NEMA MPRDA NHRA SAHRA permitting requirements	• As needed
Construction and operation of surface infrastructure (e.g., access and haul roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, blasting and development of adit for mining, etc.) and underground mining	Potential damage to subsurface cultural remains and cemetery may occur during construction of surface infrastructure and underground mining				
Underground mining	Underground mining may result in subsidence which could damage heritage buildings, structures and cemeteries intersecting the area demarcated for underground mining				

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			archaeologist must conduct a pedestrian survey on the new area and amend the report accordingly. • As archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the development and construction phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended, and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).		
Socio Economic					
Construction of infrastructure	<u>Positive Impacts</u>: Impacts on local employment (limited); Impacts on existing and new HDSA suppliers, SMMEs and other small businesses due to local procurement of goods and services; and Economic spin-offs as a result of salaries and wages, contractors that reside in local B&B's and guesthouses; positive impacts for local merchants and grocery stores as a result of higher spending power; and a possible increase in informal traders.	To enhance local economic impacts during the construction phase	• Define the "mine/host community" clearly prior to the tender processes commencing. It is usually best practice to identify the local study area and affected communities (Ward 3) first for direct benefits (employment, SLP Projects, etc.) and then to gradually allow economic benefits of the Project to ripple to the wider STLM area. • Appoint a Community Liaison Officer ("CLO") for the duration of the construction phase. The person should be accustomed to local customs and speak the local languages. • Establish an Environmental Management Forum ("EMF") or similar structure prior to construction commencing, represented by the mining company, community groupings (i.e., Youth, Land, Women and so forth), the Ward Councillor and the STLM LED Department, that makes the targets of procurement and employment clear to the	Social Labour Plan Labour Act Basic Conditions of Employment Act	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			local communities and promotes transparency. • Use the Municipality's database of existing SMMEs, if the need arises. Make the requirements (skills, procurement opportunities, women, and Youth minimum thresholds and so forth) available to the EMF and STLM LED Unit in advance, (e.g., four (4) months prior to construction commencing) to ensure that locals are trained and prepared to tender. • Maximise the local content of the construction phase by using local labour, local contractors, SMMEs and local service providers, wherever possible, and make this compulsory for the main contractor by including minimum thresholds in the CSMP. • As part of the tender documents the Contractor has to provide subcontracting values per package and the plan on how he will meet BEE procurement and SMMEs targets assigned, as defined in the social management plan that he submits as part of his tender documents. • Once appointed, monitor the social performance of contractors, and determine how contractors fair on each key performance area ("KPI"). • Implement requirements of the CSMP for the duration of the construction period. Implement relevant measures should the contractors not comply (impose penalties, termination where necessary, review of future prospective work and so forth). • Cost of remedial work associated with the social incident is borne by the contractor. • Implement training for HDSA small businesses (where possible) and make it compulsory for suppliers to form		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			partnerships with HDSAs and local SMMEs to provide mentorship and ensure skills transfer.		
Construction and operation of surface infrastructure and underground mine	Positive: Skills development and training is that it increases the employability of a region's workforce, resulting in enhanced economic opportunities and thus addressing poverty alleviation over the medium to long term		• Clearly define the study area and beneficiary communities who would benefit directly through employment and equity. • Require larger contractors to work with small SMMEs to train and transfer skills and include this requirement in the CSMP. Require contractors to issue SMME's and workers with certificates / references that can be used for future recruitment. • If feasible, implement a SMME skills development programme to train and educate SMMEs and other small vendors how to tender, understanding contracts, basic business skills and so forth, prior to the tender processes commencing. • Formulate an Employment Equity Plan and implemented wherever possible. • As part of the tender documents, the contractor/s have to provide subcontracting values per package and the plan on how they will meet procurement of minority groups (women, youth, disabled) and SMMEs targets assigned.	Social Labour Plan Labour Act Basic Conditions of Employment Act	• Continuous
Construction of infrastructure	Influx of jobseekers and the impact of temporary construction workers		• Take care not to create unrealistic job expectations and communicate details of the construction period to the STLM through the EMC and Future Forum. • Ensure that the CSMP reflects targets with regards to local SMMEs and local employment. Implement the guidelines of the CSMP for the duration of the construction period.	Social Labour Plan Commitments Health and Safety Plan ESMS MHSA OHSA	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			• Each contractor is required to submit its own accommodation and transport plan. • Apart from security personnel, no workers/contractors to be housed on site. • No recruitment of temporary workers at the entrance of the construction site or Project Area. • Establish an Influx Management Committee that operates for the duration of the Project.	Code of Conduct	
Construction of infrastructure	Impacts on families and individuals due to increased traffic, higher security risks and intrusion risks	To enhance local economic impacts during the construction phase	Awareness and communications: • Announce road disruptions such as road closures (if any) by using the local media, road sign boards and other Municipal structures. • The mine to consult with surrounding communities/landowners whose private residences, crops and other infrastructure could be affected by dust, noise and other impacts that result from traffic movement and construction activities. Provide a schedule of the construction activities to landowners and relevant I&APs. • Erect signboards indicating accesses to the construction site. • Display a contact number on the construction vehicles where motorists can report reckless driving. • Keep the local SAPS, and other emergency services and the Ward Councillor informed about the construction progress and timelines. • Consider circulating summaries of monitoring results (dust, ambient noise levels, etc.) to the local Councillor and landowners, especially those that raised complaints. • Agree on a procedure to notify the municipality and emergency services, so that immediate and	Social Labour Plan Commitments Health and Safety Plan ESMS MHSA OHSA Code of Conduct	Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			appropriate measures can be put in place to rectify any problems. Road safety and security measures: • Impose penalties for reckless drivers to enforce compliance to traffic rules. • Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and un-roadworthy vehicles that could lead to accidents. • Erect signboards at the access road that leads off the N11 to warn motorists of slow-turning construction vehicles. • Communicate with the STLM with regards to potholes and possible repairs to the road surfaces that might be required and repair access roads that have been damaged as a result of construction vehicles. Safety and security: • Fence off the development footprint of the construction site prior to the commencement of site-clearing and other construction activities. • Limit all activities to the development footprint of the proposed construction site. • Provide workers with identity tags and instate strict security measures at the access points to discourage unauthorised people entering the construction site. • Workers should not be allowed to remain in the construction area when they are off duty. • Implement safety and security measures, such as fencing, 24-hour security guards, CCTV cameras, random security checks and access control. • Join any local security organisation (such as Buurtwag) and participate in their initiatives. Intrusion impacts: • Ensure that all construction machinery has the required silencers, if required.		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			• Dust alleviation methods: Vehicles carrying dusty materials should be securely covered before leaving the site; water gravel, dirt, and roads regularly; temporarily cover earthworks if possible and minimize drop heights; monitor the dust fall out concentrations; etc. • Implement all mitigation measures as proposed in the respective Specialist Reports: Visual, Air Quality and Noise Impact Assessments.		
Construction of infrastructure	Impacts on surface infrastructure and services due to damage to road surfaces and service disruption		• Upgrade access roads prior to the construction period commencing and maintain the roads during the length of the construction period. Once construction is finalised, ensure that damaged road surfaces have been repaired. • Inform surrounding landowners and other affected parties in advance of possible service interruptions and restore the service as soon as possible. • Establish a protocol for landowners and other affected parties to raise complaints: make a complaints' register available at the entrance to the construction site; make the contact details of the main contractor, CLO, and Ward Councillor available; address complaints speedily.	Health and Safety Plan ESMS MHSA OHSA Code of Conduct Constitution of South Africa SLP Commitments	• Continuous
Construction of infrastructure	Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers that could manifesting in the following ways: Construction related accidents due to structural safety of project infrastructure; Dust generation and air pollution causing respiratory diseases; High ambient noise levels caused by machinery and construction equipment, resulting in loss of hearing; Dehydration, sunburn and related issues due to unsafe and insufficient	To address health and safety impacts	• Health and safety measures to protect workers and the broader community: • Construction workers to wear protective clothing (e.g., masks that minimize dust inhalation and clothing that protects against sunburn) and earplugs. • Lock away dangerous plant, equipment and material when not supervised or in use. • Provide safe and clean drinking water and instil regular water breaks to keep workers hydrated. • Provide sufficient ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly.	Health and Safety Plan ESMS Code of Conduct OHSA MHSA Constitution of South Africa SLP Commitments	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	drinking water and high temperatures during summer months; and Possible increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services (should contractors and/or workers from outside the local/regional study areas be used).		• Keep the local police, emergency and ambulance services informed of construction times and progress. • Ensure that emergency vehicles / ambulance is on stand-by for the duration of the construction period. • Erect a safety fence around the entire construction site to prevent illegal trespassing of humans and livestock. • Display “danger” warning signs and “no public access” signs at all potential accesses, paths and along the periphery of the construction areas in English and the local languages. • Ensure good visibility at the accesses to the site. • Adhere to the Emergency and Safety plan procedures for the duration of the construction phase. • Implement all mitigation measures as proposed in Section **Error! Reference source not found.** (Mitigation and management to address individual and family level impacts) and as proposed in the Specialist Noise, Air Pollution and Geohydrological Assessment Reports to address potential community health and safety impacts. Environmental health and safety measures: • Implement measures to suppress dust, such as spraying water on gravel roads, surfaces, and stockpiles on a regular basis. • Dispose of the various types of waste generated in the appropriate manner at licensed waste landfill sites at regular intervals. • Store any materials away from sensitive locations in fenced-off areas. • Accommodation and facilities of security guards and any other personnel that may stay on site should comply with health and safety standards.		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			• Inform the Municipality and emergency services if harmful substances are spilled. • Designate a suitable area for cooking fires (if required).		
Operation of mine and surface infrastructure	Positive: The Birmingham Mining Project MWP (2020) indicates that the project will have a workforce of about 167 people. A marginal impact on the local economy as a result of new employment is anticipated.	To enhance the positive impacts on the local economy during the operational phase	• The number of job opportunities could be enhanced through the implementation of more labour- intensive techniques. However, this should be measured against the advantages gained through the employment of higher skilled personnel, improved training, and higher salaries. • Develop and implement a strategy of recruiting from the local communities (Ward 3 and gradually extend the labour sending area to the wider STLM, district and province) and develop recruits guided by the career progression path and skills development programmes, to ensure a skilled and competent workforce. This strategy will strive to maximise the number of locals sourced for employment, SMME development, local procurement, and local supporting industries in order to increase the overall significance of the positive economic impacts. • Specifically provide opportunities for workers from disadvantaged backgrounds and target local communities for economic, social, and educational development. Work with the ward Councillor and LED Unit in this regard.	Social Labour Plan Labour Act • Basic Conditions of Employment Act	• Continuous
Operation of mine and surface infrastructure	Positive: The Birmingham Mining Project will prioritise the sourcing capital goods, services, and consumables from HDSA empowered companies and already implements an enterprise development programme with the aim to find opportunities for HDSAs in the core of the business in line with the criteria and standards set by Mining Charter (2018). This practise will continue for the duration of the project's operation.	To enhance the positive impacts on the local economy during the operational phase			

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation

			• Ensure that the CSMP reflects these recruitment targets, implement the guidelines of the CSMP for the duration of the operational period and impose penalties upon the contractors where required.
			• Supply a Value Chain Analysis and needs requirement to the STLM so that they can assist in preparing the Youth, women, and entrepreneurs. Assist the SMMEs and other small businesses with training, equipment and other "gaps" identified during the needs assessment.
			• Draw up a Preferential Procurement Policy/Plan to encourage a fair, transparent, and compliant environment at all levels of procurement:
			  • Identify and record the level of procurement from HDSA companies on a quarterly basis, as well as geographical sources of procurement.
			  • Encourage all suppliers to form partnerships with HDSA companies, without overlooking the necessary requirements of the tender process; and
			  • Where necessary and feasible, provide mentoring and capacity building assistance to HDSA suppliers.
			  • Provide feedback to the communities and the STLM when tenders have been awarded to ensure transparency throughout the process.		

Operation of mine and surface infrastructure	The mine may result in potential job losses in the agricultural sector, loss in access to livelihoods, and impact negatively on the value of the land.	To address the loss of jobs and impact of value on land.	• Implement all the mitigation and management measures as proposed in the Specialist Assessments done for the EIA (Geohydrological, Air Quality and Noise Impact Assessments) to address intrusion	Social Labour Plan Labour Act Basic Conditions of Employment Act	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Operation of mine and surface infrastructure	Possible long-term impacts of underground coal mining on natural resources and agricultural land uses could include: Potential to alter the topography due to surfaces that collapse over time; Reduction of groundwater supply due to the pumping of underground water; Quality impacts on water resources and water that is not fit for human and livestock consumption as well as irrigation purposes; and Water holding capacity of the soil could be impacted as water leaks out of soil profile beyond the root zone.	To address negative local impacts during the operational phase	and pollution impacts that could result in degradation of agricultural land and land values and that could lead to job losses in the agricultural sector. • Reduce the Project infrastructure area to the smallest area possible. • Ensure that all surrounding landowners are familiar with the procedures to lodge complaints and attend to the issues at hand expediently. Implement all efforts to maintain good relations with the landowners. • It is recommended that negotiations take place with landowners that could be impacted by the underground mining operations over the long-term (topography subsidence, erosion, loss in soil characteristics etc.) to decide on amicable solutions to reduce impacts on their livelihoods, if it occurs.	NEMAQA Dust regulations ECA noise regulations SANS 10103 OHSA MHSA Grievance Mechanism	• Continuous
Operation of underground mining and surface infrastructure	An influx of jobseekers and migrant workers results in population growths and impacts on STLM in the following ways: Increase in the number and size of informal settlements; An increase in local unemployment, especially amongst the youth and unskilled; Potential conflict between locals and “outsiders” that compete for employment opportunities and other resources; A potential increase in crime and other social issues in the direct vicinity of the Project and in the wider municipal area (drug abuse, prostitution, etc.); Impacts on spatial planning; and Additional pressure on local government to provide housing,	To address negative local economic impacts during the operational phase	• Due to a shortage of skills the Project would possibly have no other alternative than to draw a percentage of its workforce from outside the municipal boundaries. It is thus imperative that contractors submit (i) a transport plan ensuring that employees are transported to and from their places of residence; and (ii) a housing plan is drawn up that sets out how the mining company and/or the main contractor will be dealing with employees from outside the municipal boundaries. • Draw up and implement a Local Employment Strategy as proposed in the Social Management Plan. • Do not create unrealistic job expectations and set clear goals with regards to local employment, career progression and so forth. Make this information available to the	Labour Act Basic Conditions of Employment Act SLP Commitments	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
	services, employment		Ward Councillor/s to distribute to local communities. • Monitor the above goals of SLP implementation and housing provision through the Future Forum / EMC. • Collaborate with surrounding landowners and mining houses to prevent and control informal settlements on mine owned properties. • Deal with illegal structures expediently, follow the correct legal procedures and support landowners in this regard.		
Operation of underground mining and surface infrastructure	A variety of factors could impact land values of affected farms and those in the surrounds: The quality and availability of water for domestic and farming purposes; Negative impacts on topography (surfaces that collapse with time due to underground mining); Loss of soil characteristics (erosion and compaction); Intrusion impacts, such as noise and dust, which could have an impact on crops and livestock; Visual impacts; Criminal activities (theft, vandalism, etc.); Occurrence of informal settlements, trespassing on private land, illegal grazing; Pre-requirements and restrictions set by the mining company in terms of new infrastructure developments on private properties; Fragmentation of agricultural land (subdivisions); and so forth.	To address individual and family level impacts	• Implement all the mitigation and management measures as proposed in the Specialist Assessments done for the EIA (Geohydrological, Air Quality and Noise Impact Assessments) to address intrusion and pollution impacts that could result in degradation of agricultural land and land values and that could lead to job losses in the agricultural sector. • Reduce the Project infrastructure area to the smallest area possible. • Ensure that all surrounding landowners are familiar with the procedures to lodge complaints and attend to the issues at hand expediently. Implement all efforts to maintain good relations with the landowners. • It is recommended that negotiations take place with landowners that could be impacted by the underground mining operations over the long-term (topography subsidence, erosion, loss in soil characteristics etc.) to decide on amicable solutions to reduce impacts on their livelihoods, if it occurs.	NEMAQA Dust regulations ECA noise regulations SANS 10103 OHSA MHSA SA Constitution EMS Policy Grievance Mechanism	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Operation of underground mining	The aim of the various training programmes, as enforced through the Mining Charter (2018), is to produce a skilled, trained, and diverse workforce to meet the demands of the modern industry; develop skills that enhance productivity of the workforce and improve the employment prospects of HDI's; and develop entrepreneurial skills that improve people's livelihoods and create mining-led local and regional economic diversification. The community projects will also continue.	To enhance impacts associated with skills development and social responsibility during the operational phase	• Skills development / training / capacity building: • Comply with all requirements of the Mining Charter (2018). • Ensure that minority groups (women, Youth and the disabled) are included in the SLP for bursaries, training, and employment opportunities. • Focus on the local communities (specifically Ward 3) when students are identified for bursaries, internships and so forth. • Implement the 'Procurement Action Plan' to develop the capacity of HDSA suppliers, as set out in the SLP. • Mobilize the Department of Labour Social Plan Services (e.g., technical assistance, Job Advice Centre, Retrenchment Response Team etc.). • Community development project(s) / Income generating project(s): • Maximise the local content of the SLP recommendations and projects. Do a needs / skills / gender analysis of Ward 3 (refer to the Social Management Plan) and focus on income generating projects as opposed to once-off infrastructure development. • During the SLP engagement processes: • Involve the Future Forum, EMC, LED Unit, Ward Councillor, and other community groups (Youth groups, Community development workers, etc.) so that employees, local communities, and Unions are aware of the goals, strategies, and progress of SLP implementation. These structures should also be consulted for the identification of suitable projects that will address real community-based needs. • Publish LED projects in English and one other local language as prescribed by the new Mining Charter.	Labour Act Basic Conditions of Employment Act SLP Commitments	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			• Submit annual SLP reports to the DMR as required in the Mining Right and provide feedback to communities; should be certain of the training / project targets not be reached, ensure that financial provision has been made for the allocated budget, and implement it the following year. • Be transparent and provide feedback to the communities and the STLM when tenders, bursaries, training opportunities etc. are awarded. • Housing / Living conditions: • Determine how the mining company and/or the main contractor will be dealing with employees from outside the Municipal boundaries. Link with the STLM (LED and IDP Units) in this regard and include these targets in the 'Housing and Living Conditions Plan'. • It is further recommended that workers are encouraged to find accommodation in close proximity (within about 30 km) from the operations. • Consider partnerships with relevant government departments, private companies, and interest groups to facilitate sustainable housing developments in the nearest towns and subsequent access to such developments for its employees through appropriate means. • Monitor the above goals of SLP implementation and housing provision through the EMC. • Implement health awareness campaigns and programmes for workers: • HIV/AIDS/TB, blood pressure, Body Mass Index, Fatigue management, chronic disease management and wellness, to improve knowledge in the workplace and in the surrounding communities. • Health care and general wellness to inform workers how they can benefit from good		

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			nutrition, balanced diets, correct method of food preparation to maximize nutritional benefits of food, as well as the use of nutritional diets in the management of chronic illnesses including HIV. • Make condoms available to the workforce. • If possible, make the services of the mine clinic and social welfare worker available to the workers' family members and even local community members residing in close proximity to the mine.		
Operation of underground mining	Impacts due to lack of communication with landowners and communities can results in disruptions for the Project, temporary mine closures and loss of income; Financial implications for the mine, host communities and private landowners should legal resources be pursued.	To address negative community / institutional arrangements during the operational phase	• Establish an EMC and communicate with landowners / community leadership / Ward Councillors / STLM structures when operations commence to implement mutually acceptable solutions with regards to any issues that may arise even though mitigation measures have been implemented (dust, noise, blasting concerns, traffic related matters and so forth). Provide feedback at follow-up meetings. • Be vigilant not to raise unrealistic expectations amongst the local communities and workers with regards to employment, skills requirements, and new community projects. Ensure transparency through the regular feedback meetings of the Future Forum and the EMC. • Make the methods to raise complaints available to landowners, communities, and residents (complaints register at the entrance to the Mining Area, contact details of the CLO, Ward Councillor and EMC, etc.), respond to complaints promptly and provide feedback to affected parties. • It is imperative and, in the mine's, best interest to take their environmental and social responsibilities serious and to maintain open communication channels with surrounding landowners and communities.	EMS Policy Grievance Mechanism Social Labour Plan Labour Act Basic Conditions of Employment Act	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Operation of underground mining	Mining depletes water supplies; pollutes the air, soil, and water; destroys ecosystems and arable land. Runoff and spills from mines and waste ponds often contaminate drinking and irrigation water, violating the rights to life, health, water, food, and a healthy environment.	To limit impacts on the natural environment.	• Implement all the mitigation and management measures as proposed in the Specialist Assessments done for the EIA (Geohydrological, Air Quality and Noise Impact Assessments) to address intrusion and pollution impacts that could result in degradation of agricultural land and land values and that could lead to job losses in the agricultural sector. • Reduce the Project infrastructure area to the smallest area possible. • Ensure that all surrounding landowners are familiar with the procedures to lodge complaints and attend to the issues at hand expediently. Implement all efforts to maintain good relations with the landowners. • It is recommended that negotiations take place with landowners that could be impacted by the underground mining operations over the long-term (topography subsidence, erosion, loss in soil characteristics etc.) to decide on amicable solutions to reduce impacts on their livelihoods, if it occurs.	SA Constitution NEMAQA Dust regulations ECA noise regulations SANS 10103 OHSA MHSA	• Continuous
Operation of underground mining and surface infrastructure	Positive impact on minority group due to employment of women, Employment equity of HDP's	To ensure the employment of woman within various levels of the mine.	• Implement the Gender Equity Policy (refer to the Social Management Plan) and implement the measures contained in the SLP to address negative impacts on communities and the existing WIM. • Ensure that minority groups (women, youth and the disabled) are included in the SLP for bursaries, training and employment opportunities and gradually increase targets when the SLP is reviewed. • Repeat the needs assessment in the local communities every 5 years and align the projects with the IDP, to ensure that real community-based needs are addressed. • In terms of WIM, implement all the strategies and action plans included in the SLP to encourage the development of WIM and also for management positions.	Labour Act Basic Conditions of Employment Act SLP Commitments	• Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Operation of underground mining and surface infrastructure	Impact on health and safety of workers and people living in the area; Impact on traffic; Impact on sense of place; Impacts on community health; Relocation of individuals; Security Risks; and impacts associated with blasting	To address health and safety risks during the operational phase	Relocations: • Consider and negotiate the relocation of households / financial compensation where intrusion impacts, and impacts associated with blasting cannot be mitigated to acceptable levels. • Do relocations in accordance with the required legislation, consultation and use local government structures for assistance, if so required. Blasting: • Implement all the mitigation and management measures as set out in the Blast Impact Assessment Report (Blast Management Consulting, October 2020). • Effective Public Relations and communication with landowners and communities for the duration of the operational phase. Ensure that parties are familiar with the methods to raise complaints and address any issues that arise speedily. Safety / security: • Join a local Security organisation and/or Community Policing Forum and their initiatives for the duration of the construction, operation, and decommissioning phases. • Erect fencing around Surface Infrastructure Area to restrict the access and movement of cattle and humans at dangerous areas. • 24-hour security on site, access control. Traffic and associated impacts: • Implement all recommendations of the TIA Report, to reduce and mitigate potential road safety issues, pedestrian safety and so forth. • Access to Road D622 is subject to approval from the Mpumalanga Department of Roads	OHSA MHSA SLP Commitments Grievance Mechanism National Road Traffic Act	Continuous

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
			and Transport. It is recommended that this road be upgraded with relevant road pavement design to an appropriate standard (refer to TIA, October 2020). • Provide on-site facilities for safe picking up and dropping off of staff. • Maintain internal and haul roads for the duration of the operation and upgrade stormwater management measures where required. • Dust suppression on all access and haul roads. • Impose penalties for reckless drivers of trucks, to enforce compliance to traffic rules and speed limits. • Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and un-roadworthy vehicles that could result in accidents. • Display a contact number on trucks where motorists can report reckless driving. Intrusion impacts / Sense of place: • Implement all mitigation and monitoring measures as proposed by the respective Specialists to suppress dust, air pollution, noise, visual impacts and to prevent ground and surface water pollution. • Conduct ongoing engagements with landowners and other affected parties. Make the channels of communication and contact details known to them and attend to concerns and issues speedily.		
Operation of underground mining and surface infrastructure	Impacts on basic services and historical and archaeological service	To address impacts on basic services and archaeological services.	Impacts on services / water: • Implement all mitigation and management measures as proposed by the Geohydrologist to reduce impacts on ground and surface water resources. • Continually monitor borehole water levels to detect changes in water levels early on.	National Road Traffic Act OHSA MHSA	• Continuous
Operation of underground mining and surface infrastructure	Increased traffic and impacts on road infrastructure	To address traffic and road infrastructure impacts			

Activity	Potential Impact	Management Objective	Mitigation Measures	Standard to be Achieved	Time Period for Implementation
Closure of underground mine and decommissioning and closure of surface infrastructure	Traffic and intrusion impacts; Potential security issues; Impacts on road infrastructure; and Health and Safety impacts.	To address traffic and road infrastructure impacts. To address health and safety risks during closure	• Provide affected landowners with an alternative source of water supply. • Should any service disruptions (electricity, water, etc.) occur, communicate this with the landowners and restore the service as quickly as possible. • Consider providing water to settlements / communities in the local study area and repair damaged structures (boreholes, windmills, dams, etc.) as part of the SLP community projects. • Historical / Archaeological sites: • Implement all mitigation measures as proposed in the AIA (November 2020). This includes monitoring by the mine's ECO on a quarterly basis of: • All intact buildings dating to the Historical Period falling within the boundary of the underground mining area, as well as pre- and post-blasting. • Graves and cemeteries falling outside of the areas demarcated for surface development, but within the boundary of the proposed underground mining section. • The proposed development should avoid certain of the culture historical/archaeological sensitive areas, as recommended in the AIA. • A fenced-off conservation buffer of 50 m must be established around graves or cemeteries that are at risk of being impacted by the proposed surface development and a qualified archaeologist must compile a Conservation Management Plan to ensure the safeguarding of the burial sites. • Access to the cemeteries/graves must not be refused. • Should graves be removed, this must be done in accordance the relevant legislation and by involving community leaders and relatives of the deceased.	National Road Traffic Act OHSA MHSA	• Continuous

7 FINANCIAL PROVISION

7.1 DETERMINATION OF THE AMOUNT OF FINANCIAL PROVISION

Refer to comments made in Section 19 of Section A and Appendix 20.

7.1.1 Describe the Closure Objectives and the Extent to Which They Have Been Aligned To the Baseline Environment Described Under Regulation 22 (2) (D) As Described In 2.4 Herein

Refer to comments made in Section 19 of Section A and Appendix 20.

7.1.2 Confirm Specifically That the Environmental Objectives In Relation To Closure Have Been Consulted With Landowner and Interested and Affected Parties

Refer to comments made in Section 19 of Section A and Appendix 20.

7.1.3 Provide A Rehabilitation Plan That Describes And Shows The Scale And Aerial Extent Of The Main Mining Activities, Including The Anticipated Mining Area At The Time Of Closure

Refer to comments made in Section 19 of Section A and Appendix 20.

7.1.3.1 Explain Why It Can Be Confirmed That The Rehabilitation Plan Is Compatible With The Closure Objectives.

Refer to comments made in Section 19 of Section A and Appendix 20.

7.2 CONFIRM THAT THIS AMOUNT CAN BE PROVIDED FOR FROM OPERATING EXPENDITURE

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

Annual financial provisioning reports will be updated and submitted to the DMRE. Canyon Resources (Pty) Ltd. will make the said amount available to the DMRE as required.

8 MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON

Including:
a) Monitoring of Impact Management Actions
b) Monitoring and reporting frequency
c) Responsible persons
d) Time period for implementing impact management action
e) Mechanisms for monitoring compliance

Table 4: Mechanisms for monitoring (Including Time period, Functional requirements, Roles and responsibilities and Frequency)

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
No Go Option							
No-go option	Reduced period of development and upliftment of the surrounding communities and infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A
No-Go Option	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	N/A	N/A	N/A	N/A	N/A	N/A
No-Go Option	**Positive:** No additional negative impacts on I&APs or surrounding land users	N/A	N/A	N/A	N/A	N/A	N/A
No-Go Option	**Positive:** No additional negative impacts on the environment	N/A	N/A	N/A	N/A	N/A	N/A
Hydrogeological							
Underground mining	Underground mining may result in spread of pollution	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for	Implement IWWMP Monitoring prescribed	Environmental Manager, Contractor	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
		NEMA Polluter Pays Principle DWS best practice guidelines	Environmental water resources and Water Quality as specified in WUL			Groundwater quality and quantity	
Underground mining	Dewatering due to underground mining may lower water table	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	Environmental Manager, Contractor	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity	Continuous
Closure of underground mine	Spread of pollution	GNR 704 Water Use Licence Groundwater monitoring program	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	Environmental Manager, Contractor / specialist	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity - or as additionally specified in WML	Closure Phase
Closure of underground mine	Subsurface Seepage	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	Environmental Manager, Contractor	Monthly for Surface water quality, Bi-annually for Aquatic Ecology and Quarterly for Groundwater quality and quantity	Closure Phase
Surface Water							

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Surface water quality - Sedimentation and pollution of surface water resources resulting in the deterioration of water quality	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	Environmental Manager, Contractor	Monthly surface water monitoring, biannual aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained in the PCD.	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	Environmental Manager, Contractor	Monthly surface water monitoring, biannual aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related waste water and residue materials; and Water use and storage on-site; Demolition and removal of all infrastructures, including	Surface water quality - Deterioration of surface water quality as a result of Acid Mine Drainage.	GNR 704 Water Use Licence Groundwater monitoring program NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines	Water Quality: In line with the specific Integrated Unit of Analysis RQS (Resource Quality Standards) for Environmental water resources and Water Quality as specified in WUL	Implement IWWMP Monitoring prescribed	Environmental Manager, Contractor	Monthly surface water monitoring, biannual aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and subsequent general surface rehabilitation. Updating and implementing a monitoring programme appropriate for the closure phase.							
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and subsequent general surface rehabilitation. Updating and implementing a monitoring programme appropriate for the closure phase.	POSITIVE: Surface water quantity Reinstatement of surface drainage patterns	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality in line with the specific Resource Quality Standards for environmental water resources and water quality objectives as per the WUL	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual aquatic ecology and quarterly groundwater quality and quantity monitoring	Closure Phase
Aquatic Ecology							
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Construction impacts resulting in impacts to biodiversity and ecological function	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines	Water Use Licence	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
		Water Use Licence				and quantity monitoring	
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Loss of biodiversity and ecological function. Impacts to ecological corridor functioning due to prolonged activity in proximity to watercourses	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water Use Licence	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Alteration of drainage patterns leading to decrease and changes in water quantity and availability	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water Use Licence	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Deterioration of water quality in the Bosmanspruit and Klein-Olifants River due to polluted water runoff, affecting aquatic communities	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water Use Licence	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Nutrient enrichment due to sedimentation, leading to decline of Dissolved Oxygen (DO), thereby impacting aquatic invertebrate communities	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water Use Licence	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Wetlands							

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps; Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site.	Deterioration of surface water quality may lead to a deterioration of the Present Ecological Status (PES).	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Direct impacts: Accidental direct impacts to wetland vegetation and habitat by heavy machinery during construction and site establishment. Wetland fauna fatalities.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Indirect hydrological and geomorphological impacts: Erosion and/or sedimentation of wetlands due to catchment land clearing and landcover disturbance during construction and site establishment. Reduced water inputs to the wetlands due to surface flow and subsurface interflow interception and diversion	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Water quality impacts: Pollution of wetlands due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g., oil and diesel leaks and spills, spills and leakages from ablutions.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Site clearing, including the removal of topsoil and vegetation; Construction of mine related infrastructure; Development of on surface stockpiles and discard dumps	Indirect ecological process impacts: Increased alien invasive plant invasion. Noise pollution and vibrations associated with earthworks and the use of heavy machinery. Light pollution associated with camp site and the use of heavy machinery use at night. Reduced ecological connectivity as a result of increased wetland fragmentation and/or expanded / more intense edge impacts.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Direct impacts: Accidental direct impacts to wetland vegetation and habitat by heavy machinery during operation activities i.e., repair and maintenance activities. Wetland fauna fatalities.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Indirect hydrological and geomorphological impacts: Erosion and/or sedimentation of wetlands due to catchment land clearing and landcover disturbance operation i.e., ongoing stockpile area expansion. Erosion and/or sedimentation of wetlands due to pollution control dam and/or slurry dam failure and/or spill over. Reduced water inputs to the wetlands due to surface flow and subsurface interflow interception and diversion.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Water quality impacts: Pollution of wetlands due to contaminated runoff and interflow from the dirty water areas and/or mine residue deposits seeping into the surrounding environment. Pollution of wetlands due to pollution control dams and/or slurry dams' failure and/or spill over. Pollution of wetlands due to leakages from and/or failure of septic tank systems. Contaminants include bacteria, viruses, ammonia, phosphate, sulphate, nitrate, and organic matter that lead to elevated chemical oxygen demand (COD) and biological oxygen demand (BOD) in surface and ground water. Pollution of wetlands due to the leakages and spillages from	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
	workshops and hazardous material storage areas. e.g., oil and diesel leaks and spills. Pollution of wetlands due to the mishandling of hazardous substances and/or improper maintenance of machinery during repair and maintenance. e.g., oil and diesel leaks and spills.						
Drilling and blasting of coal; Load, haul and stockpiling of ROM coal; Use and maintenance of haul roads for the transportation of coal to the wash plant and off-site; Operation of wash plant and storage of related wastewater and residue materials; and Water use and storage on-site	Indirect ecological process impacts: Increased alien invasive plant invasion. Noise pollution and vibrations associated with earthworks, the use of heavy machinery and blasting. Light pollution associated with camp site and the use of heavy machinery use at night. Reduced ecological connectivity as a result of increased wetland fragmentation and/or expanded / more intense edge impacts.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and sub	Direct impacts: Accidental direct impacts to wetland vegetation and habitat by heavy machinery during decommissioning.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Closure
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and	Indirect hydrological and geomorphological impacts: Erosion and/or sedimentation of wetlands due to catchment land clearing and landcover	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle	Water quality as per the WUL for process related water GN704: Capturing and	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and	Closure

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and sub	disturbance during decommissioning.	DWS Best Practice Guidelines Water Use Licence	containing dirty water			quarterly groundwater quality and quantity monitoring	
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and sub	Water quality impacts: Pollution of wetlands due to the mishandling of hazardous substances and/or improper maintenance of machinery during decommissioning. Pollution of wetlands due to contaminated runoff and interflow from the rehabilitated mine residue deposits seeping into the surrounding environment. • Pollution of wetlands due to pollution control dams and/or slurry dams' failure and/or spill over.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Closure
Demolition and removal of all infrastructures, including transporting materials off site. Rehabilitation, including shaping, spreading of soil and re-vegetation. Removing of haul roads and 100 mm of underlying material. Clearing of stockpile areas and sub	Indirect ecological process impacts: increased alien invasive plant invasion. • Noise pollution and vibrations associated with earthworks and heavy machinery. • Light pollution associated with camp site and heavy machinery use at night.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Closure
Underground mining	Indirect hydrological and geomorphological impacts: Reduced water inputs to the wetlands fed by springs due to the drawdown of the weathered aquifer during the dewatering of the underground workings. Erosion and/or sedimentation of wetlands due to dewatering	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
	discharges.						
Underground mining	Indirect ecological process impacts: Noise pollution and vibrations associated with earthworks, the use of heavy machinery, and blasting.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Continuous
Decommissioning of underground mining (including post-closure)	Indirect hydrological and geomorphological impacts: Reduced water inputs to the wetlands fed by lateral subsurface interflow and perched aquifers due to the disruption of interflow soils and perched aquifer lateral movement as a result of land subsidence. Erosion and/or sedimentation of wetlands as a result of mine decant discharges once the water levels are reinstated.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Closure Phase

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Decommissioning of underground mining (including post-closure)	Indirect hydrological and geomorphological impacts: Reduced water inputs to the wetlands fed by lateral subsurface interflow and perched aquifers due to the disruption of interflow soils and perched aquifer lateral movement as a result of land subsidence. Erosion and/or sedimentation of wetlands as a result of mine decant discharges once the water levels are reinstated.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Closure Phase
Decommissioning of underground mining (including post-closure)	Water quality impacts: Wetland pollution due to mine decant water once the water levels are reinstated. Sulphate is normally a significant solute in drainage from mines.	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Water quality as per the WUL for process related water GN704: Capturing and containing dirty water	Implement IWWMP Implement SWMP Monitoring prescribed	Environmental Manager / Specialist Consultant(s)	Monthly surface water monitoring, biannual biomonitoring and aquatic ecology and quarterly groundwater quality and quantity monitoring	Closure Phase
Agriculture, Soil and Land Capability							
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Soil Erosion: Vegetation will be removed from all areas where infrastructure will be constructed. This includes the office and ablution areas, discard dump and slurry dams as well as haul roads and parking areas. This will expose the soil surfaces to soil erosion. Both wind and water erosion are a risk and once the soil surface is exposed, the intensity of single rainstorm may result in soil particles being transported away.	CARA	CARA Principles	Regular inspections around construction areas to monitor for any signs of soil erosion developing. When signs of erosion are present, the area must be rehabilitated using indigenous vegetation and other ecologically innocuous methods to prevent	Environment Control Officer / Environmental Manager	As needed	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
				expansion of the eroded areas			
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Soil Compaction: All areas where vehicles and equipment will traverse during the construction phase to deliver materials, prepare the terrain, and construct the infrastructure be at risk of soil compaction. Several areas such as the haul roads, dump areas, slurry dam and product stockpile areas will be deliberately compacted during the construction phase to stabilise the surface following engineering specifications. Similarly, trucks and vehicles traversing the haul roads between the different infrastructure components, will increase the existing compaction. During the decommissioning phase, the movement of vehicles and equipment will again result in soil compaction	CARA	CARA Principles	Regular inspections around construction areas to monitor for any signs of soil erosion developing. When signs of erosion are present, the area must be rehabilitated using indigenous vegetation and other ecologically innocuous methods to prevent expansion of the eroded areas	Environment Control Officer / Environmental Manager	As needed	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Soil Pollution: During the construction phase, oil and fuel spills and leaks from construction vehicles and equipment as well as waste generation on site, can result in soil pollution. The mixing of concrete on site can also be a source of soil pollution. During the operational phase, dust suppression of haul roads will increase the pollutant load of soil at and around the haul roads. Any spills from the slurry dam and rainwater seepage and runoff from the product stockpile, can cause soil pollution. During the decommissioning phase, the preparation of the site and the materials that are decommissioned will be additional source of soil pollution and the preparation of the site, may result in pollution.	CARA Hazardous Substances Act NWA NEMA Duty of Care NEMWA Incident Reporting	CARA Principles Pre-mining conditions post closure	Vehicle maintenance / service plan Monitor areas for spills that need to be cleaned. Ensure spills are adequately cleaned and contaminated material correctly disposed of.	Environmental Control Officer / Environmental Manager	As needed	Continuous
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Loss of soil quality: The stripping and stockpiling of topsoil prior to construction of infrastructure, will disturb the in-situ profiles drastically. Even though care might be taken to strip topsoil effectively from the underlying material, soil stockpiles will become a soil mixture with altered properties. Soil porosity and water-holding capacity will be affected, and the lengthy storage of topsoil (for the life of mine of 27 years) will destroy the soil microbiology and the nutrient cycles it maintains. This impact will remain unchanged during the	Principles of CARA Rehabilitation and Closure Plan	Pre-mining conditions post closure	Visual inspection and monitoring of the condition of the surface areas and where activities are taking place	Environmental Control Officer / Environmental Manager	Monthly visual assessments	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
	operational phase. During the rehabilitation phase, topsoil will be used to cover areas where vegetation needs to re-establish. The soil that might develop there will have different physical and chemical properties and will also be highly compacted						
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Loss of food production: Once the mining commences, the surface footprint of the mining area will be fenced off and the areas currently used for production of grain crops (soybean and maize), will be lost from agricultural production. Since crop rotation is practiced, the annual losses in the best-case scenario (see Section 12.3) will be 428.3 tonnes/year soybean or 1208.7 tonnes/year maize, depending on what is cultivated that year. Similarly, the forage available for livestock farming will be reduced, thereby reducing the number of weaners produced by 37 animals per year.	CARA	Principles of CARA Rehabilitation and Closure Plan	Monitoring of the condition of the new MR	Environmental Manager	Monthly	During the entire construction, operational and decommissioning phases

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump) and decommissioning	Fragmentation of agricultural land in a Priority B Protected Agricultural Area: Once the mining commences, the surface footprint of the mining area will be fenced off. The development footprint boundaries will impact on high potential agricultural soil with high crop yield potential as well as grazing veld with good grazing capacity. The change of the land use from agriculture to mining will fragment the Central Mpumalanga Protected Agricultural Area that was gazetted through CARA in 2021	CARA	Principles of CARA Rehabilitation and Closure Plan	Monitoring of the condition of the new MR	Environmental Manager	Monthly	During the entire construction, operational and decommissioning phases
Underground mining	Reduction of drinking water available for livestock grazing	DWS best Practice Principles Water Use Licence CARA	IWWMP CARA Principles	Monitoring of water quality and quantity – both surface and ground water. Regular inspections around construction areas to monitor for any signs of soil erosion developing. When signs of erosion are present, the area must be rehabilitated using indigenous vegetation and other ecologically innocuous methods to prevent expansion of the eroded areas	Environment Control Officer / Environmental Manager	As needed	Continuous
Subsidence							

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Underground mining	Subsidence of surface due to failure of pillars	Rehabilitation and Closure Plan	Original topography and landform serve as a reference for rehabilitation	Visual inspection	Mine Manager	Monthly	Continuous until closure certificate has been received
Ecology							
Construction activities (office, workshop, haul roads, slurry damps, discard dump)	The proposed northern mining infrastructure site has sections which are slightly/moderately degraded, and habitat has been transformed to an extent due to farming activities in the area. However, the onset of additional activities might result in impacts to the natural environment due to increased movement, traffic, and large machinery to the area. Heavy machinery and vehicles might result in compaction of the soil and destruction of vegetation habitat which in turn will also impact on the animals that use the area as habitat	NEMBA Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) TOPS Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011) IUCN Red List of Threatened Species South African Red List of Species	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as amended Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)	Ecological monitoring and compliance	Environmental Manager / Specialist Consultant(s)	Annually	Continuous

Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump)	Mining related activities may lead to the loss of faunal and floral species of conservation concern within the northern mining infrastructure area. Avifaunal red listed species was confirmed during the field assessment within the vicinity of the northern development area. In the desktop floral assessment, three (3) species listed by POSA for the area are classified as species of conservation concern (SCC), one (1) of which may potentially occur on the northern project footprint. Also, during the field assessment, the MNCA protected species, Cyrtanthus tuckii (Pempempie), was confirmed to occur on areas outside the northern development footprint (but within the Mining Right applied for) and could potentially spread to occur within the footprint site as well before mining commences. Species (both floral and faunal) are not static entities and work in terms of movement within and between suitable habitat types and by means of range requirements, migration, and dispersal. Mining of the northern section (where the infrastructure is proposed) and related activities could still impact on the sensitive habitats, such as riparian and wetland areas, situated around the northern mining footprint, although these will not be developed directly.	NEMBA Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) TOPS Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011) IUCN Red List of Threatened Species South African Red List of Species	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as amended Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)	Ecological monitoring and compliance	Environmental Manager / Specialist Consultant(s)	Annually	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump)	Construction and operational impacts may lead to the further increase of invasive species from the surrounding areas and may change the vegetation structure and composition found at the proposed northern mining infrastructure site. It may also result in the spread of the invaders already found on-site to surrounding natural areas	NEMBA Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as amended Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)	Ecological monitoring and compliance	Environmental Manager / Specialist Consultant(s)	Annually	Continuous
Construction and operation of infrastructure (office, workshop, haul roads, slurry damps, discard dump)	Impacts on the aquatic ecology and species dependant on habitats associated with water resources and wetlands (located in close proximity to the northern mining surface infrastructure, although these are not to be developed). This may be due to pollutants directly or indirectly entering the water resource, during construction or during operational phase from sources associated with the mine.	NEMBA Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) TOPS Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011) IUCN Red List of Threatened Species South African Red List of Species	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as amended Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)	Ecological monitoring and compliance	Environmental Manager / Specialist Consultant(s)	Annually	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Decommissioning of infrastructure	Rehabilitation could be ineffective if measures are not appropriately complied to (revegetation and monitoring until self-sustaining). The possibility of subsidence for underground mining should be managed and stability of pillars ensured, and a stability report had been completed to assess this risk by the client. Although not expected, if subsidence ever occurs, it should be rehabilitated properly to prevent impacts to faunal species that might fall into these depressions, leading to serious injury, entrapment, and death. Without mitigation the alien invasive species will increase and result in a degraded veld condition making the property less viable for post-closure land use activities such as wilderness, grazing and agriculture.	NEMBA Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) TOPS Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011) IUCN Red List of Threatened Species South African Red List of Species	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as amended Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)	Ecological monitoring and compliance	Environmental Manager / Specialist Consultant(s)	Annually	Continuous
Blasting and Vibration							
Blasting for north adit	Blasting may result in ground vibrations which could impacts on various farm buildings, boreholes, graveyards, and ruins	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and	Blasting Regulations of the Explosives Act, 1956 (Act 26 of 1956). Vibration Management Plan	Consult blast specialist as construction begins, blast in accordance with Blast Management Plan and specifications	Environmental Manager, Mine Manager	As needed	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
		recommendations on air blast					
Blasting for north adit	Blasting may result in air blast which could negatively impact on farmsteads, buildings, farm buildings and boreholes	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Blasting Regulations of the Explosives Act, 1956 (Act 26 of 1956). Vibration Management Plan	Consult blast specialist as construction begins, blast in accordance with Blast Management Plan and specifications	Environmental Manager, Mine Manager	As needed	Continuous
Blasting for north adit	Blasting may result in fly rock which could negatively impact on farmsteads, buildings, farm buildings and boreholes	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	Blasting Regulations of the Explosives Act, 1956 (Act 26 of 1956). Vibration Management Plan	Consult blast specialist as construction begins, blast in accordance with Blast Management Plan and specifications	Environmental Manager, Mine Manager	As needed	Continuous
Traffic							
Use of roads for transporting material for construction of infrastructure, coal product, workers during construction, operational and decommissioning and closure	Additional traffic on road network	National Road Traffic Act OHSA MHSA	Traffic Management Plan	As per Traffic Management Plan	Environmental Manager, Mine Manager	As per Traffic Management Plan	Continuous
Air Quality							

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Site Clearing, removal of topsoil and vegetation	A number of operations take place such as land clearing, topsoil removal, loading of material, hauling, grading, stockpiling, bulldozing and compaction. Initially, topsoil and subsoil will be removed with large scrapers. The topsoil will be stockpiled for rehabilitation in the infrastructure area. It is anticipated that each of the above-mentioned operations will have its own duration and potential for dust generation. Fugitive dust (containing TSP (total suspended particulate, will give rise to nuisance impacts as fallout dust), as well as PM10 and PM2.5 (dust with a size less than 10 microns, and dust with a size less than 2.5 microns giving rise to health impacts)) It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity, the specific operations, and the prevailing meteorological conditions. This activity will be short-term and localised, seizing after construction activities. Material will be removed by using a bulldozer and then storing this material separately for use during rehabilitation at end of life of mine when the operation cease. These	NEMAQA National Dust Control Regulations MHSA	MHSA: Occupational Hygiene Regulations	Conduct Occupational air quality monitoring. Adhere to current Dust Management Programme	SHEQ Manager / Specialist Consultant	As per Occupational Hygiene Survey Risk Assessment	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
	construction sites are ideal for dust suppression measures as land disturbance from clearing and excavation generates a large amount of soil disturbance and open space for wind to pick up dust particles and deposit it elsewhere (wind erosion). Issues with dust can also arise during the transportation of the extracted material, usually by truck and shovel methods, to the stockpiles. The dust can further be created by the entrainment from the vehicle itself or due to dust blown from the back of the bin of the trucks during transportation of material to and from stockpiles.						
Construction of surface infrastructure (e.g., access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, drilling blasting and development of adit for mining, etc.)	The construction of infrastructure. This will include, access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, blasting and development of the decline for mining, etc. Activities of vehicles on access roads, levelling and compacting of surfaces, as well localised drilling and blasting will have implications on ambient air quality. The above-mentioned activities will result in fugitive dust emissions containing TSP (total suspended particulate, giving rise to nuisance impacts as fallout dust). Underground mining will commence with the stripping of the vegetation for the initial shaft	NEMAQA National Dust Control Regulations MHSA	MHSA: Occupational Hygiene Regulations	Conduct Occupational air quality monitoring. Adhere to current Dust Management Programme	SHEQ Manager / Specialist Consultant	As per Occupational Hygiene Survey Risk Assessment	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
	development. The construction of roads take place through removing the topsoil and then grading the exposed surface in order to achieve a smooth finish for vehicles to move on. Temporary stockpiles will be created close to the edge of the road in order to be backfilled easily once the road has expired or need to be rehabilitated						
General transportation, hauling and vehicle movement on site	Transportation of the workers and materials in and out of mine site will be a constant feature during the construction phase. This will however result in the production of fugitive dust (containing TSP, as well as PM10 and PM2.5) due to suspension of friable materials from earth roads. It is anticipated this activity will be short-term and localised and will seize once the construction activities are finalised. Haul trucks generate the majority of dust emissions from surface operations. Observations of dust emissions from haul trucks show that if the dust emissions are uncontrolled, they can be a safety hazard by impairing the operator's visibility. Substantial secondary emissions may be emitted from material moved out from the site during grading and deposited adjacent to roads. Passing traffic can thus loosen and re-suspend the deposited material again into the air. In order to minimize these impacts the stockpiles should be	NEMAQA National Dust Control Regulations MHSA	MHSA: Occupational Hygiene Regulations	Conduct Occupational air quality monitoring. Adhere to current Dust Management Programme	SHEQ Manager / Specialist Consultant	As per Occupational Hygiene Survey Risk Assessment	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
	vegetated for the duration that it is exposed.						
Use and maintenance of the access road. Dust from material handling and wind erosion from stockpiles.	Use and maintenance of the access road. Dust from material handling and wind erosion from stockpiles may result in increased fugitive emission sources and may impact on the ambient air quality specifically an increase in daily PM10 concentrations and TSP concentrations	NEMAQA National Dust Control Regulations MHSA	MHSA: Occupational Hygiene Regulations	Conduct Occupational air quality monitoring. Adhere to current Dust Management Programme	SHEQ Manager / Specialist Consultant	As per Occupational Hygiene Survey Risk Assessment	Continuous
Demolition & Removal of all infrastructure (incl. transportation off site) and	Demolition of buildings and foundation and subsequent removal of rubbles generated. There is cleaning-up of workshops, fuels and reagents, removal of power and water supply, removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure as well as features which will remain. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, transporting, and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructures will cause fugitive dust emissions.	NEMAQA National Dust Control Regulations MHSA	MHSA: Occupational Hygiene Regulations	Conduct Occupational air quality monitoring. Adhere to current Dust Management Programme	SHEQ Manager / Specialist Consultant	As per Occupational Hygiene Survey Risk Assessment	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
	The impacts will be short-term and localised. Any implication or implications this phase will have on ambient air quality will seize once the activities are finalised.						
Rehabilitation (spreading of soil, revegetation & profiling/contouring	During this activity, there is the reshaping and restructuring of the landscape. Since this is an underground operation mainly, the area to be reconstructed will be limited to the decline shafts and discard dump. Topsoil can be imported to reconstruct the soil structure. There is less transfer of soil from one area to other therefore negligible chances of dust through wind erosion. Profiling of dumps to enhance vegetation cover and reduce wind erosion from such surfaces post mining.	NEMAQA National Dust Control Regulations MHSA	MHSA: Occupational Hygiene Regulations	Conduct Occupational air quality monitoring. Adhere to current Dust Management Programme	SHEQ Manager / Specialist Consultant	As per Occupational Hygiene Survey Risk Assessment	Continuous
Noise							
Construction of surface infrastructure (e.g., access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, drilling blasting and development of adit for mining, etc.)	Equipment and vehicles used for construction of infrastructure will result in increased noise levels.	ECA noise regulations SANS 10103 OHSA MHSA Blasting Regulations Vibration management plan Noise Management Plan ECA noise regulations	Noise Management Plan	Environmental Noise monitoring	Environmental Manager / Specialist	As per Environmental Noise Risk Assessment	Continuous
Operational phase including the use of the various stockpiles, the plant operational activities e	Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of	ECA noise regulations SANS 10103 OHSA MHSA	Noise Management Plan	Environmental Noise monitoring	Environmental Manager / Specialist	As per Environmental Noise Risk Assessment	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
movement of vehicles, use of workshop and office.	workshop and office will all increase noise level in the project area.	Blasting Regulations Vibration management plan Noise Management Plan ECA noise regulations					
Demolishing of surface infrastructure	Equipment and vehicles used for demolishing and rehabilitation of infrastructure will result in increased noise levels.	ECA noise regulations SANS 10103 OHSA MHSA Blasting Regulations Vibration management plan Noise Management Plan ECA noise regulations	Noise Management Plan	Environmental Noise monitoring	Environmental Manager / Specialist	As per Environmental Noise Risk Assessment	Continuous
Visual							
Construction of surface infrastructure (e.g., access roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, drilling blasting and development of adit for mining, etc.)	Construction of surface infrastructure on surrounding receptors	NEMA Duty of Care	NEMA Pre-mining conditions, post closure	Not Applicable	Environmental Manager / Specialist	Not Applicable	Continuous
Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of workshop and office.	Operational phase including the use of the various stockpiles, the plant operational activities the movement of vehicles, use of workshop and office will all increase visual level in the project area.	NEMA Duty of Care	NEMA Pre-mining conditions, post closure	Not Applicable	Environmental Manager / Specialist	Not Applicable	Continuous
Heritage							

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Construction of surface infrastructure (e.g., access and haul roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, blasting and development of adit for mining, etc.)	Construction surface infrastructure may result in potential damage to subsurface culturally significant material	National Heritage Resources Act, 1999 (Act No 25 of 1999)	NEMA MPRDA NHRA SAHRA	Record occurrences of heritage sites and artefacts if and when discovered. Immediately contact a heritage specialist if any discoveries are made.	Environmental Manager / Specialist	As per Heritage Impact Assessment and Heritage Management Plan	Continuous
Construction and operation of surface infrastructure (e.g., access and haul roads, pipes, storm water diversion berms, change houses, admin blocks, drilling, blasting and development of adit for mining, etc.) and underground mining	Potential damage to subsurface cultural remains and cemetery may occur during construction of surface infrastructure and underground mining	National Heritage Resources Act, 1999 (Act No 25 of 1999)	NEMA MPRDA NHRA SAHRA	Record occurrences of heritage sites and artefacts if and when discovered. Immediately contact a heritage specialist if any discoveries are made.	Environmental Manager / Specialist	As per Heritage Impact Assessment and Heritage Management Plan	Continuous
Underground mining	Underground mining may result in subsidence which could damage heritage buildings, structures and cemeteries intersecting the area demarcated for underground mining	National Heritage Resources Act, 1999 (Act No 25 of 1999)	NEMA MPRDA NHRA SAHRA	Record occurrences of heritage sites and artefacts if and when discovered. Immediately contact a heritage specialist if any discoveries are made.	Environmental Manager / Specialist	As per Heritage Impact Assessment and Heritage Management Plan	Continuous
Socio Economic							
Construction of infrastructure	Positive Impacts: Impacts on local employment (limited); Impacts on existing and new HDSA suppliers, SMMEs and other small businesses due to local procurement of goods and services; and Economic spin-offs as a result of	Social Labour Plan Labour Act Basic Conditions of Employment Act	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
	salaries and wages, contractors that reside in local B&B's and guesthouses; positive impacts for local merchants and grocery stores as a result of higher spending power; and a possible increase in informal traders.						
Construction and operation of surface infrastructure and underground mine	Positive: Skills development and training is that it increases the employability of a region's workforce, resulting in enhanced economic opportunities and thus addressing poverty alleviation over the medium to long term	Social Labour Plan Labour Act Basic Conditions of Employment Act	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous
Construction of infrastructure	Influx of jobseekers and the impact of temporary construction workers	Social Labour Plan Commitments Health and Safety Plan ESMS MHSA OHSA Code of Conduct	Social Labour Plan Community Engagement Plan	Environmental Manager / Community Liaison Officer	Human Resources/ Procurement	Environmental Manager / Community Liaison Officer	Continuous
Construction of infrastructure	Impacts on families and individuals due to increased traffic, higher security risks and intrusion risks	Health and Safety Plan ESMS MHSA OHSA Code of Conduct	Social Labour Plan Community Engagement Plan	Complaints should be investigated (if any)	Environmental Manager	Annually	Continuous
Construction of infrastructure	Impacts on surface infrastructure and services due to damage to road surfaces and service disruption	Health and Safety Plan ESMS MHSA OHSA Code of Conduct Constitution of South Africa SLP Commitments	Social Labour Plan Community Engagement Plan	Complaints should be investigated (if any)	Environmental Manager	Annually	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Construction of infrastructure	Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers that could manifesting in the following ways: Construction related accidents due to structural safety of project infrastructure; Dust generation and air pollution causing respiratory diseases; High ambient noise levels caused by machinery and construction equipment, resulting in loss of hearing; Dehydration, sunburn and related issues due to unsafe and insufficient drinking water and high temperatures during summer months; and Possible increase in HIV/AIDS and other STDs due to prostitution activities and temporary sexual relationships with local women, unwanted pregnancies that place further pressure on Basic Health Care Services (should contractors and/or workers from outside the local/regional study areas be used).	Health and Safety Plan ESMS Code of Conduct OHSA MHSA Constitution of South Africa SLP Commitments NEMBA NEMAQA	Health and Safety Regulations. A safe and low risk environment	Monitor Emergency Preparedness	Environmental Manager, Mine Manager	Continuous	Continuous
Operation of mine and surface infrastructure	Positive: The Birmingham Mining Project MWP (2020) indicates that the project will have a workforce of about 167 people. A marginal impact on the local economy as a result of new employment is anticipated.	Social Labour Plan Labour Act Basic Conditions of Employment Act	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Operation of mine and surface infrastructure	Positive: The Birmingham Mining Project will prioritise the sourcing capital goods, services, and consumables from HDSA empowered companies and already implements an enterprise development programme with the aim to find opportunities for HDSAs in the core of the business in line with the criteria and standards set by Mining Charter (2018). This practise will continue for the duration of the project's operation.	Social Labour Plan Labour Act Basic Conditions of Employment Act	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous
Operation of mine and surface infrastructure	The mine may result in potential job losses in the agricultural sector, loss in access to livelihoods, and impact negatively on the value of the land.	Social Labour Plan Labour Act Basic Conditions of Employment Act	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous
Operation of mine and surface infrastructure	Possible long-term impacts of underground coal mining on natural resources and agricultural land uses could include: Potential to alter the topography due to surfaces that collapse over time; Reduction of groundwater supply due to the pumping of underground water; Quality impacts on water resources and water that is not fit for human and livestock consumption as well as irrigation purposes; and Water holding capacity of the soil could be impacted as water leaks out of soil profile beyond the root zone.	NEMAQA Dust regulations ECA noise regulations SANS 10103 WUL CARA OHSA MHSA Grievance Mechanism	Health and Safety Regulations. A safe and low risk environment	Monitor Emergency Preparedness	Environmental Manager, Mine Manager	Continuous	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Operation of underground mining and surface infrastructure	An influx of jobseekers and migrant workers results in population growths and impacts on STLM in the following ways: Increase in the number and size of informal settlements; An increase in local unemployment, especially amongst the youth and unskilled; Potential conflict between locals and "outsiders" that compete for employment opportunities and other resources; A potential increase in crime and other social issues in the direct vicinity of the Project and in the wider municipal area (drug abuse, prostitution, etc.); Impacts on spatial planning; and Additional pressure on local government to provide housing, services, employment	Labour Act Basic Conditions of Employment Act SLP Commitments	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Operation of underground mining and surface infrastructure	A variety of factors could impact land values of affected farms and those in the surrounds: The quality and availability of water for domestic and farming purposes; Negative impacts on topography (surfaces that collapse with time due to underground mining); Loss of soil characteristics (erosion and compaction); Intrusion impacts, such as noise and dust, which could have an impact on crops and livestock; Visual impacts; Criminal activities (theft, vandalism, etc.); Occurrence of informal settlements, trespassing on private land, illegal grazing; Pre-requirements and restrictions set by the mining company in terms of new infrastructure developments on private properties; Fragmentation of agricultural land (subdivisions); and so forth.	NEMAQA Dust regulations ECA noise regulations SANS 10103 OHSA MHSA SA Constitution EMS Policy Grievance Mechanism	Health and Safety Regulations. A safe and low risk environment	Monitor Emergency Preparedness	Environmental Manager, Mine Manager	Continuous	Continuous

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Operation of underground mining	The aim of the various training programmes, as enforced through the Mining Charter (2018), is to produce a skilled, trained, and diverse workforce to meet the demands of the modern industry; develop skills that enhance productivity of the workforce and improve the employment prospects of HDI's; and develop entrepreneurial skills that improve people's livelihoods and create mining-led local and regional economic diversification. The community projects will also continue.	Labour Act Basic Conditions of Employment Act SLP Commitments	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous
Operation of underground mining	Impacts due to lack of communication with landowners and communities can results in disruptions for the Project, temporary mine closures and loss of income; Financial implications for the mine, host communities and private landowners should legal resources be pursued.	EMS Policy Grievance Mechanism Social Labour Plan Labour Act Basic Conditions of Employment Act	Community Engagement Plan	Responsibility: Mining company EMC to consist of CLO, Ward Councillor, representative of prominent community groups, landowners, national, provincial, and local government.	Establishment of the EMC Annual / quarterly EMC feedback meetings and reports (monitoring purpose). Provide historic and current data to the mine that relate to crop yields, livestock illnesses, reduction in turnovers, cutbacks of farm workers, etc	Prior to construction Construction phase Operational phase	Responsibility: Mining company EMC to consist of CLO, Ward Councillor, representative of prominent community groups, landowners, national, provincial, and local government.

Activity	Potential Impact	Standard to be Achieved	Compliance with Standard to be Achieved	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency	Implementation
Operation of underground mining	Mining depletes water supplies; pollutes the air, soil, and water; destroys ecosystems and arable land. Runoff and spills from mines and waste ponds often contaminate drinking and irrigation water, violating the rights to life, health, water, food, and a healthy environment.	SA Constitution NEMAQA Dust regulations ECA noise regulations SANS 10103 OHSA MHSA	Health and Safety Regulations. A safe and low risk environment	Monitor Emergency Preparedness	Environmental Manager, Mine Manager	Continuous	Continuous
Operation of underground mining and surface infrastructure	Positive impact on minority group due to employment of women, Employment equity of HDP's	Labour Act Basic Conditions of Employment Act SLP Commitments	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous
Operation of underground mining and surface infrastructure	Impact on health and safety of workers and people living in the area; Impact on traffic; Impact on sense of place; Impacts on community health; Relocation of individuals; Security Risks; and impacts associated with blasting	OHSA MHSA SLP Commitments Grievance Mechanism National Road Traffic Act	Health and Safety Regulations. A safe and low risk environment	Monitor Emergency Preparedness	Environmental Manager, Mine Manager	Continuous	Continuous
Operation of underground mining and surface infrastructure	Impacts on basic services and historical and archaeological service	National Road Traffic Act OHSA MHSA SAHRA NHRA	Social Labour Plan Community Engagement Plan	Impacts should be investigated Complaints should be investigated (if any)	Environmental Manager	Annually	Continuous
Operation of underground mining and surface infrastructure	Increased traffic and impacts on road infrastructure	National Road Traffic Act OHSA MHSA	Social Labour Plan Community Engagement Plan	Complaints should be investigated (if any)	Environmental Manager	Annually	Continuous
Closure of underground mine and decommissioning and closure of surface infrastructure	Traffic and intrusion impacts; Potential security issues; Impacts on road infrastructure; and Health and Safety impacts.	National Road Traffic Act OHSA MHSA	Social Labour Plan Community Engagement Plan	Complaints should be investigated (if any)	Environmental Manager	Annually	Continuous

8.1 DETAILED MONITORING PROGRAMMES AS DESCRIBED FOR ACTIVITIES

8.1.1 Geology, Soil and Erosion Monitoring Programme

Soil monitoring will involve the inspection of soil which has been disturbed, compacted, contaminated, or eroded. Soil monitoring will assist in determining where soils have not been sufficiently rehabilitated.

Where soils have contaminated by the spillage of hydrocarbon, monitoring must take place on a weekly basis for at least four (4) weeks or until the soil is considered sufficiently rehabilitated. Soils samples should be taken and submitted to a laboratory to test for contaminant content if it is considered necessary.

Soil monitoring should be undertaken during the following periods:

- Areas which have been rehabilitated following construction
- After remediation, soils which have been contaminated by spillages during the operational phase, and
- After the closure and decommissioning phase.

Monitor and Manage soil contamination in accordance with Standard Operational Programmes and Consolidated EIA (Approved 2015) for the existing operations.

All watercourses or riparian areas requiring re-vegetation should be monitored for signs of erosion. In addition, all of the following areas should also be monitored:

- All stormwater discharge points
- All clean water diversion discharge points, and
- All road crossings.

Monitoring activities should consist of fixed-point photography as well as a walk-through surveys to observe for signs of erosion in the field. Monitoring should be done annually at the end of the rainy season. Any erosion damage observed should be repaired immediately.

8.1.2 Ground Water Monitoring Pogramme

Groundwater Monitoring Network

A groundwater monitoring system must adhere to the criteria mentioned below. As a result, the system should be developed accordingly.

Source, plume, impact, and background monitoring

A groundwater monitoring network should contain monitoring positions which can assess the groundwater status at certain areas. The boreholes can be grouped classification according to the following purposes:

- **Source monitoring:** Monitoring boreholes are placed close to or in the source of contamination to evaluate the impact thereof on the groundwater chemistry.
- **Plume monitoring:** Monitoring boreholes are placed in the primary groundwater plume's migration path to evaluate the migration rates and chemical changes along the pathway.

- **Impact monitoring:** Monitoring of possible impacts of contaminated groundwater on sensitive ecosystems or other receptors. These monitoring points are also installed as early warning systems for contamination break-through at areas of concern.
- **Background monitoring:** Background groundwater quality is essential to evaluate the impact of a specific action/pollution source on the groundwater chemistry.

System response monitoring network

Groundwater levels: The response of water levels to abstraction is monitored. Static water levels are also used to determine the flow direction and hydraulic gradient within an aquifer. Where possible all of the above-mentioned borehole's water levels need to be recorded during each monitoring event.

Monitoring frequency

In the operational phase and closure phase, quarterly monitoring of groundwater quality and groundwater levels is recommended. Quality monitoring should take place before after and during the wet season, i.e., during September and March. It is important to note that a groundwater-monitoring network should also be dynamic. This means that the network should be extended over time to accommodate the migration of potential contaminants through the aquifer as well as the expansion of infrastructure and/or addition of possible pollution sources.

Monitoring Parameters

The identification of the monitoring parameters is crucial and depends on the chemistry of possible pollution sources. They comprise a set of physical and/or chemical parameters (e.g., groundwater levels and predetermined organic and inorganic chemical constituents). Once a pollution indicator has been identified it can be used as a substitute to full analysis and therefore save costs. The use of pollution indicators should be validated on a regular basis in the different sampling positions. The parameters should be revised after each sampling event; some metals may be added to the analyses during the operational phase, especially if the pH drops.

Abbreviated analysis (pollution indicators)

Physical Parameters:

- Groundwater levels

Chemical Parameters:

- Field measurements:
  - pH, EC
- Laboratory analyses:
  - Major anions and cations (Ca, Na, Cl, Cr, SO4)
  - Other parameters (EC)

Full Analysis

Physical Parameters:

- Groundwater levels

Chemical Parameters:

- Field measurements:
  - pH, EC
- Laboratory analyses:
  - Anions and cations (Ca, Mg, Na, K, NO3, Cl, SO4, F, Fe, Mn, Al, Cr & Alkalinity).
  - Other parameters (pH, EC, TDS).
  - Petroleum hydrocarbon contaminants (where applicable, near workshops and petroleum handling facilities)
  - Sewage related contaminants (E. coli, faecal coliforms) in borehole in proximity to septic tanks or sewage plants.

Monitoring Boreholes

DWAF (1998) states that "A monitoring hole must be such that the section of the groundwater most likely to be polluted first, is suitably penetrated to ensure the most realistic monitoring result."

Currently a monitoring network does not exist for the proposed Birmingham Project. The recommended boreholes are listed in Table 5. These boreholes can be utilised for water level monitoring during operations, as well as groundwater quality monitoring after decommissioning of the site. However, a monitoring network should be dynamic. This means that the network should be extended over time to accommodate the migration of contaminants through the aquifer as well as the expansion of infrastructure and/or addition of possible pollution sources. An audit on the monitoring network should be conducted annually.

Table 5: Proposed groundwater monitoring boreholes for the proposed Birmingham Mining Porject

ID	Latitude (South)	Longitude (East)	Owner	Property	Reasoning	Frequency	Existing/New
BSMFNT BH1	-26.0764	29.67322	Mr. A. Pelser	BOSCHMANSFONTEIN 182 IS, Portion 4	Water level and quality measurements	Quarterly	Existing
BSMFNT BH2	-26.0771	29.68004	Mr. A. Pelser	BOSCHMANSFONTEIN 182 IS, Portion 4	Water level and quality measurements	Quarterly	Existing
BSMFNT BH3	-26.0808	29.67462	Mr. A. Pelser	BOSCHMANSFONTEIN 182 IS, Portion 4	Water level and quality measurements	Quarterly	Existing
BSMFNT BH4	-26.0556	29.6745	Mr. A. Pelser	KLEIN DRAKENSTEIN 183 IS	Water level and quality measurements	Quarterly	Existing
BSMFNT BH5	-26.0821	29.67311	Mr. A. Pelser	BOSCHMANSFONTEIN 182 IS, Portion 4	Water level and quality measurements	Quarterly	Existing
BSMFNT BH6	-26.0736	29.68339	Mr. A. Pelser	BOSCHMANSFONTEIN 182 IS, Portion 4	Water level and quality measurements	Quarterly	Existing
BIRM BH3	-26.1247	29.64349	Mr. A. van Wyk	BOSCHMANSKRAAL 184 IS, Portion 1	Water level and quality measurements	Quarterly	Existing
BIRM BH5	-26.1438	29.6771	Mr. W.A. de Klerk	BIRMINGHAM 197 IS	Water level and quality measurements	Quarterly	Existing
BIRM BH6	-26.1445	29.67544	Mr. W.A. de Klerk	BIRMINGHAM 197 IS	Water level and quality measurements	Quarterly	Existing
BSMNKR BH1	-26.1514	29.64349	Mr. Sakhile	BOSCHMANSKRAAL 184 IS, Portion 3	Water level and quality measurements	Quarterly	Existing
BOS 1	-26.1072	29.65605	Mr. W.A. de Klerk	BOSCHMANSFONTEIN 182 IS, Portion 1	Water level and quality measurements	Quarterly	Existing

8.1.3 Surface Water Monitoring Programme

Due to the risk of surface water pollution, it is suggested that monthly surface water monitoring takes place in the Klein-Olifants River and its tributaries, at the monitoring points described in Table 6. Biomonitoring should be undertaken biannually, once in the wet season and once in the dry season, at an upstream (if possible) and downstream point (BRH Sample 4).

Proposed monitoring should be undertaken during the construction and operational phases of the mine. Once the mine moves towards decommissioning and closure, the monitoring programme will have to be updated and upgraded to cover the monitoring needs related to the specific closure objectives.

Table 6: Surface Water Monitoring Sites

Monitoring point	Coordinates	Description
BRH Sample 1 - U/S	26° 9'38.36"S, 29°38'58.11"E	Dam in an unnamed tributary of the Klein-Olifants River, southern section project activities
BRH Sample 2 - U/S	26° 9'52.60"S, 29°40'7.61"E	Dam in an unnamed tributary of the Klein-Olifants River, southern section project activities
BRH Sample 4 - D/S	26° 3'4.58"S, 29°43'21.46"E	Klein-Olifant River, north-east of project activities. Downstream.

The monthly surface water monitoring samples should be analysed for the following parameters:

- Magnesium
- Sulphate
- Sodium
- Chloride
- Calcium
- Conductivity
- pH
- Oxygen Dissolved
- Total Alkalinity
- TDS
- Ammonia and Ammonium
- Nitrate
- Nitrite
- Ortho Phosphate
- Potassium
- Silicon
- Aluminium
- Fluoride
- Iron
- Manganese

In addition, monitoring of the water quality in the pollution control dam/s should be undertaken on a quarterly basis and include the variables as specified in the table above. The water quality will be representative of:

- Seepage/run off from the mining areas.
- Seepage from waste rock dump and other mine residue stockpiles.

8.1.4 Wetland Monitoring

Construction Phase Monitoring

- Compliance monitoring will be the responsibility of a suitably qualified/trained ECO (Environmental Control Officer) with any additional support from the Environmental Officer/Environmental Manager, having the required competency skills and experience to ensure that monitoring is undertaken effectively and appropriately.
- A photographic record of the state of the watercourse prior to the commencement of clearing/construction must be kept for reference and rehabilitation monitoring purposes.
- The ECO must undertake bi-monthly compliance monitoring audits. Freshwater ecosystem aspects that must be monitored, related to monitoring freshwater ecosystem impacts include:
    - Condition of demarcation fence
    - Evidence of no-go area incursions
    - Condition of temporary runoff, erosion and sediment control measures and evidence of any failures
    - Evidence of elevated river / stream turbidity levels
    - Evidence of bed/bank erosion
    - Visual assessment of stormwater quality and instream water quality
    - Waste management and presence of litter within the working area
    - Evidence of hazardous waste material spillage and soil contamination
    - Presence of alien invasive species
    - Once construction and rehabilitation has been completed, the ECO should conduct a close-out project audit, one (1) month after completion of rehabilitation.

Operational Phase Monitoring

- It is important that the location and extent of the wetlands and rivers in the vicinity of project activities be incorporated into all formal monitoring plans for the current mining operation and activities.
- In terms of management, alien invasive plant control must be practiced on an on-going basis in line with the requirements of Section 2(2) and Section 3 (2) the National Environmental Management: Biodiversity Act (NEM:BA), which obligates the landowner/developer to control invasive alien species on their property.

It will be important that long-term monitoring of the potential freshwater ecosystem impacts be undertaken to proactively to identity any environmental issues and impacts that may arise as a result of the project. This should be one as part of the monitoring programme. The following key aspects should be monitored:

- Erosion in the wetland downslope waste rock dumps
- Presence of alien invasive plants.

8.1.5 Aquatic Monitoring

The monitoring plan is outlined in Table 7.

Table 7: Aquatic Monitoring programme proposed

Location	Aspect	Parameters	Frequency
Upstream in watercourse	Aquatic Health – Biomonitoring	As per Water Quality measured to determine baseline quality – refer to Surface water assessment report (Red Kite Environmental Solutions (Pty) Ltd, 2020)	Bi-annually
	Surface water quality and quantity		Monthly
Downstream in watercourse	Surface water quality and quantity		Monthly
	Aquatic Health – Biomonitoring		Bi-annually
Water balance	Daily abstraction values to ensure no over abstraction of either surface or ground water resources occur	Bi-annual updating of formal water balance based on seasonal trends, usage (flow meter data).	Daily recording, monthly statistics, and bi-annual water balance update to determine trends on a seasonal basis
Footprints within buffer zones which includes crossings or other within 100m (rivers) or 500m (wetlands)	Monitor regularly along pipelines or other structures to ensure no undetected leakage, erosion or wastage is taking place within these zones	Monitor for impacts within sensitive zones	Monthly

8.1.6 Ecological and Vegetation Establishment

Vegetation Re-Establishment

Areas re-vegetated following construction activities, decommissioning activities or any activities leading to vegetation removal and disturbance should be monitored following seeding to ensure successful establishment of vegetation. The following broad guidelines should apply, though the site-specific details should be determined by a suitably qualified expert:

- Monthly monitoring for the first six (6) months, then annual monitoring during the growing season.
- Monitoring for the first six (6) months should focus on cover.
- 70% cover should be achieved after 3 months.
- Annual monitoring (representative sample of re-vegetated sites only) should be undertaken until the appointed independent specialist is satisfied that a sustainable vegetation cover has been established.

Alien Vegetation

An ongoing alien vegetation removal programme should be implemented during and after construction, and continually during the operational phase. Alien vegetation removal should consider water quality concerns

associated with removal of invasive alien vegetation within a water course (i.e. only approved herbicides or mechanical measures may be used). Biannual monitoring inspections should identify target areas for clearing.

8.1.7 Noise Monitoring Program

The proposed noise monitoring program is included below. The Environmental Monitoring Programme is presented below in Table 8. Monitoring localities are presented in Figure 1 below.

Table 8: Environmental Noise Monitoring Programme

Environmental Monitoring Programme
Frequency and locality: – Quarterly noise measurements to be conducted at For R2 and R4. – The Environmental measurements should be conducted at I&AP's i.e., farmsteads, receptors, communities. Should the receptors be relocated, the measurement locality be investigated to be removed. – Monitoring at the plant footprint boundary needs to be conducted. Although no receptors are at the plant boundary, the noise spill over extent into neighbouring properties must be assessed. – The measurements should be conducted prior to any phase to ensure baseline findings. Measurements should further be conducted during all phases including construction, operational and closure phases. **EMPr Monitoring Programme:** – Measurements should be conducted in terms of L_{Aleq} equivalent values (impulse), with statistical and octave data logged (if uncertain about L_{Aleq} or due to limitations). Meteorological (wind) conditions should be logged. International (fast) measurements could be considered for comparison with the International Finance Corporation requirements (if required). – Where feasible longer term (+24 hours) unattended or 10-minute measurements should be attempted to represent a maximum capacity of evaluated scenario, and at/near receptors (or project footprint). – (Recommended but not required) If feasible Engineering test should be conducted during Environmental measurements to identify any noisy equipment requiring enclosures, or equipment where maintenance is required. – The quarterly measurement report should be reviewed after the first 2 years of monitoring. – Reporting should be compiled and submitted to the relevant authorities. The ToR of the report should include SANS10103:2008 methodologies in it, with the Noise Control Regulations limits applied. – Reports should be made available to receptors with the frequency and platform decided by the project team. – Each measurement should be conducted during a "worst-case scenario" (identify, discuss operations, ensure what is been measured is relevant for a moderate operational protocol or higher), and to minimise limitations of measuring only every quarterly period.

Target Criterion:

- The methodology as proposed by SANS10103:2008 should be used. Compliance with the Noise Control Regulations should be met (no increase of +7dBA from identified Rating).
- The boundary of the property/farm portion/mining rights area should not be exceeded by 61 dBA 24 hour or similar (controlled zone).

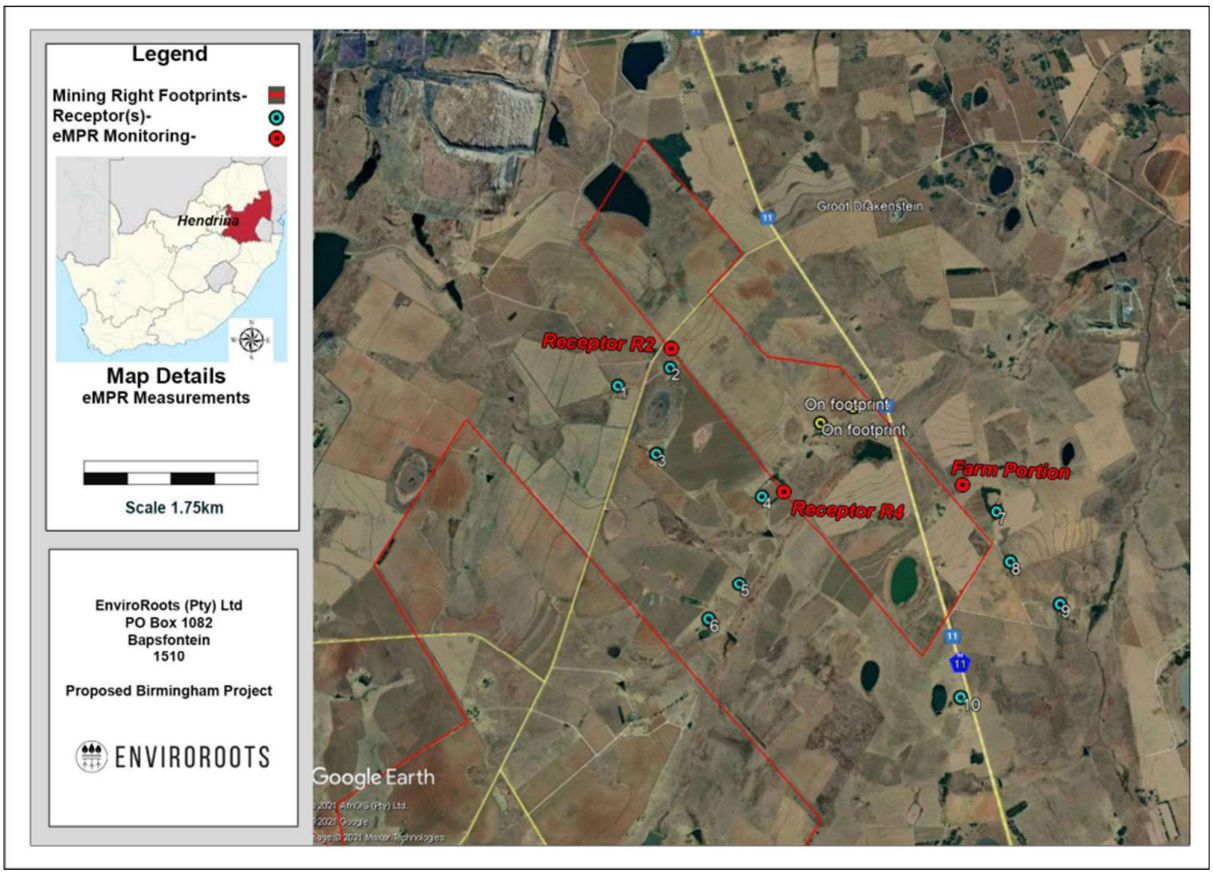

Figure 1: Monitoring points

8.1.8 Blasting Monitoring Programme

A monitoring programme for recording blasting operations is recommended. The following elements should be part of such a monitoring program:

- Ground vibration and air blast results.
- Blast Information summary.
- Meteorological information at time of the blast.
- Video Recording of the blast.
- Fly rock observations.

Most of the above aspects do not require specific locations of monitoring. Ground vibration and air blast monitoring requires identified locations for monitoring. Monitoring of ground vibration and air blast is done to

ensure that the generated levels of ground vibration and air blast comply with recommendations. Proposed positions were selected to indicate the nearest points of interest at which levels of ground vibration and air blast should be within the accepted norms and standards as proposed in this report. The monitoring of ground vibration will also qualify the expected ground vibration and air blast levels and assist in mitigating these aspects properly. This will also contribute to proper relationships with the neighbours.

Monitoring positions were identified for the new North Adit area as a minimum that will be required. Some of these points may be applicable to more than one installation. The new adit will have the same points that need to be monitored. Monitoring positions are indicated in Figure 2 and Table 9 lists the positions with coordinates. These points will need to be re-defined after the first blasts done and the monitoring programme defined.

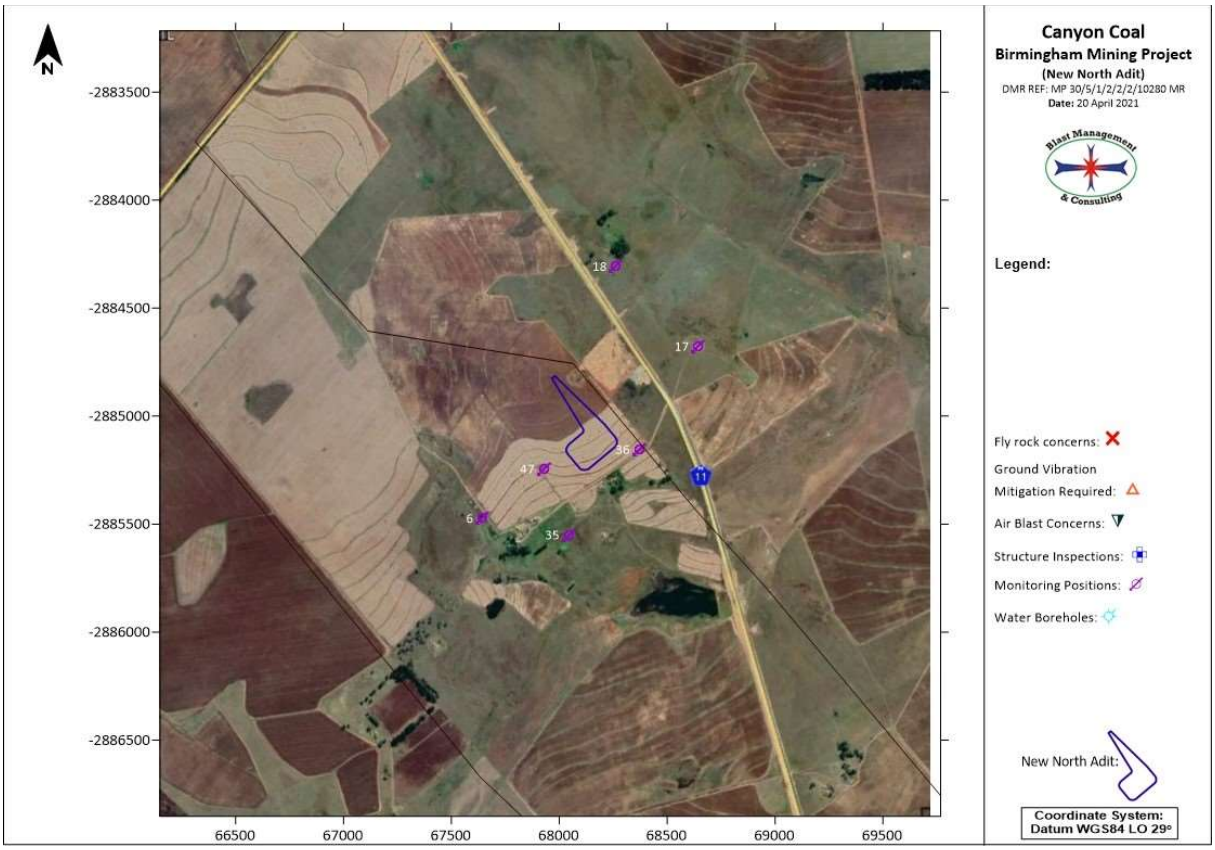

Figure 2: Monitoring Positions suggested for new North Adit

Table 9: List of possible monitoring positions for new North Adit

Tag	Description	Y	X
6	Farm Buildings/Structures	-67643.8	2885473
17	Farm Buildings/Structures	-68644.3	2884677
18	Ruins	-68263.4	2884307
35	BSMFNT BH2	-68044.1	2885549
36	BSMFNT BH6	-68370.5	2885154

47	Graveyard (BF25)	-67927.6	2885244.6

8.1.9 Biodiversity Monitoring

A monitoring framework should be instigated and managed by their responsible body and the following system may enforce good practice:

- Implement an “observe and report” approach which will enable employees to report any disturbance of flora/fauna or degradation that they encounter.
- Alien invasive awareness, eradication, and control programme on an annual basis.

8.1.10 Heritage Monitoring Program, including Paleontological Features

The proposed heritage monitoring programme is included in Figure 3 below.

Site type	Impact	Applicable Phase	Action	Frequency	Responsible person
Heritage buildings, structures and cemeteries intersecting the area demarcated for underground mining	Potential damage should subsistence and vibration occur	Operational	Monitoring of buildings, structures and cemeteries	Quarterly, as well as pre- and post-blasting	ECO
Demolished heritage sites intersecting the area demarcated for underground mining	None foreseen	Operational	None required	N/A	N/A
Demolished heritage buildings, structures and intact cemetery intersecting the area demarcated for surface infrastructure	Potential damage to subsurface cultural remains and cemetery	Planning & Construction	Monitoring of subsurface remains; Conservation buffer, management plan and monitoring of cemetery	Subsurface material: Duration of construction Cemetery: Quarterly, as well as pre- and post-blasting	ECO
All surface impacts	Potential damage to subsurface culturally significant material	Construction	Monitor subsurface material	Duration of construction	ECO

Figure 3: Proposed heritage monitoring

Should any heritage remains be discovered during any phase of the development, all work shall stop, and a specialist should be consulted.

8.1.11 Air/Dust Monitoring Program

Dust deposition measurements should be carried out by method ASTM 1739- 98 recommended in SANS 1929-2004. This involves exposure of a standard bucket for a month, with weighing (and chemical analysis, if necessary) of the dust collected. The changing of dust buckets should be undertaken by trained Birmingham Mining Project personnel monthly and the weighing should be carried out at a suitable off-site or on-site laboratory.

	Birmingham - Baseline Dust							
	Gravimetric Dust Fallout (mg/m2/day)							
Location	Nov-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Average
BIRM1	172	249	421	143	40	39	485	221
BIRM2	53	99	184	159	209	127	119	136
BIRM3	191	322	540	88	193	92	590	288
BIRM4	101	150	227	102	136	46	80	120
Residential Limit	600	600	600	600	600	600	600	191
Industrial Limit	1200	1200	1200	1200	1200	1200	1200	
3 Month Average			226	224	204	115	180	
Monthly Average	129	205	343	123	145	76	319	

Figure 4: Current Dust Monitor Results

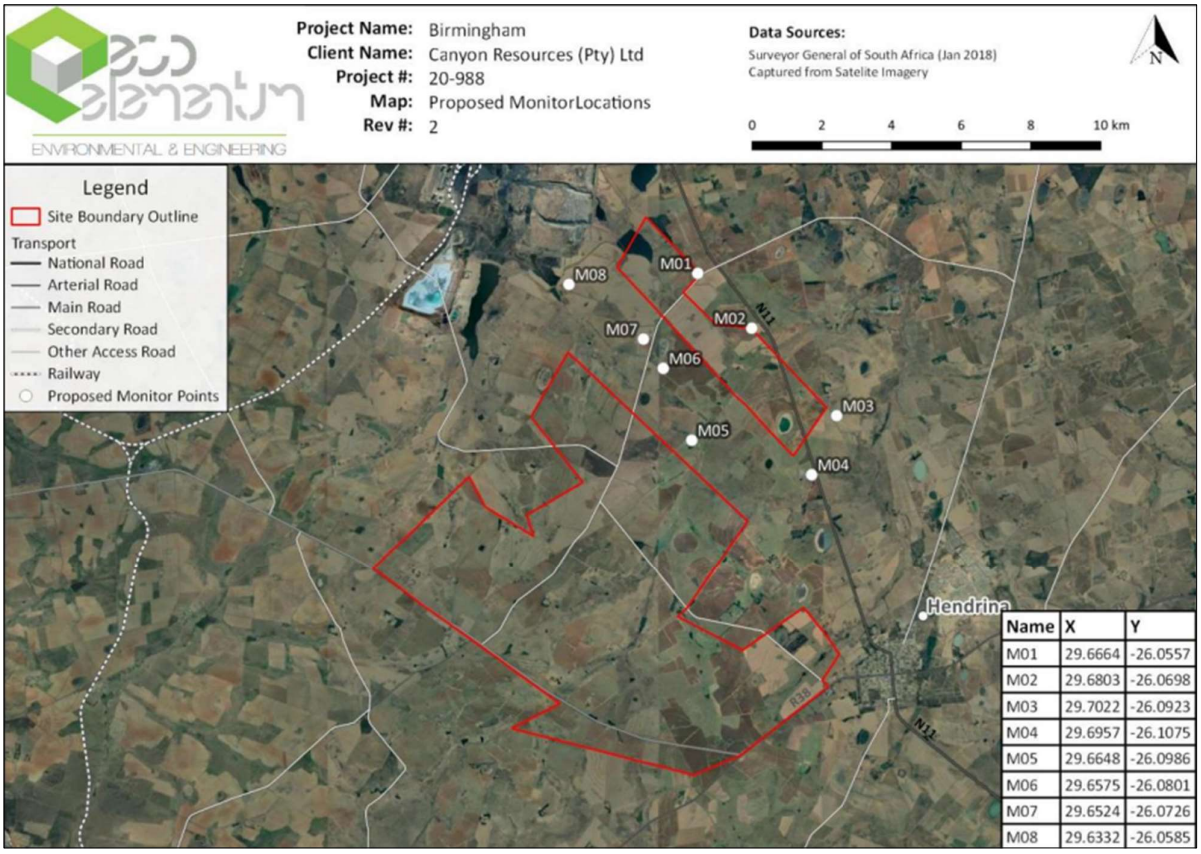

Figure 5: Proposed air quality monitoring sites

8.1.11.1 Gravimetrical Dust Fallout – (Milligram/Square m/day) or mg/m2/Day) (Monthly 8 Samples)

Site layout for sampling points must be carried out according to the eight main compass directions; the site layout and equipment placement must be done in accordance with the ASTM standard, D 1739 – 2010, thereafter relevant sampling reference numbers will be allocated to the receptors accordingly. At each gravimetric dust fallout gauge/receptor point there is a stand built according to specification containing the dust sample collection bucket. Samples will be collected after a 1 month running period (+-30 day's exposure). After

sample collection, the samples are taken to a SANAS accredited laboratory as required. A visual site investigation is done where after correlations are drawn and findings are identified and reported on. Dust buckets of a standard size and shape are prepared and set up at locations related to the eight main compass points on the borders of the property so that dust can settle in them for periods of 30+/-2 days. The dust buckets are then sealed and replaced with new empty ones and send away to the SANAS accredited laboratory for analysis. The masses of the water-soluble and –insoluble components of the material collected are then determined and results are reported as mg/m²/day. This methodology is described according to South African National Standards 1929:2004 and the American Society for Testing and Materials (ASTM) Designation: D 1739-98 (2010). The results for this method of testing are obtained by gravimetrical weighing. The apparatus required include open top buckets/containers not less than 150 mm in diameter with a height not less than twice its diameter. The buckets must be placed on a stand at a height of 2 +/-0.2 m above the ground.

8.1.11.2 PM10 Monitoring

It is recommended that the client should establish a fine particulate monitoring programme, which should include one particulate instrument to monitor PM10 and preferably PM2.5 specifically at the problem areas shown by the passive sampling campaign at the residential areas. Handheld sampling instruments not only allows for sampling in the 8 main wind directions, but also on-site sampling down-wind of potential dust sources to quantify and determine impacts that need to be managed. It is advised to conduct this sampling on a monthly basis but also when the need arise during periods of elevated dust concentrations being emanated from the site. Passive Sampling in the form of Dust Buckets lack crucial information such as wind direction to determine the direction of the source of the emissions.

8.1.12 Waste Monitoring

The following wastes needs to be monitored for the project:

- The types and volumes of waste deposited; and
- The volume of water removed and disposed of.

8.1.13 Rehabilitation Monitoring

The purpose of a monitoring, maintenance and aftercare programme is to ensure that the rehabilitation and closure objectives are met and that the rehabilitation process is followed. The frequency of monitoring must be adequate to identify potential gaps in the effectiveness of the mine closure strategy. A monitoring programme must be implemented during the operational and closure phases of the mine. The following identified aspects required continuous monitoring during the operation and closure phases:

- Alignment of the final landform design with that of the actual topography and landscape.
- Placing of the correct topsoil depth in order to encourage successful rehabilitation of vegetation communities.
- Erosion status of the mine site.
- Surface drainage and surface water quality.

- Groundwater quality.
- Successful re-vegetation and basal cover proportions.
- Rehabilitation effectiveness.
- Fauna and flora re-colonisation; and
- Control of invasive vegetation species.

9 ENVIRONMENTAL MONITORING AND AUDITING

Ongoing monitoring of the bio-physical and socio-economic environments will continue throughout the life of the project as per the approved EMPR's and the accepted monitoring programmes. Furthermore, Canyon will monitor and assess the performance of the EMP on an ongoing basis.
Monitoring of different environmental aspects/impacts shall take place by means of quantitative and qualitative evaluation techniques in order to determine whether the requirements of the environmental management programme are being complied with. Monitoring is a continuous data-gathering and control procedure. It may range from routine visual inspections to in-depth investigative monitoring.

9.1 GENERAL MONITORING AND MANAGEMENT

The appointment of a suitably qualified on-site Environmental Control Officer (ECO) is essential to the successful implementation and management of this project, although this role can be fulfilled by the SHE Representative. The ECO will be responsible for the implementation of the EMP, applicable environmental legislation and any stipulations/conditions set by the relevant competent authorities (including but not limited to the DMRE and DWS). The ECO will conduct formal monthly site inspections and conduct an internal annual audit during the phases of the development.

An external Environmental Auditor should also be appointed to conduct annual audits for the duration of the project. The auditor should monitor the success and effective implementation of the environmental management measures stipulated by applicable legislation, the EIA/EMP, and any conditions set by the competent authorities. Following each site visit, the auditor should submit a report to the DMRE documenting the success/failure of the implementation of the management measures at the operations.

9.1.1 Specific Monitoring Requirements

Monitoring of the development (both on site and where appropriate in the surrounding environments) should be considered a high priority and should be conducted in accordance with the relevant specialist recommendations as summarized below in the sections below.

9.1.2 Monitoring Protocol

It is essential that during the implementation and operational phase of the development that the monitoring of certain elements are carried out to ensure compliance with regulatory bodies. A monitoring protocol will be required. The monitoring only includes those activities identified in the EMP and excludes any monitoring that should take place according to the water use license. Compliance in terms of the WUL is essential.

9.1.3 Monitoring Requirements and Record Keeping

To ensure that the procedures outlined throughout the EMP are implemented effectively, it will be necessary to monitor the implementation of the EMP and evaluate the success of achieving the objectives listed in the EMP. To ensure that all personnel on site are aware of their obligation to protect the environment, induction training will also include environmental awareness.

The audit procedure will include a Compliance audit, conducted by the ECO. Where the objectives of the EMP are not being met the reasons will be determined and remedial action or variation to the tasks will be recommended. Major residual effects shall be documented in a Non-Conformance Report, during the remaining phases of the project. Follow-up audits will be conducted as per the audit protocol in the EMP.

9.1.3.1 Implementation Phase

The following monitoring needs to be conducted:

- The onset of monitoring (and those recorded within the Baseline assessment) will provide enough baseline data for comparison against future monitoring of the activities if re-opening occurs, especially since no significant change in monitoring is prescribed.
- All monitoring should commence at full scale as soon as opening is envisaged to ensure recent data for comparison against the operational phase.

9.1.3.2 Operational Phase

The following monitoring must be conducted: Please refer to Table 3 regarding mitigation outcomes and Table 4 for mechanisms for monitoring. Adherance to all conditions and monitoring frameworks as prescribed by the mine WUL.

9.1.3.3 Audit Protocol

It is essential that during the current and future phases of the development, the monitoring and auditing of certain elements are carried out to ensure compliance with regulatory bodies. An Audit Protocol for all phases will be required. The auditing only includes those activities identified in the EIA/EMP and excludes any auditing that should take place according to the water use license or any other legislative authorization process if and when they will be authorized.

9.1.3.3.1 Construction, Operational and Decommisioning Phase

The following audits must be completed:

- EMP compliance (Continuously): to be checked by an on-site ECO, SHE representative or Environmental manager (EM).
- External environmental compliance audits (EIA/EMP annually during operations).

9.1.3.4 Environmental Incidents

An environmental incident is defined as any unplanned event that results in actual or potential damage to the

environment, whether of a serious or non-serious nature. An incident may involve non-conformance with environmental legal requirements, the requirements of the EMP, or contravention of written or verbal orders given by the ECO or relevant authority.
All details regarding Environmental Incidents and procedures have been described within Section 2.3.2 above and should be handled accordingly.

9.1.3.5 Penalties and Fines for Non-Compliance or Misconduct

This EMP forms part of the contract agreement between the Client and the Principal contractor. As such, non-compliance with conditions of the EMP will amount to a breach of contract. Penalties will be issued directly to the contractor by the applicant in the event of non-compliance to the EMP specifications. The issuing of a penalty will be preceded by a verbal warning by the applicant, as well as strict instruction in at least one monthly ECO report to rectify the situation. The ECO and applicant will communicate with regards to realistic timeframes for possible rectification of the contravention, and possible consequences of continued non-compliance to the EMP. Penalties incurred do not preclude prosecution under any other law. Cost of rehabilitation and/or repair of environmental resources that were harmed by the actions of the contractor if such actions were in contravention of the specifications of the EMP will be borne by the contractor himself. Penalties may be issued over and above such costs. The repair or rehabilitation of any environmental damage caused by non-compliance with the EMP cannot be claimed in the Contract Bill, nor can any extension of time be claimed for such works. Penalty amounts shall be deducted from Certificate payments made to the Contractor.

The following categories of non-compliance are an indication of the severity of the contravention, and the fine or penalty amounts may be adjusted depending on the seriousness of the infringement:

- Category One: Acts of non-compliance that are unsightly, a nuisance or disruptive to adjacent landowners, existing communities, tourists or persons passing through the area.
- Category Two: Acts of non-compliance that cause minor environmental impact or localized disturbance.
- Category Three: Acts of non-compliance that affect significant environmental impact extending beyond point source.
- Category Four: Acts of non-compliance that result in major environmental impact affecting large areas, site character, protected species or conservation areas.

9.1.4 Environmental Awareness Plan

Environmental awareness training is important for two primary reasons:

a) The workforce must understand how they can play a role in achieving the objectives specified in the EMP; and
b) The workforce must understand their obligations in terms of the implementation of the EMP and adherence to environmental-legislative requirements.

The environmental awareness plan is aimed at ensuring that employees, contractors, subcontractors and other relevant parties are aware of and able to meet their environmental commitments. This plan is to be updated on a yearly basis during the phases of the project in light of operational changes, learning experiences and

identified training needs.

All full-time staff and contractors are required to attend an induction session when they start, which should include environmental aspects. It is, therefore, recommended that the ECO/Environmental Manager be involved in induction training. As the induction and entry will be located on the existing premises, the induction sessions may be modified/adapted based on the audience attending the specific session, but it should ensure that all employees gain a suitable understanding of:

- Environmental requirements of the project, and how these will be implemented and monitored;
- Including each employee's responsibilities with respect to environmental issues;
- Contents and commitments of the EMP, including no-go areas, employee conduct, pollution prevention (prohibitions against littering, unauthorized fires, loud music, entry to adjacent properties, road conduct etc.);
- Environmentally sensitive areas on and around the development sites, including why these are deemed important and how these are to be managed. Employees will also be made aware of protected species found on the existing and surrounding site and how these are to be conserved, as well as alien invasive species potentially found on the site and how these should be managed; and
- Incident identification, remediation and reporting requirements: what constitutes an environmental incident (spillages, fire, etc.) and how to react when such an incident occurs.

Environmental training will not be restricted to induction training sessions alone, but will be conducted on an on-going basis throughout the lifecycle of the project as and when required. Records are to be kept of the type of training given (matters discussed and by whom), date on which training was given and the attendees of each training session. The proposed Birmingham Mining Project will need to compile and implement a general environmental awareness programme, as well as job specific environmental awareness training.

The purpose of the general environmental awareness programme will be to promote ongoing environmental awareness amongst the workforces. It will focus on addressing environmental issues which have been identified as problematic through environmental audits, complaints received, or environmental monitoring undertaken. This awareness campaign can form part of daily/ weekly toolbox talks and must cover all applicable topics related to environmental management.

The purpose of the job specific environmental awareness training will be to ensure that Employees within the specific management units are equipped to implement the actions committed to in the EMPr. All members of the workforce are to be subject to job specific environmental training. This training will be undertaken by the managers of each of the management units. Supervisors will be trained to assist with the implementation and training of the work force.

9.1.4.1 Environmental Risk Identification

The environmental risks associated with each management area are to be identified by the manager and supervisors together with the technical services manager. The risks are to be documented and actions to reduce

these risks should be developed. The actions are to ensure overall compliance with the commitments of the EMPr.

9.1.4.2 Training

All members of the workforce (mining, plant workers, administration etc.) are to be subject to job specific training. This may include but not be limited to:

- Preventing pollution.
- Spill prevention and clean-up procedures.
- The location and purpose of material safety data sheets (MSDSs)
- Managing waste.
- No-go areas.
- Incident reporting.

The aspects to be covered however are dependent on the findings of the individual risk assessments. This is to be undertaken for each management area initially. Thereafter all new members of the workforce are to undergo environmental training as part of the training required to do their particular job.

9.1.4.3 Social Management Plan

Following are the management and monitoring measures for the Social Management Plan component of the Project:[12]

The objectives of the HDSA / Gender/ Skilled Development plan are to:

- Include previously disadvantaged individuals and groups in the employment, SMME, skills development and community projects.
- Identification of real community-based needs for community projects and income generating projects.
- Locals in the DPKISLM and in the site-specific study area are the primary recipients of economic advantages of the Project, training programmes, etc.
- Contribute to the 'Skills Development Plan'.

The activities and outputs for this plan are provided in Table 10.

Table 10: Activities and outputs for the Skills Development Plan

ACTIVITIES	TIMEFRAME	RESPONSIBLE / PARTIES INVOLVED	OUTPUT
• **Conduct needs assessment / skills / youth / gender analysis in local communities (DPKISLM).**	• When Mining Right is awarded • Construction phase	• CLO • SLP Manager • Ward Councillor • DPKISLM (LED Manager)	• Identification of locally available skills and gaps. • Recruitment targets included in Contractor Services Management

[1] This section only deals with social issues. Environmental related management and monitoring measures as proposed in the SEIA report are included in the EMPr.

[2] A 'Skills Development Plan' and 'Procurement Policy' is Table addressed in the SLP and compiled and finalised by the Birmingham Mining Project in accordance with the New Mining Charter.

• **Obtain the DPKISLM database of SMME's and identify gaps (training, etc.).** • **Implement training and other strategies to equip SMME's.** • **Feedback when tenders are awarded to promote transparency.** • **Compile strategies to address employment equity of HDSA's (women, youth, disabled).** • **Provide annual feedback for SLP purposes.**	• Operational phase (monitoring)	• Community groups (Ward committees, Youth, Women, etc.)	Plan (CSMP). Penalties where contracts are breached. • Prepared and trained SMME's that are ready to tender. • Compilation of a 'Gender Equity Policy'. • Equity strategies included in the 'Skills Development Plan'. • Identification of SLP infrastructure and income-generation community projects and training programmes focused on locals.

9.1.4.4 Awareness / Community Engagement Plan

The objectives of the community engagement plan are:

- Promotion of transparency and implementation of public participation for the duration of the Project.
- Eliminate conflict and address potential conflict in a pro-active manner.
- To establish a structure (EMC) that can be accessed by stakeholders for communication and engagement purposes.
- Address potential negative impacts on farming and livelihoods proactively.

The activities and outputs of the awareness / community engagement plan are provided in Table 11.

Table 11: The Awareness / Community Engagement Plan Activities and Outputs

ACTIVITIES	TIMEFRAME	RESPONSIBLE / PARTIES INVOLVED	OUTPUT
• **Appointment of a Community Liaison Officer (CLO).** • **Establishment of an Environmental Management Committee (EMC) and its objectives.** • **Compile protocol for stakeholders to raise complaints and make the procedures publicly available.**	• Prior to construction • Construction phase • Operational phase	• Responsibility: Mining company • EMC to consist of CLO, Ward Councillor, representative of prominent community groups, landowners, national, provincial, and local government.	• Establishment of the EMC • Annual / quarterly EMC feedback meetings and reports (monitoring purpose). • Provide historic and current data to the mine that relate to crop yields, livestock illnesses, reduction in turnovers,

• **Attend to matters expediently.**			cutbacks of farm workers, etc.

9.1.4.4.1 Complaints /Grievance Register

A complaints/grievance register must be kept at the office of the community liaison or environmental manager. The complaints form must also be electronically available and the environmental manager's contact details provided should a complaint submission be required or if minor problems are raised that can be easily rectified. The complaints register must provide the means for any environmentally related complaint to be registered. A registered complaint needs to be investigated and resolved though formal complaints system where the complainant can enquire on the status of the complaint. Complaints should be investigated with one month of being lodged or communication on reasons for extension be submitted to the complainant. Should complaints not be resolved to the satisfaction of the complainant it need to be escalated to the Department of Mineral Resources and Energy for mediation.

9.1.4.5 Responsible Persons

Compliance with the emergency response plan and ensuring individual safety will be responsibility of all employees and contractors on the mine. Record keeping, investigation and management of emergencies will be the responsibility of the following persons:

- Mine manager.
- Environmental Management Representative- this includes the Safety, Health and Environmental (SHE) managers and officers.
- Mining Engineer; and
- Site Manager(s).

9.1.4.6 Defining an Environmental Response Plan

Environmental emergencies occur over the short term and require an immediate response. A mine, as part of its management tools, especially if it is ISO 9000 and ISO 14001 compliant, should have an Environmental Emergency Response Plan. The plan should be disseminated to all employees and contractors and in the event of an emergency, it should be consulted.

This Environmental Emergency Response Plan should be used together with the Emergency Preparedness Plan placed on the mine where it will be easily viewed. The Emergency Response Plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers.

If the environmental emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed on the mine. A checklist of emergency response units must be consulted and the relevant units notified.

The checklist includes:

- Fire department.

- Police.
- Emergency health services such as ambulances, paramedic teams, poisons centres.
- Hospitals, both local and further afield, for specialist care.
- Public health authorities.
- Environmental agencies, especially those responsible for air, water, and waste issues.
- Other industrial facilities in the vicinity with emergency response facilities.
- Public works and highways departments, port, and airport authorities; and
- Public information authorities and media organisations.

9.1.4.7 Process for Identifying Environmental Emergency Procedures

The process that will be used to identify emergency situations at the mining operations will be conducted in terms of the Aspects Registers and may include the following emergencies:

- Safety risks and subsidence.
- Dam Overflow.
- Dam Breach (on-site).
- Residue Stockpile Failures and Risks.
- Berm Breach/Drain Overflow.
- Hydrocarbon Spill (diesel, oil, grease, etc.); and
- Veld Fires.

The necessary actions required, as well as the responsible person for ensuring that the actions are followed through and the reporting requirements are adhered to, to ensure effective and efficient response to each of the environmental emergency situations listed above are set out in this procedure.

9.1.4.8 Most likely Potential Environmental Emergencies

The following define the most likely potential environmental emergencies:

- Accidents.
- Fires.
- A major hydrocarbon spill or leak.
- A major spill or leak of process water.
- Flooding.
- Subsidence; and
- Explosions.

9.1.4.9 Accidents

In the case of a medical accident or problem, refer to the Emergency Preparedness Plan.

9.1.5 Indicate the Frequency of the Submission of the Performance Assessment Report

Yearly performance assessment reports are recommended. Refer to details on Auditing procedures (Section 9.1.3.3).

9.1.6 Manner In Which Risks Will Be Dealt With In Order To Avoid Pollution Or The Degradation of The Environment

Refer to Table 3 for the recommended mitigation measures to limit environmental impacts. A suitable risk matix may be used to evaluate operational risks during any stage of the development. Ensure compilation and compliance with all Standard Operational Procedures (SOPs) and that they be updated annually/bi-annually to ensure validity.

Also create a system or platform for I&APs to submit any grievances to the mine and communication with internal and external stakeholder i.e an Environmental and Social Management System (ESMS) system.

10 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

(among others, confirm that the financial provision will be reviewed annually).

The Immediate Closure Provision, as calculated, will be updated yearly as part of the annual liability assessment required by the MPRDA and GNR 1147 in terms of the NEMA, once operations commence. The Final Rehabilitation plan will need to be formalised as soon as Closure planning commences.

11 UNDERTAKINGS

The EAP, ……..Elemental Sustainability (Pty) Ltd ……., herewith confirms

a) The correctness of the information provided in the reports;

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

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

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

Signed at.....Centurion.....on this.....8th ..... day November 2021 .....

Signature of EA.....

Designation Environemental Assessment Practitioner.....

COMMITMENT/UNDERTAKING BY THE APPLICANT

I, Clifford Hallatt, the undersigned and duly authorised thereto by the Canyon Resources (Pty) Ltd undertake to adhere to the requirements and to the conditions as set out in the EMPR submitted to the Director: Mineral Development and approved on .....

Signed at Sandton on this 3rd day November 2021

Signature of applicant .....

Designation Chief Operating Officer

-END-

12 REFERENCES

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13 APPENDICES

Appendix 1: Qualifications and Resume of EAP

Appendix 2: Locality Plans (A3)

Appendix 3: Master layout plan / Site Layout information (A3 Drawings)

Appendix 4: Public Participation Documents (Scoping Report)

Appendix 5: Public Participation Documents (Environmental Impact Assessment)

Appendix 6: Specialist report – Agricultural Assessment, Soil and Land Capability Report

Appendix 7: Specialist report – Terrestrial Ecology

Appendix 8a: Specialist report – Surface Water Assessment

Appendix 8b: Specialist report – Aquatic Ecology Assessment

Appendix 9: Specialist report – Wetland Impact Assessment

Appendix 10: Specialist report – Hydrogeology and Hydropedological

Appendix 11: Specialist report – Air Quality Impact Assessment

Appendix 12: Specialist report – Noise Impact Assessment

Appendix 13: Specialist report – Heritage Impact Assessment

Appendix 14: Specialist report – Traffic Impact Assessment

Appendix 15: Specialist report – Visual Impact Assessment

Appendix 16: Specialist report – Cost Benefit Analysis

Appendix 17: Specialist report – Social Impact Assessment

Appendix 18: Specialist report – Blasting and Vibration Assessment

Appendix 19: Specialist report – Risk Assessment

Appendix 20: Specialist report – Rehabilitation and Closure Assessment

Appendix 21: Stability Assessment

Appendix 22: Screening report

Appendix 23: Acceptance of Scoping Report

Appendix 24: Waste Classification