DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE PROPOSED 2 SEAM MINE PROCESSING PLANT AND RIVER DIVERSION Mpumalanga

DMRE REF: MP 30/5/1/2/3/2/1 (405) EM

November 2022

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]

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Document Control, Quality Control and Disclaimer

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mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH THE 2 SEAM MINE PROCESSING PLANT AND RIVER DIVERSION, LOCATED IN THE MPUMALANGA PROVINCE

(MP) 30/5/1/2/3/2/1 (405) 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	2 Seam (Pty) Ltd.
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File Reference Numbers	**MP 30/5/1/2/3/2/1 (405) EM**

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

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.

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)

Refer to Section 18 and 19 of Part A: Environmental Impact Assessment Report and Appendix 15. These sections provide 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 (as amended) financial provision.

2.2.1 EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED

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, in the transitional period.

Due to the current uncertainty surrounding the change in the financial provision regulations, this report has utilised the current existing regulations but has only calculated the final rehabilitation cost and no concurrent

rehabilitation cost is included based on the mine schedule.

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 cost.

This Closure Cost Assessment was compiled in order to comply with the requirements of Regulation 54(2) of the MPRDA. This financial provision is submitted in terms of regulation 53 and 54 of the MPRDA, within the extended transitional period as presented in Government Notice No. R. 495 of 11 June 2021: "*unless regulation 17A, a holder of a right or permit, who applied for such right or permit prior to 20 November 2015, regardless when the right or permit was obtained –*

(a) must by no later than 19 June 2022 comply with these Regulations; and

(b) shall, until 19 June 2022, be regarded as having complied with the provisions of these Regulations, if such holder has complied with the provisions and arrangements regarding financial provisioning, approved as part of the right or permit issued in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)."

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 37 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.

2 Seam 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 2 Seam Mine needs 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. 2 Seam Mine 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 2 Seam Mine 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 2 Seam Mine 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. The 2 Seam Mine 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 2 Seam Mine 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 2 Seam Mine 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

2 Seam will establish standard operating procedures (SOPs). Th ese 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

As soon as possible.

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 2 Seam Mine 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 2 Seam Mine 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 2 Seam Mine 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 (DWS, 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.

2 Seam Mine 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"*.

4 ACID MINE DRAINAGE

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

Acid base accounting is a screening analytical procedure that provides values to help assess the acid-producing and acid-neutralising potential of waste rock or coal material in order to evaluate the acid mine drainage producing potential of the material that will be handled on site.

In this procedure, the amount of acid-producing rock is compared with the amount of acid neutralising rock, and a prediction of the water quality at the site (whether acidic or alkaline) is obtained.

The values that are compared are called the acid potential (AP) and the neutralising potential (NP). The comparison may be the difference between the two values, called the net neutralising potential (NNP) or the ratio of the two values, called the neutralisation potential ratio (NPR). Below are three tables showing the comparison ranges as well as the classification of the rock samples.

4.1 POTENTIAL RISK OF ACID MINE DRAINAGE

As 2 Seam Mine is a coal mine there is potential for 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.

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

A groundwater study, including a geochemical assessment was undertaken by GCS in 2016, updated in 2020 and 2022 for the 2 Seam Mine. Refer to Appendix 9. The Department of Water Affairs and Sanitation (i.e. Best Practice Guideline G4: Impact Prediction, Department of Water Affairs and Forestry 2008), as well as best international practice as outlined in the Global Acid Rock Drainage (GARD) Guide developed by the International Network for Acid Prevention (INAP) or in the International Finance Corporation Guideline for Mining (IFC 2007) requires a geochemical characterization including the evaluation of potential Acid Rock Drainage (ARD) and Metal Leaching (ML) of all formations foreseen to be disturbed or otherwise exposed by a mining project. These studies need to be adopted and carried out accordingly.

4.1.1.1 Base Testing

Acid-base accounting (ABA) is a static test where the net potential of the rock to produce acidic drainage is determined. The percentage sulphur (%S), the Acid Potential (AP), the Neutralization Potential (NP) and the Net Neutralization Potential (NNP) of the rock material are determined in this test, as an important first order assessment of the potential leachate that could be expected from the rock material. A description of the different ABA components is given below:

- If pyrite is the only sulphide in the rock the AP (acid potential) is determined by multiplying the percentage sulphur (%S) with a factor of 31.25. The unit of AP is kg $CaCO_3$/t rock and indicates the theoretical amount of calcite neutralized by the acid produced;
- The NP (Neutralization Potential) is determined by treating a sample with a known excess of standardized hydrochloric or sulfuric acid (the sample and acid are heated to ensure reaction completion). The paste is then backtitrated with standardized sodium hydroxide in order to determine the amount of unconsumed acid. NP is also expressed as kg $CaCO_3$/t rock as to represent the amount of calcite theoretically available to neutralize the acidic drainage; and
- NNP is determined by subtracting AP from NP.

In order for the material to be classified in terms of their acid-mine drainage (AMD) potential, the ABA results could be screened in terms of its NNP, %S and NP:AP ratio as follows:

- A rock with NNP < 0 kg $CaCO_3$/t will theoretically have a net potential for acidic drainage. A rock with NNP > 0 kg $CaCO_3$/t rock will have a net potential for the neutralization of acidic drainage. Because of the uncertainty related to the exposure of the carbonate minerals or the pyrite for reaction, the interpretation of whether a rock will actually be net acid generating or neutralizing is more complex. Research has shown that a range from -20 kg $CaCO_3$/t to 20 kg $CaCO_3$/t exists that is defined as a “grey” area in determining the net acid generation or neutralization potential of a rock. Material with an NNP above this range is classified as *Rock Type IV - No Potential for Acid Generation*, and material with an NNP below this range as *Rock Type I - Likely Acid Generating*;
- Further screening criteria could be used that attempts to classify the rock in terms of its net potential for acid production or neutralization. The following screening methods are given in Table 1below, as

proposed by Price (1997), use the NP:AP ratio to classify the rock in terms of its potential for acid generation; and

- Soregaroli and Lawrence (1998) further states that samples with less than 0.3% sulphide sulphur are regarded as having insufficient oxidisable sulphides to sustain long-term acid generation. According to Li (2006), a material with an S% of below 0.1% has no potential for acid generation. Therefore, a material with a %S of above 0.3%, is classified as *Rock Type I - Likely Acid Generating,* 0.2-0.3% is classified as *Rock Type II,* 0.1-0.2% is classified as *Rock Type III*, and below 0.1% is classified as *Rock Type IV - No Potential for Acid Generation*.

Table 1: Screening methods using the NP: AP ratio (Price, 1997)

Potential for acid generation	NP:AP screening criteria	Comments
Rock Type I. Likely Acid Generating.	< 1:1	Likely AMD generating.
Rock Type II. Possibly Acid Generating.	1:1 – 2:1	Possibly AMD generating if NP is insufficiently reactive or is depleted at a faster rate than sulphides.
Rock Type III. Low Potential for Acid Generation.	2:1 – 4:1	Not potentially AMD generating unless significant preferential exposure of sulphides along fracture planes, or extremely reactive sulphides in combination with insufficient reactive NP.
Rock Type IV. No Potential for Acid Generation.	>4:1	No further AMD testing required unless materials are to be used as a source of alkalinity.

4.1.1.2 Terminology and Screening Methods (Nag)

The NAG test provides a direct assessment of the potential for a material to produce acid after a period of exposure (to a strong oxidant) and weathering. The test can be used to refine the results of the ABA predictions. In the Net-acid Generating (NAG) test hydrogen peroxide (H_2O_2) is used to oxidize sulphide minerals in order to predict the acid generation potential of the sample. The following relates to the methodology:

- In general, the static NAG test involves the addition of 25 ml of 15% H_2O_2 to 0.25 g of sample in a 250 ml wide mouth conical flask or equivalent. The sample is covered with a watch glass, and placed in a fume hood or well-ventilated area;
- Once "boiling" or effervescing ceases, the solution is allowed to cool to room temperature and the final pH (NAG pH) is determined; and
- A quantitative estimation of the amount of net acidity remaining (the NAG capacity) in the sample is determined by titrating it with sodium hydroxide (NaOH) to pH 4.5 (and/or pH 7.0) to obtain the NAG Value.

In order to determine the acid generation potential of a sample, the screening method of Miller et al. (1997) is used. Refer to Table 2.

Table 2: NAG test screening method (edited from Miller et al., 1997)

Rock Type	NAG pH	NAG Value (H_2SO_4 kg/t)	NNP ($CaCO_3$ kg/t)
Rock Type Ia. High-Capacity Acid Forming.	< 4.5	> 10	Negative
Rock Type Ib. Lower Capacity Acid Forming.	< 4.5	≤ 10	-
Uncertain, possibly Ib.	< 4.5	> 10	Positive
Uncertain.	≥ 4.5	0	Negative (Reassess mineralogy)*
Rock Type IV. Non-acid Forming.	≥ 4.5	0	Positive

** If low acid forming sulphides is dominant then Rock Type IV.*

From the ABA and NAG test results the following observations could be made:

- The sulphide %S (determined by infrared (IR) detector after heating the sample to ±1 000°C in an Eltra Furnace) was used to determine the acid potential of the rock. The acid potential of the sample was therefore not overestimated;
- The NP/AP indicates the potential for the rock to generate acid drainage, whereas the %S indicated whether this drainage will be over the long term.

The potential for the material sampled to generate acid mine drainage are summarized:

- 33.3% of the carbonaceous mudstone/shale samples collected has a high potential to generate acidic drainage (and will generate a high salt load), 17% has a low potential to generate acidic drainage (and will generate a low to medium salt load), 17% has a very low potential to generate acidic drainage (and will generate a very low to medium salt load), 33.3% of the carbonaceous mudstone/shale samples collected has no potential to generate acidic drainage (and will generate no salt load);
- 100% (of the coal samples collected has a high potential to generate acidic drainage (and will generate a high salt load);
- 50% of the shale samples collected has a very high potential to generate acidic drainage (and will generate a very high salt load), 50% has a very low potential to generate acidic drainage (and will generate a very low salt load);
- 25% of the sandstone/mudstone samples collected has a high potential to generate acidic drainage (and will generate a high salt load), 38% has a low to medium potential to generate acidic drainage (and will generate a medium to high salt load), 17% has a low potential to generate acidic drainage (and will generate a low to medium salt load), 17% has a very low potential to generate acidic drainage (and will generate a very low to medium salt load), 13% of the sandstone/ mudstone samples collected has no potential to generate acidic drainage (and will generate no salt load); and
- 100% of the soil and clay samples collected has low potential to generate acidic drainage (and will generate a low to medium salt load);

- The carbonaceous mudstone samples generally have a variable %S content at an average of 0.274%. There is, however, an average neutralisation potential of 30.3 kg/t $CaCO_3$, thus the initial leachate from these rocks will not be acidic as confirmed by the NAG testing but it is suspected that 66% of the samples have sufficient sulphide content and will acidify over the long-term because of the high sulphide content;
- The coal samples all have a high %S content and a lower neutralisation content thus if subjected to oxidisation then leached acidic drainage will occur as confirmed by NAG testing;
- The sandstone and mudstone samples have variable %S content with a relatively high neutralisation potential, but about 38-76% of the samples have potential to generate acidic drainage if oxidised and subsequently leached as confirmed by NAG testing;
- The weathered sandstone and clay sample have a relatively low %S content with a low neutralisation potential thus there is a low potential to generate acidic drainage; and
- Overall, it can be concluded that about 50% of the overburden/waste rock material (weathered sandstone, clay, sandstone, mudstones, carbonaceous mudstone and carbonaceous shales) have potential to generate acidic drainage if the material is oxidised and leaching occurs subsequently. The coal samples have a high potential to generate acidic drainage if subjected to oxidisation. Usually, the coal is mined before significant oxidation occurs and only coal remaining in the mine will potentially be of concern over the long-term.

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. The groundwater model should be 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 2 Seam (Pty) Ltd 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), (c), (g), (i) and (j) of the National Water Act, 36 of 1998, as amended ("NWA") will be applied for. Two WULAs, one for the river diversion and associated activities and one for the processing plant, are underway and have 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?

2 Seam has three approved water use licences (WULs) in terms of the National Water Act (NWA) (Act 36 of 1998) for the existing infrastructure and activities on site. The reference numbers for the three WULs are Licence No.: 06/B11B/ AICGJ/7070 approved on 06 April 2018, Licence No.: 06/B11B/ACGIJ/10048 approved on 31 March 2021 and Licence No: 06/B11B/CGIJ/29/3 approved on 12 May 2021. (Licence No.: 06/B11B/AICGJ/7070 and Licence No. 06/B11B/CGIJ (WU18102), File no.: 27/2/2/B211/18/11/29/3). A WUL has been lodged on the eWULAAs system for the 2 Seam River Diversion Project. Another WUL has been lodged for the proposed PCD's, wash plant, ROM stockpile and related activities.

6 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

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

Table 3 provides the mitigation measures to rehabilitate the environment.

Table 3: Mitigation Measures to rehabilitate the environment

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
No-go option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure.	No Additional Management Objectives if Project does not proceed	No management possible if no development occurs	N/A	N/A
No-Go Option	Socio-Economic	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	No management possible if no development occurs	N/A	N/A
No-Go Option	Socio-Economic	**Positive:** No additional negative impacts on I&APs or surrounding land users	No Additional Management Objectives if Project does not proceed	No management possible if no development occurs	N/A	N/A
No-Go Option	Natural Environment and Wetlands	**Positive:** No additional negative impacts on the environment	No Additional Management Objectives if Project does not proceed	No management possible if no development occurs	N/A	N/A
Stripping of topsoil for river diversion	Wetlands and Aquatics	Sediment ingress into the aquatic ecosystem, clearing of vegetation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Initiate removal at highest level working downward. Only remove sections of topsoil in relation to removal work. Diversion of river with implementation of rehabilitation plan attached in Appendix	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
River diversion	Wetlands and Aquatics	Diversion of the Olifants River	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Diversion of river with implementation of rehabilitation plan attached in Appendix		
Stockpiling of topsoil for river diversion	Wetlands and Aquatics	Sediment releases, impact of area disturbed by stockpile	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Berming of stockpile, slope 1:3 and revegetation of stockpile Diversion of river with implementation of rehabilitation plan attached in Appendix	GN704 NEMA Duty of Care	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
			To protect wetlands and ensure their ecological function continues.		NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	
Excavation of river diversion	Wetlands and Aquatics	Area impacted by placement of soils on surface next to excavation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Small volumes to be stockpiled. Ensure stockpile is within stormwater management areas. Diversion of river with implementation of rehabilitation plan attached in Appendix		
Excavation of river diversion	Wetlands and Aquatics	Sediment ingress	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Monitor points of release, ensure bunding of stockpiles. Diversion of river with implementation of rehabilitation plan attached in Appendix		
Excavation of river diversion	Wetlands and Aquatics	Increased flow volumes	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Monitor points of release, ensure bunding of stockpiles. Installation of windrows to ensure water movement does not concentrate and lead to erosion. Diversion of river with implementation of rehabilitation plan attached in Appendix		
Excavation of river diversion	Wetlands and Aquatics	Impact on long term ecosystem health	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Monitor the systems with emphasis on water quality and preventative measure to ensure any degradation is observed and mitigated. Diversion of river with implementation of rehabilitation plan attached in Appendix	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Excavation of river diversion	Wetlands and Aquatics	Reduced functionality of buffer	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of water flows downstream of activity with monitoring and feedback. Emergency reaction plan to be compiled for stochastic events. Diversion of river with implementation of rehabilitation plan attached in Appendix		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Excavation of river diversion	Wetlands and Aquatics	Ecotone removal	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Ensure activities adjacent to the aquatic ecosystems are managed/limited to ensure impact is mitigated. Diversion of river with implementation of rehabilitation plan attached in Appendix		
Excavation of river diversion	Wetlands and Aquatics	Possible spillage into natural area	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Bunding of stockpiles. Placement of berms along natural areas to prevent ingress. Defined works areas demarcated. Diversion of river with implementation of rehabilitation plan attached in Appendix		
Excavation of river diversion	Wetlands and Aquatics	Refilling of machinery with hydrocarbons	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Refill outside the confines of the aquatic ecosystems and setback buffers. Spill kits present. Refilling over bunded area. Diversion of river with implementation of rehabilitation plan attached in Appendix		
Excavation of river diversion	Wetlands and Aquatics	Stockpiling of soils	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Bunding of stockpiles. Placement of berms along natural areas to prevent ingress. Diversion of river with implementation of rehabilitation plan attached in Appendix	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Excavation of river diversion	Wetlands and Aquatics	Physical excavation in soil	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Sequential nature of soils is kept. Stockpiling done outside setback area, bunding of stockpiles. Diversion of river with implementation of rehabilitation plan attached in Appendix		
Transportation from site due to river diversion	Wetlands and Aquatics	Area impacted by waiting trucks and machinery	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Minimise area of impact. Create sloped and controlled waiting area. Ensure adequate toilet facilities are available.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Transportation from site due to river diversion	Wetlands and Aquatics	Crossing of aquatic ecosystem on existing roads and bridges	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Manage hydrology avoiding impounding by crossing structure. Sloping of banks 1:3. Reseed after construction.		
Hydrocarbon spill (river diversion)	Wetlands and Aquatics	Possible spillage into natural area	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Do not refill near aquatic ecosystems and or setbacks. Placement of spill kits near all activities and vehicles.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Hydrocarbon spill (river diversion)	Wetlands and Aquatics	Refilling of machinery	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Refilling over hydrocarbon spill remediation blankets. No refilling near aquatic ecosystems. Ensure spill kits are on standby close to refilling point.		
Access Road for river diversion	Wetlands and Aquatics	Crossing of aquatic ecosystem with machinery	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Long-term crossing structure must be constructed to prevent repeated impacts. Ensure hydrological connections remain. Reduce sediment ingress into the aquatic ecosystem using sediment barriers.		
Impoundment of water in excavation pit (river diversion)	Wetlands and Aquatics	During rainfall events the excavation pit can fill with water (unlikely but included)	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Pumping and clearing sediment control structures. Diffused flows must be achieved using sediment barriers. Compilation of Standard Operating Procedures to manage impact.		
Alien vegetation spreading and establishment (river diversion)	Wetlands and Aquatics	Alien vegetation establishment and spread	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of alien vegetation throughout the activities on site. Must be compiled through alien vegetation management plan. Removal throughout activities on site and not as once off.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Post development/ rehabilitation (river diversion)	Wetlands and Aquatics	Decompaction of soil	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Ripping must follow contour of landscape creating windows.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Post development/ rehabilitation (river diversion)	Wetlands and Aquatics	Removal of crossings over aquatic ecosystem	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Sediment reducing barriers must be installed downstream of the crossing. Working from upstream structures must be removed as quickly as possible.		
Removal of crossings over aquatic ecosystem (river diversion)	Wetlands and Aquatics	Altering of beds and banks	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Sediment reducing barriers must be installed downstream of the crossing. Working from upstream structures must be removed as quickly as possible.		
Removal of crossings over aquatic ecosystem (river diversion)	Wetlands and Aquatics	Sediment ingress	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Installation of sediment reducing structures – sandbags.		
Infilling of soil and or placement of topsoil (river diversion)	Wetlands and Aquatics	Replacement of soil into excavated area (unlikely)	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Infilling of lowest point or closest to the aquatic ecosystems must be completed first. Temporary berm must be placed adjacent to the aquatic ecosystem until all filling has been completed. Work must follow contours of area creating windrows.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Infilling of soil and or placement of topsoil (river diversion)	Wetlands and Aquatics	Moving of topsoil from stockpile rehabilitated areas	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Infilling of soil and or placement of topsoil (river diversion)	Wetlands and Aquatics	Levelling of topsoil's	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
Erosion of replaced soils (river diversion)	Wetlands and Aquatics	Replaced surface soils are washed away if not stabilised or planted before the first rainfall	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Refilling of eroded areas with coarser topsoil to prevent erosion. Management of reseeding in area to prevent erosion.		
Alteration of soil chemical properties (river diversion)	Wetlands and Aquatics	Alteration of soil chemical properties reducing soil productivity	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Application of fertilisers to manage altered soil chemical properties.		
Alien vegetating eradication (river diversion)	Wetlands and Aquatics	Application of herbicides	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of alien vegetation through the activities on site.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
New processing plant	Wetlands and Aquatics	Flood attenuation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Use of PCD and storm water systems to manage attenuation of storm water.		
New processing plant	Wetlands and Aquatics	Streamflow regulation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
New processing plant	Wetlands and Aquatics	Sediment trapping	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Installation of sediment traps before storm water systems.		
New processing plant	Wetlands and Aquatics	Phosphate assimilation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Inclusion of phytoremediation aspects in all PCD and storm water systems.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
New processing plant	Wetlands and Aquatics	Nitrate assimilation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
New processing plant	Wetlands and Aquatics	Toxicant assimilation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
New processing plant	Wetlands and Aquatics	Erosion control	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of storm water to prevent concentrated flow.		
New processing plant	Wetlands and Aquatics	Carbon storage	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Inclusion of phytoremediation aspects in all PCD and storm water systems.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
New processing plant	Wetlands and Aquatics	Alien vegetation establishment and spread	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of alien vegetation through the activities on site. Must be completed through alien vegetation management plan. Removal throughout activities on site and not as once off.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Decompaction, infilling of soil and or placement of topsoil due to processing plant	Wetlands and Aquatics	Ripping of area and access roads to reduce compaction	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Ripping must follow contours of landscape creating windrows.		
Decompaction, infilling of soil and or placement of topsoil due to processing plant	Wetlands and Aquatics	Replacement of soil	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Infilling of lowest point or closest to the aquatic ecosystem must be completed first. Temporary berm must be placed adjacent to the aquatic ecosystem until all filling has been completed. Work must follow contours of area creating windrows.		
Decompaction, infilling of soil and or placement of topsoil due to processing plant	Wetlands and Aquatics	Moving of topsoil from stockpile rehabilitated areas	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
Decompaction, infilling of soil and or placement of topsoil due to processing plant	Wetlands and Aquatics	Levelling of topsoil	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of alien vegetation through the activities on site. Must be completed through alien vegetation management plan. Removal throughout activities on site and not as once off.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Decompaction, infilling of soil and or placement of topsoil	Wetlands and Aquatics	Ripping of area and access roads to reduce compaction	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Use of PCD and storm water systems to manage attenuation of storm water.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Contractor's yard	Wetlands and Aquatics	Flood attenuation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Use of PCD and storm water systems to manage attenuation of storm water.		
Contractor's yard	Wetlands and Aquatics	Streamflow regulation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
Contractor's yard	Wetlands and Aquatics	Sediment trapping	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Installation of sediment traps before storm water systems.		
Contractor's yard	Wetlands and Aquatics	Phosphate assimilation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Inclusion of phytoremediation aspects in all PCD and storm water systems	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Contractor's yard	Wetlands and Aquatics	Nitrate assimilation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
Contractor's yard	Wetlands and Aquatics	Toxicant assimilation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Inclusion of phytoremediation aspects in all PCD and storm water systems		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Contractor's yard	Wetlands and Aquatics	Erosion control	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of storm water to prevent concentrated flows.		
Contractor's yard	Wetlands and Aquatics	Carbon storage	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Inclusion of phytoremediation aspects in all PCD and storm water systems	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Contractor's yard	Wetlands and Aquatics	Alien vegetation establishment and spread	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of alien vegetation through the activities on site. Must be completed through alien vegetation management plan. Removal throughout activities on site and not as once off.		
Contractor's yard	Wetlands and Aquatics	Ripping of area and access roads to reduce compaction	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Ripping must follow contours of landscape creating windrows.		
Contractor's yard	Wetlands and Aquatics	Replacement of soil	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Infilling of lowest point or closest to the aquatic ecosystem must be completed first. Temporary berm must be placed adjacent to the aquatic ecosystem until all filling has been completed. Work must follow contours of area creating windrows.		
Contractor's yard	Wetlands and Aquatics	Moving of topsoil from stockpile rehabilitated areas	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Infilling of lowest point or closest to the aquatic ecosystem must be completed first. Temporary berm must be placed adjacent to the		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
			To protect wetlands and ensure their ecological function continues.	aquatic ecosystem until all filling has been completed. Work must follow contours of area creating windrows.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Contractor's yard	Wetlands and Aquatics	Levelling of topsoil	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
Contractor's yard	Wetlands and Aquatics	Alien vegetation establishment and spread	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of alien vegetation through the activities on site. Must be completed through alien vegetation management plan. Removal throughout activities on site and not as once off.		
Pollution Control Dams	Wetlands and Aquatics	Flood attenuation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Use of PCD and storm water systems to manage attenuation of storm water.		
Pollution Control Dams	Wetlands and Aquatics	Streamflow regulation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
Pollution Control Dams	Wetlands and Aquatics	Sediment trapping	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Installation of sediment traps before storm water systems.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Pollution Control Dams	Wetlands and Aquatics	Phosphate assimilation	To prevent the loss of aquatic biodiversity and	Inclusion of phytoremediation aspects in all PCD and storm water systems		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
			ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
Pollution Control Dams	Wetlands and Aquatics	Nitrate assimilation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Inclusion of phytoremediation aspects in all PCD and storm water systems		
Pollution Control Dams	Wetlands and Aquatics	Toxicant assimilation	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.			
Pollution Control Dams	Wetlands and Aquatics	Erosion control	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of storm water to prevent concentrated flows. Regulation of erosion preventing devices is needed.		
Pollution Control Dams	Wetlands and Aquatics	Carbon storage	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Inclusion of phytoremediation aspects in all PCD and storm water systems	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Pollution Control Dams	Wetlands and Aquatics	Alien vegetation establishment and spread	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of alien vegetation through the activities on site. Must be completed through alien vegetation management plan. Removal throughout activities on site and not as once off.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Pollution Control Dams	Wetlands and Aquatics	Ripping of area and access roads to reduce compaction	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Ripping must follow contours of landscape creating windrows.		
Pollution Control Dams	Wetlands and Aquatics	Replacement of soil	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Infilling of lowest point or closest to the aquatic ecosystem must be completed first. Temporary berm must be placed adjacent to the aquatic ecosystem until all filling has been completed. Work must follow contours of area creating windrows.		
Pollution Control Dams	Wetlands and Aquatics	Alien vegetation establishment and spread	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem. To protect wetlands and ensure their ecological function continues.	Management of alien vegetation through the activities on site. Must be completed through alien vegetation management plan. Removal throughout activities on site and not as once off.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Clearing topsoil from footprint areas will influence the rate of infiltration of water to the shallow groundwater system and/or baseflow component to shallow streams.	Groundwater	Water Quantity > Groundwater > Olifants River	Prevent hydrogeological impacts and prevent contamination of water resources	Groundwater level monitoring should be conducted down the gradient of these facilities, in terms of the groundwater flow direction. Footprint areas should be minimised and compacted to reduce infiltration.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Diversion of the Olifants river to a new flow path will void the existing river segment and subsequent alluvium aquifer sone of groundwater baseflow.	Groundwater	Water Quantity > Groundwater > Olifants River	Prevent hydrogeological impacts and prevent contamination of water resources	No mitigation measures possible as the river will be mined. A new flow equilibrium will take place along the diversion path. Peak flows in the river are not anticipated to change, only recharge and baseflow characteristics are associated with the riverbed sediments.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Handling of waste and transport of material can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and contaminate the groundwater system. Poor quality mine drainage from material removed during the opencast development (i.e., from overburdened rock piles) may cause local soil and groundwater contamination. Oil and fuel spills and leakages at hard park areas, and in the mining pits, may cause poor quality seepage and soil contamination.	Groundwater	Water Quantity > Groundwater > Olifants River	Prevent hydrogeological impacts and prevent contamination of water resources	Waste should be discarded in the allocated waste area. The waste area should be bunded. Spills should be cleaned up immediately according to the WULA conditions. DWS should be notified in the event of a significant spill. Solid waste must similarly either be stored at the site in an approved waste disposal area or removed by credible contractors. Groundwater quality monitoring (quarterly) to identify problem areas. Have fuel & oil spill clean-up kits on site. Park vehicles in designated areas. Ensure route geochemical monitoring (quarterly ABA, NAG, static leach test) of material excavated and placed during mining to confirm AMD potential.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Stripping of the topsoil during the channel creation for the Olifants River diversion may cause temporary sedimentation as the river takes to the new flow path. There may be some bank erosion which could also lead to sedimentation and suspended solid transport. If vehicles and machines leak hydrocarbons during the diversion trenching, there may be local soil contamination that could impact the surface and groundwater quality.	Groundwater	Water Quantity > Groundwater > Olifants River	Prevent hydrogeological impacts and prevent contamination of water resources	Mitigation will likely have a minimum effect, as stream diversion will be required to mine OC4A. The only mitigation measures that can be considered are: • Have fuel and oil spill clean-up kits on-site during stream division trenching. • Park vehicles in designated areas. • Ensure re-vegetation of eroded areas.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Opencast mining will result in groundwater inflows into the pits which need to be pumped out for mine safety and will lead to a lowering of groundwater levels in the surrounding aquifers.	Groundwater	Water Quantity > Groundwater Level	Prevent hydrogeological impacts and prevent contamination of water resources	Dewatering should be conducted over as short a period as possible. Groundwater ingress rates should be monitored. Water supply should be compensated if any community supply boreholes are influenced. Groundwater level and quality monitoring should be conducted.		
Dewatering activity may impact shallow baseflow to Olifants River and tributaries.	Groundwater	Water Quantity > Baseflow	Prevent hydrogeological impacts and prevent contamination of water resources	Dewatering should be conducted over as short a period as possible. Impacts on the surface water bodies should be monitored. Groundwater level monitoring should be conducted close to the Olifants River, and additional	GN704 NEMA Duty of Care NEMA Polluter Pays Principle	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				boreholes should be drilled to monitor the water table and fluctuations.	DWS Best Practice Guidelines Water Use Licence	
Diversion of the Olifants river to a new flow path will void the existing river segment and subsequent alluvium aquifer sone of groundwater baseflow.	Groundwater	Water Quantity > Olifants River	Prevent hydrogeological impacts and prevent contamination of water resources	No mitigation is possible, as the river will be mined. A new flow equilibrium will take place along the diversion path. Peak flows in the river are not anticipated to change, only recharge and baseflow characteristics are associated with the riverbed sediments.		
Analyses showed that acid mine drainage (AMD) formation is expected and poor-quality leachate can occur based on the leaching potential of the material. This can influence the water quality in the surrounding aquifers. However, groundwater flow directions will be directed towards the opencast workings and contaminant migration away from the mining areas will be limited during active mining.	Groundwater	Water Quality > Soil water > Aquifer zones (water table)	Prevent hydrogeological impacts and prevent contamination of water resources	Loose coal should be removed continuously within pits to reduce the exposure period. The operational term of the opencast pit should be kept to a minimum. Groundwater quality monitoring should be conducted in the surrounding area. Ensure route geochemical monitoring (quarterly ABA, NAG, static leach test) of material excavated and placed during mining to confirm AMD potential.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Potentially contaminated groundwater ingress if fracture networks from underground workings are	Groundwater	Water Quality > Aquifer zones (water table)	Prevent hydrogeological impacts and prevent contamination of water resources	Fracture networks and flow paths should be sealed to prevent the ingress of fresh or contaminated groundwater during mining. Blasting should be conducted in such a manner as to reduce impacts on the stability of barrier		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
intercepted during opencast mining.				pillars between opencast workings and old underground workings.		
Coal transport via haulage roads.	Groundwater	Water Quality > Soil water > Aquifer zones (water table) > Dust fallout along the rivers and streams in the project area	Prevent hydrogeological impacts and prevent contamination of water resources	Spillages should be cleaned regularly.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Concurrent backfilling of opencast pits - poor quality seepages.	Groundwater	Water Quality > Aquifer zones (water table)	Prevent hydrogeological impacts and prevent contamination of water resources	Backfill of the opencast pits with overburden should be conducted correctly - geology with the highest acid leach potential must be backfilled at the base of the pit and compacted. Waste rock should be backfilled to at least 5 m below the static groundwater level, well compacted and lime added. Ensure that pollution control dams are lined and their structural integrity maintained. Groundwater level and quality monitoring are necessary.		
Waste disposal on surface - poor quality seepages.	Groundwater	Water Quality > Aquifer zones (water table)	Prevent hydrogeological impacts and prevent contamination of water resources	The footprint areas of waste rock dumps should be kept to a minimum. The footprint areas should be compacted before disposal and prepared per the results of the waste classification. Dumps should be constructed to facilitate runoff into trenches. Dumps should be separated from any surface water bodies by a berm. Groundwater level and quality monitoring are necessary.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Coal and ROM Stockpiles.	Groundwater	Water Quality > Soil water > Aquifer zones (water table)	Prevent hydrogeological impacts and prevent contamination of water resources	The footprint areas of stockpiles should be kept to a minimum. The footprint areas should be compacted before disposal. Stockpiles should be constructed to facilitate runoff into trenches. Stockpiles should be separated from any surface water bodies by a berm. Groundwater level and quality monitoring are necessary.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Operation of the plant could lead to spillages/seepage	Groundwater	Water Quality > Soil water > Aquifer zones (water table)	Prevent hydrogeological impacts and prevent contamination of water resources	Spillages should be cleaned regularly and prevented. Trenches should be constructed around the plant area to divert contaminated runoff/interflow to the PCD.		
Workshops and spillages (hydrocarbons, sewage, domestic waste).	Groundwater	Water Quality > Soil water > Aquifer zones (water table)	Prevent hydrogeological impacts and prevent contamination of water resources	Waste should be discarded in the allocated waste area; The waste area should be bunded. Spills should be cleaned up immediately according to the WULA conditions. DWS should be notified in the event of a significant spill. Solid waste must similarly either be stored at the site in an approved waste disposal area or removed by credible contractors. Have fuel & oil spill clean-up kits on site.		
Pollution Control Dams (existing and proposed)- poor quality seepages.	Groundwater	Water Quality > > Soil water > Aquifer zones (water table)	Prevent hydrogeological impacts and prevent contamination of water resources	The liner of the existing PCD is not adequate to contain dirty water and may result in groundwater contamination. The liner needs to be maintained or replaced to ensure functionality. Groundwater level and quality monitoring are necessary. Ensure that the new PCD is lined with an impermeable barrier.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Infrastructure	Groundwater	Seepage that makes it from the plant areas PCD and ROM area and contractors' yard via the vadose and aquifer zones and enters streams as baseflow.	Prevent hydrogeological impacts and prevent contamination of water resources	Only excavate areas applicable to the project area. Backfill the material in the same order it was excavated to reduce contamination of deeper soils with shallow oxidised soils. Cover excavated soils with a temporary liner to prevent contamination. Retain as much indigenous vegetation as possible. Exposed soils are to be protected using a suitable covering or revegetating. Park heavy machinery in lined areas and place drip trays under vehicles at the site. Visual soil assessments for signs of contamination during construction (monthly)	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
Infrastructure	Groundwater	Dewatering may impact groundwater table and groundwater uses	Prevent hydrogeological impacts and prevent contamination of water resources	No mitigation proposed. The risk is very low.		
Rehabilitated mining areas - rebounding water levels.	Groundwater	Groundwater Quantity > Groundwater Levels	Prevent hydrogeological impacts and prevent contamination of water resources	Groundwater levels in the backfilled pits will recover. Pollution plumes may migrate to surface water bodies such as the Olifants River, its tributaries and wetlands. The final backfilled opencast topography should be engineered such that runoff is directed away from the opencast areas to reduce recharge. The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge into the opencast workings. Material with the highest acid leach potential must be backfilled at the base of the pit, below the		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				regional groundwater level and compacted. Surface water monitoring of the streams will be essential. Quarterly groundwater sampling should be done to establish a database of plume movement trends, to aid eventual mine closure. If it is established that contaminated baseflow seepage occurs to surface water bodies, suitable remediation measures should be evaluated and implemented as soon as possible. It should also be considered only backfilling OC4 and OC4A with non-acid generating material (if possible). This will reduce long-term liability. If it is determined that private groundwater users are affected by the potential contaminant plumes, their water supply can be compensated. Groundwater level and quality monitoring post-closure is crucial, particularly between the opencast pits and surface water bodies.		
Rehabilitated mining areas - Migration of groundwater contaminant plume and contaminated groundwater seepage to streams and Olifants river (salt load).	Groundwater	Water Quality > Olifants River > Groundwater table	Prevent hydrogeological impacts and prevent contamination of water resources	To manage AMD, a detailed water balance should be calculated for the mine. Pit groundwater inflows should be recorded and used to update the decant calculations. Decant calculations should be updated for the final pit topography. Water influx into the mining areas should be kept to the absolute	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Rehabilitated mining areas - depending on the pit water balance, the pit can decant at the lowest topographical area and negatively impact groundwater and stream quality. This is particularly probable for OC4A.	Groundwater	Water Quality > Olifants River > Groundwater table	Prevent hydrogeological impacts and prevent contamination of water resources	minimum possible. In this regard, the fracturing of the overlying strata due to blasting or surface subsidence should be avoided at all costs, to prevent increased infiltration of surface water into the mine workings. Berms should be constructed and maintained between pit and downstream surface water bodies and depressions to reduce the flow of decanting to surface water bodies. Backfilling should be conducted to limit recharge to the opencast pits and free drainage to trenches should be facilitated. Diverted water should be managed. Treating decanting mine water to acceptable water quality levels can be achieved by the installation of a treatment plant. The level to which the water is treated depends on the use of the water after treatment. As a minimum, treated water should meet the standards for use for livestock watering and irrigation. Groundwater level and quality monitoring post-closure is crucial, particularly between the opencast pits and surface water bodies.		
Potentially contaminated groundwater ingress if fracture networks from underground workings were intercepted during mining.	Groundwater	Water Quality > Olifants River > Groundwater table	Prevent hydrogeological impacts and prevent contamination of water resources	Fracture networks and flow paths should be sealed to prevent the ingress of fresh or contaminated groundwater during mining. Blasting should be conducted in such a manner as to reduce impacts on the stability of barrier pillars between opencast workings and old underground workings.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Seepage from plant area, ROM area, contractors' yard and PCD	Groundwater	Vadose zone soils and subsequent aquifer (groundwater table)	Prevent hydrogeological impacts and prevent contamination of water resources	Install a monitoring scavenger well system to contain any potential seepage (if required – to be determined by monitoring). Ensure a stormwater system is in place to capture any runoff from the site.		
No River diversion	Hydropedology	No change in flow is expected	Prevent hydropedological impacts on the wetlands.	Mitigation measures recommended in the Aquatic ecosystem mitigation plan for the Seam 2 Mine North block 2 done by Galago Environmental in November 2020 should be done. In summary these mitigation measures are: o Installation of a berm to prevent ingress of the Olifants River into the mining area. ***Based on the site visit of October 2022 this berm is already in place.*** o Stripping of topsoil from the wetland, o Removal and storage of hydrophytes, o Stockpiling of the stripped topsoil, o Diversion of the wetland flows from the catchment to the Olifants River system, ***based on the site visit of October 2022 this berm is already in place.*** o Emulating wetland functionality brought by the interaction of the riparian area on the wetland. The largest expected function is the	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	Continuous
River diversion	Hydropedology	OC4 could impact on the flow drivers of the wetland systems through interception systems such as dewatering, diversions, drainage systems and water quality changes.	Prevent hydropedological impacts on the wetlands.			

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				attenuation of the river especially during flooding events, o Reshaping of the mined area post mining, o Reinstatement of the wetland functionality into the mined area • Confine any unpolluted water to a clean water system, away from any dirty area through upstream diversions as follows: o Groundwater -2200 to 2300 m3/a, through installing shallow boreholes (50 m) and abstracting clean water. This groundwater should then be released into the diversion through seasonal disperse flow, as designed by the wetland rehabilitation specialist. o Surface water 3100 to 3200 m3/a, through a system of clean water cut-off trenches and diversion berms o Interflow 1300 to 1400 m3/a. In contrast to the above the diversion should allow rehabilitation/reinstatement of disturbed wetland soils to be replaced at the diversion section. A total area of 66598 m2 of responsive wetland soils will be required to simulate the losses from OC4. The replacement of these soils should be overseen by a wetland rehabilitation specialist. The thickness of the soils should be determined by the wetland rehabilitation specialist.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				Collect the water arising within any dirty area, including water seeping from mining operations, outcrops or any other activity into a dirty water system; and Design, construct, maintain and operate any dirty water system at the mine or activity so that it is not likely to spill into any clean water system more than once in 50 years. Please note that the above mitigation measures are only applicable to the impacts on the wetland system and not impacts on the Olifants river.		
Construction (River diversion, opencast mine, Pollution Control Dams, Plant and ROM)	Ecological	Development related activities will specifically lead to damage or degradation of highly sensitive habitats (VU3) and overall loss of biodiversity and ecosystem function within the clearance area. As a result of the construction of these additional activities further fragmentation, degradation or compression may occur.	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 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.	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	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				Prevent impacts from reaching downstream water resources by ensuring installation and proper functioning of stormwater systems and drains to prevent contaminated water entering the natural environment.		
Construction (River diversion, opencast mine, Pollution Control Dams, Plant and ROM)	Ecological	Development and related activities could impact on the sensitive habitats (VU3) situated in and around the development footprint, including impacts from effluent discharge into the environment from the coal stockpiles, coal spillages and other contaminated areas.	Early detection of impacts and remediation thereof.	All footprint areas should remain as small as possible. This can be achieved by fencing footprint areas to contain all activities within designated areas. If any SCC are encountered within the subject property 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	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	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				protected or endangered floral species identified within the proposed development area that will be destroyed. Human and vehicle movement should be restricted from taking place in sensitive habitats. Areas to be fenced if necessary.		
Construction (River diversion, opencast mine, Pollution Control Dams, Plant and ROM)	Ecological	Fragmentation of habitat areas due to possible fencing or the placement of boundary structures could lead to increased edge effects. Habitat that is not to be cleared, needs to be protected.	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 Environmental Management Programme (EMPr). Keep the footprints as small as possible and clear only the designated approved areas. During the construction phase control of access should be implemented for all remaining natural areas to prevent unnecessary destruction of habitats or disturbance of species. It is also important that no additional fragmentation occurs and that all	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	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				roads are clearly demarcated and kept to. No vehicles or personnel should be permitted outside of these demarcated roads.		
Construction and operation (River diversion, opencast mine, Pollution Control Dams, Plant and ROM)	Ecological	Impacts may lead to the further increase of invasive species from the surrounding areas and may change the vegetation structure and composition of this unit. It may also result in the spread of the invaders already found on-site to other surrounding areas. Proliferation of AIP species in riparian areas are especially problematic due to the relative ease of AIP transport to downstream areas.	Early detection of impacts and remediation thereof.	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 published in 2020. 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	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	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Construction and operation (River diversion, opencast mine, Pollution Control Dams, Plant and Tailings Facility)	Ecological	Anthropogenic influence stemming from employees, visitors and contractors that infiltrate the natural veld areas will damage and impact on species communities within certain areas. Effluent discharge into the environment from the coal stockpiles, coal spillages and other contaminated areas may negatively affect terrestrial ecosystems, especially sensitive habitats associated with riparian and wetland areas (VU3).	Early detection of impacts and remediation thereof.	Demarcate specific areas to be developed and remain clear of other areas where activities are not necessary. Prevent impacts from reaching downstream water resources by ensuring installation and proper functioning of stormwater management systems.	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	Continuous
Closure of opencast mine, plant and related infrastructure	Ecological	Rehabilitation could be ineffective if measures are not appropriately complied to. Without the necessary mitigation measures, rehabilitation will be unsuccessful, and the environment will not be self-sustaining. 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 should be planned long before the closure phase is due. Continuous rehabilitation should also take place during the operational phase. Rehabilitation plan should be implemented. 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	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	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				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. A report should be written and stored and should be available at all times.		
Construction of infrastructure and opencast mine	Heritage	No heritage features were found within the proposed amendment areas of the mining boundary	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).	Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible. Since 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 must be contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).	NEMA NHRA SAHRA permitting requirements	As needed
Construction of infrastructure and opencast mine	Palaeontological	No fossils were found within the proposed amendment areas of the mining boundary	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for	Implementation of Chance Procedure on site.	NEMA NHRA SAHRA permitting requirements	As needed

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
			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).			
Closure and Rehabilitation	Sites of archaeological and cultural interests	Graves to be protected in-situ	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).	If the grave site and graves on it cannot be avoided by the proposed mining development then they can be exhumed and relocated after all due processes have been followed. This will include detailed social consultation to try and contact any living descendants of the deceased in order to obtain their consent for the exhumations & relocations and obtaining permits from SAHRA, local, provincial and national authorities before the exhumation and relocation work can be conducted.	NEMA NHRA SAHRA permitting requirements	As needed
Construction of infrastructure and opencast mine	Agriculture, Soil and Land Capability	Loss of agricultural land for grazing and planting	Limit impacts on agricultural activities.	Visual inspection/confirmation that no surface impacts are occurring. Management and Rehabilitation (If required)	CARA	Continuous
Opencast Mining; Bulk earthworks including foundations, trenches, berms; Establishment of n stockpiles and backfilling of opencast with waste rock and tailings; Hauling and Transporting on roads; Dust suppression;	Soils	Soil compaction by heavy duty vehicles.	Limit impacts on agricultural activities.	Visual inspection/confirmation that no surface impacts are occurring. Management and Rehabilitation (If required)		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Removal of indigenous vegetation.						
Opencast Mining; Bulk earthworks including foundations, trenches, berms; Establishment of overburden stockpiles and backfilling of opencast with tailings; backfill into Carbonaceous layer, ROM Stockpiles - Hauling and Transporting on roads; Dust suppression; Removal of indigenous vegetation.	Soils	Contamination of soils:	Limit impacts on agricultural activities.	Remedy through rehabilitation, proper removal and disposal if soils have become contaminated	Visual inspection/confirmation that no surface impacts are occurring. Management and Rehabilitation (If required)	Visual inspection/confirmation that no surface impacts are occurring. Management and Rehabilitation (If required)
Closure and Rehabilitation	Geology and Soils	Soil compaction by heavy duty vehicles.	Limit impacts on agricultural activities.	Rehabilitation and Monitoring		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Closure and Rehabilitation	Geology and Soils	Contamination of soils through: Indiscriminate disposal of waste; and Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g., paints.	Limit impacts on agricultural activities.	Remedy through rehabilitation, proper removal and disposal if soils have become contaminated		
Construction of additional mining infrastructure and opencast mine and diversion of river	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Early detection of impacts and remediation thereof.	Minimise disturbance to natural areas. Rehabilitate to resemble pre-mining conditions as close as possible.	Security specifications. Final land use Objectives.	Continuous
Closure and Rehabilitation	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.	Early detection of impacts and remediation thereof.			
Closure and Rehabilitation	Visual aspects	Visibility of solid domestic and operational waste.	Early detection of impacts and remediation thereof.	Limit footprint of waste area		
All	Traffic	Continued change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	To limit impacts on traffic as a result of the project.	Infrastructure designs; Management; Monitoring	National Road Traffic Act OHSA	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Construction of additional infrastructure and opencast mining	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	To limit impacts on traffic as a result of the project.			
Construction of surface infrastructure	Air Quality	The construction of infrastructure. 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).	To decrease impacts on air quality	Undertake dust monitoring. Implement dust suppression on site. Minimise extent of disturbed area and rehabilitate un-utilised area as soon as possible. Conduct dust suppression. Keep vehicles in a good condition. Do regular medical inspections on employees and contractors.	NEMAQA Dust regulations	Continuous
General transportation, hauling and vehicle movement on site	Air Quality	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	To decrease impacts on air quality	Undertake dust monitoring. Implement dust suppression on site. Minimise extent of disturbed area and rehabilitate un-utilised area as soon as possible. Conduct dust suppression. Keep vehicles in a good condition. Do regular medical inspections on employees and contractors	NEMAQA Dust regulations	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
		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.	Air Quality	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	To decrease impacts on air quality	Undertake dust monitoring.	NEMAQA Dust regulations	Continuous
Closure and Rehabilitation	Air Quality	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy-duty vehicles.	To decrease impacts on air quality	Implement dust suppression on site.		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
Closure and Rehabilitation	Air Quality	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.	To decrease impacts on air quality	Ensure site is restored to pre-mining conditions.	NEMAQA Dust regulations	Continuous
Closure and Rehabilitation	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy-duty vehicles and equipment.	To prevent impact of noise and lighting nuisance.	Limit blasting. Limit lighting	ECA noise regulations SANS 10103 OHSA	Continuous
Closure and Rehabilitation	Noise and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.	To prevent impact of noise and lighting nuisance.			
Closure and Rehabilitation	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.	To prevent impact of noise and lighting nuisance.			
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard, specifically - Ground vibration	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 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	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
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard, specifically - Air Blasting	To prevent impacts on people and animals and to avoid damage to structures.			
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard, specifically - Fly Rock	To prevent impacts on people and animals and to avoid damage to structures.			
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard, specifically on sensitive close by receptors	To prevent impacts on people and animals and to avoid damage to structures.			

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
				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.		
All	Health and Safety	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Minimise impacts on socio-economic environment.	Environmental Awareness, Reporting structures; Monitoring	Health and Safety Plan ESMS OHSA	Continuous
All	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Minimise impacts on health and safety environment.			
All	Health and Safety	Increased risk to public and worker health and safety	Minimise impacts on health and safety environment.			
All	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Minimise impacts on socio-economic environment.	Management; Communication; Strategy implementation	Health and Safety Plan ESMS OHSA	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
All	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners specifically the close-by receptors such as Mr Swanepoel, the Gogo identified by the community and the Potgieter farmers	Minimise impacts on socio-economic environment.			
All	Socio-Economic: **Positive Impacts**	Extended employment provision due to the implementation of the mining activities, allowing mining activities to commence.	Minimise impacts on socio-economic environment.			
All	Socio-Economic: **Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Minimise impacts on socio-economic environment.			
Closure and Rehabilitation	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Minimise impacts on socio-economic environment.			
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Minimise impacts on socio-economic environment.	Minimise impacts on socio-economic environment.	Increased Employment Opportunities in the Long term, Increased employment for the surrounding communities. Implementation of the Social and Labour Plan Implement Social and Labour Plan with the specific objectives: To ensure effective transformation as envisaged in the Minerals and Petroleum Resources Development Act (28/2002) the Regulations, and the Mining Charter	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOME	STANDARD TO BE ACHIEVED	TIME PERDIO FOR IMPLEMENTATION
					To promote fair and equitable employment practices as prescribed in the Employment Equity Act (55/1998). The social and economic advancement of the community influenced and affected by 2 Seam (Pty) Ltd. The positively strive towards equitable practices in accordance with the procurement plan. Supporting, utilising and building local economy	
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Minimise impacts on socio-economic environment.	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability, adhere to management outcomes/mitigation measures as described for Operational phase.	Health and Safety Plan ESMS MHSA OHSA	Continuous
Closure and Rehabilitation	Socio-Economic	Economic impact should there be an incident of public health and safety.	Minimise impacts on socio-economic environment.	Early detection and prevention of possible impacts. Restoration of Landscape function and Capability, adhere to management outcomes/mitigation measures as described for Operational phase.		
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Minimise impacts on socio-economic environment.	To enhance the socio-economic benefits of the project. Focus on skill-transfer.	Health and Safety Plan ESMS MHSA OHSA	Continuous
Closure and Rehabilitation	Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.	Minimise impacts on socio-economic environment.	To enhance the socio-economic benefits of the project. Focus on skill-transfer.		

7 FINANCIAL PROVISION

7.1 DETERMINATION OF THE AMOUNT OF FINANCIAL PROVISION

Refer to comments made in Section 19 of Section A and Appendix 15.

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 15.

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 15.

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 15.

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 15.

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. 2 Seam (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	ASPECTS AFFECTED	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	Socio-Economic	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	Socio-Economic	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	Socio-Economic	**Positive:** No additional negative impacts on I&APs or	N/A	N/A	N/A	N/A	N/A	N/A

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
		surrounding land users						
No-Go Option	Natural Environment and Wetlands	**Positive:** No additional negative impacts on the environment	N/A	N/A	N/A	N/A	N/A	N/A
Stripping of topsoil for river diversion	Wetlands and Aquatics	Sediment ingress into the aquatic ecosystem, clearing of vegetation	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
River diversion	Wetlands and Aquatics	Diversion of the Olifants River						
Stockpiling of topsoil for river diversion	Wetlands and Aquatics	Sediment releases, impact of area disturbed by stockpile	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence					
Excavation of river diversion	Wetlands and Aquatics	Area impacted by placement of soils on surface next to excavation						
Excavation of river diversion	Wetlands and Aquatics	Sediment ingress						
Excavation of river diversion	Wetlands and Aquatics	Increased flow volumes						
Excavation of river diversion	Wetlands and Aquatics	Impact on long term ecosystem health	GN704 NEMA					

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Excavation of river diversion	Wetlands and Aquatics	Reduced functionality of buffer	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
Excavation of river diversion	Wetlands and Aquatics	Ecotone removal						
Excavation of river diversion	Wetlands and Aquatics	Possible spillage into natural area						
Excavation of river diversion	Wetlands and Aquatics	Refilling of machinery with hydrocarbons						
Excavation of river diversion	Wetlands and Aquatics	Stockpiling of soils	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence					
Excavation of river diversion	Wetlands and Aquatics	Physical excavation in soil						
Transportation from site due to river diversion	Wetlands and Aquatics	Area impacted by waiting trucks and machinery						
Transportation from site due to river diversion	Wetlands and Aquatics	Crossing of aquatic ecosystem on existing roads and bridges						
Hydrocarbon spill (river diversion)	Wetlands and Aquatics	Possible spillage into natural area						
Hydrocarbon spill (river diversion)	Wetlands and Aquatics	Refilling of machinery						
Access Road for river diversion	Wetlands and Aquatics	Crossing of aquatic ecosystem with machinery						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Impoundment of water in excavation pit (river diversion)	Wetlands and Aquatics	During rainfall events the excavation pit can fill with water (unlikely but included)						
Alien vegetation spreading and establishment (river diversion)	Wetlands and Aquatics	Alien vegetation establishment and spread						
Post development/ rehabilitation (river diversion)	Wetlands and Aquatics	Decompaction of soil	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
Post development/ rehabilitation (river diversion)	Wetlands and Aquatics	Removal of crossings over aquatic ecosystem						
Removal of crossings over aquatic ecosystem (river diversion)	Wetlands and Aquatics	Altering of beds and banks						
Removal of crossings over aquatic ecosystem (river diversion)	Wetlands and Aquatics	Sediment ingress						
Infilling of soil and or placement of topsoil (river diversion)	Wetlands and Aquatics	Replacement of soil into excavated area (unlikely)						
Infilling of soil and or placement of topsoil (river diversion)	Wetlands and Aquatics	Moving of topsoil from stockpile rehabilitated areas						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Infilling of soil and or placement of topsoil (river diversion)	Wetlands and Aquatics	Levelling of topsoil's						
Erosion of replaced soils (river diversion)	Wetlands and Aquatics	Replaced surface soils are washed away if not stabilised or planted before the first rainfall						
Alteration of soil chemical properties (river diversion)	Wetlands and Aquatics	Alteration of soil chemical properties reducing soil productivity						
Alien vegetating eradication (river diversion)	Wetlands and Aquatics	Application of herbicides	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
New processing plant	Wetlands and Aquatics	Flood attenuation						
New processing plant	Wetlands and Aquatics	Streamflow regulation						
New processing plant	Wetlands and Aquatics	Sediment trapping						
New processing plant	Wetlands and Aquatics	Phosphate assimilation						
New processing plant	Wetlands and Aquatics	Nitrate assimilation						
New processing plant	Wetlands and Aquatics	Toxicant assimilation						
New processing plant	Wetlands and Aquatics	Erosion control						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
New processing plant	Wetlands and Aquatics	Carbon storage						
New processing plant	Wetlands and Aquatics	Alien vegetation establishment and spread	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
Decompaction, infilling of soil and or placement of topsoil due to processing plant	Wetlands and Aquatics	Ripping of area and access roads to reduce compaction						
Decompaction, infilling of soil and or placement of topsoil due to processing plant	Wetlands and Aquatics	Replacement of soil						
Decompaction, infilling of soil and or placement of topsoil due to processing plant	Wetlands and Aquatics	Moving of topsoil from stockpile rehabilitated areas						
Decompaction, infilling of soil and or placement of topsoil due to processing plant	Wetlands and Aquatics	Levelling of topsoil						
Decompaction, infilling of soil and or placement of topsoil	Wetlands and Aquatics	Ripping of area and access roads to reduce compaction						
Contractor's yard	Wetlands and Aquatics	Flood attenuation						
Contractor's yard	Wetlands and Aquatics	Streamflow regulation						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Contractor's yard	Wetlands and Aquatics	Sediment trapping						
Contractor's yard	Wetlands and Aquatics	Phosphate assimilation	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
Contractor's yard	Wetlands and Aquatics	Nitrate assimilation						
Contractor's yard	Wetlands and Aquatics	Toxicant assimilation						
Contractor's yard	Wetlands and Aquatics	Erosion control						
Contractor's yard	Wetlands and Aquatics	Carbon storage						
Contractor's yard	Wetlands and Aquatics	Alien vegetation establishment and spread						
Contractor's yard	Wetlands and Aquatics	Ripping of area and access roads to reduce compaction						
Contractor's yard	Wetlands and Aquatics	Replacement of soil						
Contractor's yard	Wetlands and Aquatics	Moving of topsoil from stockpile rehabilitated areas						
Contractor's yard	Wetlands and Aquatics	Levelling of topsoil						
Contractor's yard	Wetlands and Aquatics	Alien vegetation establishment and spread						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Pollution Control Dams	Wetlands and Aquatics	Flood attenuation		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
Pollution Control Dams	Wetlands and Aquatics	Streamflow regulation						
Pollution Control Dams	Wetlands and Aquatics	Sediment trapping	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence					
Pollution Control Dams	Wetlands and Aquatics	Phosphate assimilation						
Pollution Control Dams	Wetlands and Aquatics	Nitrate assimilation						
Pollution Control Dams	Wetlands and Aquatics	Toxicant assimilation						
Pollution Control Dams	Wetlands and Aquatics	Erosion control						
Pollution Control Dams	Wetlands and Aquatics	Carbon storage						
Pollution Control Dams	Wetlands and Aquatics	Alien vegetation establishment and spread						
Pollution Control Dams	Wetlands and Aquatics	Ripping of area and access roads to reduce compaction						
Pollution Control Dams	Wetlands and Aquatics	Replacement of soil						
Pollution Control Dams	Wetlands and Aquatics	Alien vegetation establishment and spread						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Clearing topsoil from footprint areas will influence the rate of infiltration of water to the shallow groundwater system and/or baseflow component to shallow streams.	Groundwater	Water Quantity > Groundwater > Olifants River	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	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
Diversion of the Olifants river to a new flow path will void the existing river segment and subsequent alluvium aquifer sone of groundwater baseflow.	Groundwater	Water Quantity > Groundwater > Olifants River						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Handling of waste and transport of material can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and contaminate the groundwater system. Poor quality mine drainage from material removed during the opencast development (i.e., from overburdened rock piles) may cause local soil and groundwater contamination. Oil and fuel spills and leakages at hard park areas, and in the mining pits, may cause poor quality seepage and soil contamination.	Groundwater	Water Quantity > Groundwater > Olifants River	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	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

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Stripping of the topsoil during the channel creation for the Olifants River diversion may cause temporary sedimentation as the river takes to the new flow path. There may be some bank erosion which could also lead to sedimentation and suspended solid transport. If vehicles and machines leak hydrocarbons during the diversion trenching, there may be local soil contamination that could impact the surface and groundwater quality.	Groundwater	Water Quantity > Groundwater > Olifants River	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	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
Opencast mining will result in groundwater inflows into the pits which need to be pumped out for mine safety and will lead to a lowering of groundwater levels	Groundwater	Water Quantity > Groundwater Level						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
in the surrounding aquifers.								
Dewatering activity may impact shallow baseflow to Olifants River and tributaries.	Groundwater	Water Quantity > Baseflow	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	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
Diversion of the Olifants river to a new flow path will void the existing river segment and subsequent alluvium aquifer sone of groundwater baseflow.	Groundwater	Water Quantity > Olifants River						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Analyses showed that acid mine drainage (AMD) formation is expected and poor-quality leachate can occur based on the leaching potential of the material. This can influence the water quality in the surrounding aquifers. However, groundwater flow directions will be directed towards the opencast workings and contaminant migration away from the mining areas will be limited during active mining.	Groundwater	Water Quality > Soil water > Aquifer zones (water table)	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	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
Potentially contaminated groundwater ingress if fracture networks from underground workings are intercepted during opencast mining.	Groundwater	Water Quality > Aquifer zones (water table)						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Coal transport via haulage roads.	Groundwater	Water Quality > Soil water > Aquifer zones (water table) > Dust fallout along the rivers and streams in the project area	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	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
Concurrent backfilling of opencast pits - poor quality seepages.	Groundwater	Water Quality > Aquifer zones (water table)						
Waste disposal on surface - poor quality seepages.	Groundwater	Water Quality > Aquifer zones (water table)						
Coal and ROM Stockpiles.	Groundwater	Water Quality > Soil water > Aquifer zones (water table)						
Operation of the plant could lead to spillages/seepage	Groundwater	Water Quality > Soil water > Aquifer zones (water table)						
Workshops and spillages (hydrocarbons, sewage, domestic waste).	Groundwater	Water Quality > Soil water > Aquifer zones (water table)						
Pollution Control Dams (existing and proposed)- poor quality seepages.	Groundwater	Water Quality > > Soil water > Aquifer zones (water table)						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Infrastructure	Groundwater	Seepage that makes it from the plant areas PCD and ROM area and contractors' yard via the vadose and aquifer zones and enters streams as baseflow.	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence	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
Infrastructure	Groundwater	Dewatering may impact groundwater table and groundwater uses						
Rehabilitated mining areas - rebounding water levels.	Groundwater	Groundwater Quantity > Groundwater Levels						
Rehabilitated mining areas - Migration of groundwater contaminant plume and contaminated groundwater seepage to streams and Olifants river (salt load).	Groundwater	Water Quality > Olifants River > Groundwater table						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Rehabilitated mining areas - depending on the pit water balance, the pit can decant at the lowest topographical area and negatively impact groundwater and stream quality. This is particularly probable for OC4A.	Groundwater	Water Quality > Olifants River > Groundwater table		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
Potentially contaminated groundwater ingress if fracture networks from underground workings were intercepted during mining.	Groundwater	Water Quality > Olifants River > Groundwater table	GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS Best Practice Guidelines Water Use Licence					
Seepage from plant area, ROM area, contractors' yard and PCD	Groundwater	Vadose zone soils and subsequent aquifer (groundwater table)						
No River diversion	Hydropedology	No change in flow is expected	GN704 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	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
River diversion	Hydropedology	OC4 could impact on the flow drivers of the wetland systems through interception systems such						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
		as dewatering, diversions, drainage systems and water quality changes.	Water Use Licence	water resources and Water Quality as specified in WUL				
Construction (River diversion, opencast mine, Pollution Control Dams, Plant and ROM)	Ecological	Development related activities will specifically lead to damage or degradation of highly sensitive habitats (VU3) and overall loss of biodiversity and ecosystem function within the clearance area. As a result of the construction of these additional activities further fragmentation, degradation or compression may occur.	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	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 (River diversion, opencast mine, Pollution Control Dams, Plant and ROM)	Ecological	Development and related activities could impact on the sensitive habitats (VU3) situated in and around the development footprint,	NEMBA, TOPS Animal Protection Act 1962 (Act 71 of 1962) National List of Threatened Terrestrial Ecosystems (2011)	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as amended	Ecological monitoring and compliance	Environmental Manager / Specialist Consultant(s)	Annually	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
		including impacts from effluent discharge into the environment from the coal stockpiles, coal spillages and other contaminated areas.	IUCN Red List of Threatened Species South African Red List of Species	Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)				
Construction (River diversion, opencast mine, Pollution Control Dams, Plant and ROM)	Ecological	Fragmentation of habitat areas due to possible fencing or the placement of boundary structures could lead to increased edge effects. Habitat that is not to be cleared, needs to be protected.	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	ASPECTS AFFECTED	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 (River diversion, opencast mine, Pollution Control Dams, Plant and ROM)	Ecological	Impacts may lead to the further increase of invasive species from the surrounding areas and may change the vegetation structure and composition of this unit. It may also result in the spread of the invaders already found on-site to other surrounding areas. Proliferation of AIP species in riparian areas are especially problematic due to the relative ease of AIP transport to downstream areas.	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	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	ASPECTS AFFECTED	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 (River diversion, opencast mine, Pollution Control Dams, Plant and Tailings Facility)	Ecological	Anthropogenic influence stemming from employees, visitors and contractors that infiltrate the natural veld areas will damage and impact on species communities within certain areas. Effluent discharge into the environment from the coal stockpiles, coal spillages and other contaminated areas may negatively affect terrestrial ecosystems, especially sensitive habitats associated with riparian and wetland areas (VU3).	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	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	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Closure of opencast mine, plant and related infrastructure	Ecological	Rehabilitation could be ineffective if measures are not appropriately complied to. Without the necessary mitigation measures, rehabilitation will be unsuccessful, and the environment will not be self-sustaining. 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, 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 of infrastructure and opencast mine	Heritage	No heritage features were found within the proposed amendment areas of the	NEMA NHRA SAHRA permitting requirements	NEMA MPRDA NHRA SAHRA	Record occurrences of heritage sites and artefacts if and when discovered.	Environmental Manager / Specialist	As per Heritage Impact Assessment and	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
		mining boundary			Immediately contact a heritage specialist if any discoveries are made.		Heritage Management Plan	
Construction of infrastructure and opencast mine	Palaeontological	No fossils were found within the proposed amendment areas of the mining boundary	NEMA NHRA SAHRA permitting requirements	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
Closure and Rehabilitation	Sites of archaeological and cultural interests	Graves to be protected in-situ	NEMA NHRA SAHRA permitting requirements					
Construction of infrastructure and opencast mine	Agriculture, Soil and Land Capability	Loss of agricultural land for grazing and planting	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	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Opencast Mining; Bulk earthworks including foundations, trenches, berms; Establishment of n stockpiles and backfilling of opencast with waste rock and tailings; Hauling and Transporting on roads; Dust suppression; Removal of indigenous vegetation.	Soils	Soil compaction by heavy duty vehicles.		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
Opencast Mining; Bulk earthworks including foundations, trenches, berms; Establishment of overburden stockpiles and backfilling of opencast with tailings; backfill into Carbonaceous layer, ROM Stockpiles - Hauling and Transporting on roads; Dust suppression; Removal of indigenous vegetation.	Soils	Contamination of soils:	Visual inspection/confirmation that no surface impacts are occurring. Management and Rehabilitation (If required) CARA					

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Closure and Rehabilitation	Geology and Soils	Soil compaction by heavy duty vehicles.						
Closure and Rehabilitation	Geology and Soils	Contamination of soils through: Indiscriminate disposal of waste; and Accidental spillage of chemicals such as hydrocarbon-based fuels and oils or lubricants spilled from vehicles and other chemicals from operational and maintenance activities e.g., paints.		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
Construction of additional mining infrastructure and opencast mine and diversion of river	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape and impact on 'Sense of Place' as a result of the visibility of the mining site including the waste management facilities and mining activities.	Security specifications. Final land use Objectives NEMA Duty of Care.	NEMA Pre-mining conditions, post closure	Not Applicable	Environmental Manager / Specialist	Not Applicable	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Closure and Rehabilitation	Visual aspects	Visibility from sensitive receptors / visual scarring of the landscape as a result of the closure and rehabilitation activities.						
Closure and Rehabilitation	Visual aspects	Visibility of solid domestic and operational waste.						
All	Traffic	Continued change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	National Road Traffic Act OHSA MHSA	Traffic Management Plan	As per Traffic Management Plan	Environmental Manager, Mine Manager	As per Traffic Management Plan	Continuous
Construction of additional infrastructure and opencast mining	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.						

ACTIVITY	ASPECTS AFFECTED	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	Air Quality	The construction of infrastructure. 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).	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	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
General transportation, hauling and vehicle movement on site	Air Quality	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	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	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
		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.	Air Quality	Use and maintenance of the access road. Dust from material handling and wind erosion from stockpiles may result in increased	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	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
		fugitive emission sources and may impact on the ambient air quality specifically an increase in daily PM10 concentrations and TSP concentrations						
Closure and Rehabilitation	Air Quality	Dust (soil and ore fines) pollution due to rehabilitation activities and heavy-duty vehicles.						
Closure and Rehabilitation	Air Quality	Windborne dust (soil and ore fines) and vehicle fumes and particulate matter PM10, altering air quality.						
Closure and Rehabilitation	Noise and Lighting	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise impacts associated with the operation of heavy-duty vehicles and equipment.	ECA noise regulations SANS 10103 OHSA MHSA Blasting Regulations ECA noise regulations	Noise Management Plan	Environmental Noise monitoring	Environmental Manager / Specialist	As per Environmental Noise Risk Assessment	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Closure and Rehabilitation	Noise and Lighting	Disturbance due to vibrations caused by heavy duty vehicles.						
Closure and Rehabilitation	Noise and Lighting	Impact of security lighting on surrounding landowners and animals.						
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard, specifically - Ground vibration	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
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard, specifically - Air Blasting						
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard, specifically - Fly Rock						
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard, specifically on sensitive close by receptors						
All	Health and Safety	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Health and Safety Plan ESMS OHSA	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
All	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.						
All	Health and Safety	Increased risk to public and worker health and safety						
All	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Health and Safety Plan ESMS OHSA	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
All	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners specifically the close-by receptors such as Mr Swanepoel, the Gogo identified by the community and the Potgieter farmers						
All	Socio-Economic: **Positive Impacts**	Extended employment provision due to the implementation of the mining activities, allowing mining activities to commence.						
All	Socio-Economic: **Positive Impacts**	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.		Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Closure and Rehabilitation	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.						
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Increased Employment Opportunities in the Long term, Increased employment for the surrounding communities. Implementation of the Social and Labour Plan Implement Social and Labour Plan with the specific objectives: To ensure effective transformation as envisaged in the Minerals and Petroleum Resources Development Act (28/2002) the Regulations, and the Mining Charter To promote fair and equitable employment practices as prescribed in the Employment Equity Act (55/1998). The social and economic advancement of the community					

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
			influenced and affected by 2 Seam (Pty) Ltd. The positively strive towards equitable practices in accordance with the procurement plan. Supporting, utilising and building local economy					
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Health and Safety Plan ESMS MHSA OHSA	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous
Closure and Rehabilitation	Socio-Economic	Economic impact should there be an incident of public health and safety.						
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Health and Safety Plan ESMS MHSA OHSA	Social Labour Plan	Compliance with programme principles / vision	Human Resources	Annually	Continuous

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARD TO BE ACHIEVED	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY	IMPLEMENTATION
Closure and Rehabilitation	Socio-Economic	Reduced period of providing employment for local residents and skills transfer to unskilled and semi-skilled unemployed individuals.						

8.1 DETAILED MONITORING PROGRAMMES AS DESCRIBED FOR ACTIVITIES

2 Seam will be responsible for conducting the monitoring and reporting program as part of ongoing operations as well as ensuring that sufficient resources are available for effective program implementation. Where appropriate, 2 Seam may establish agreements with others (i.e., external contractor) for provision of additional support in implementing the monitoring and reporting program.

The key aspects identified in this monitoring and reporting program are:

- Soil, land, closure and rehabilitation;
- Terrestrial and Aquatic Biodiversity;
- Surface water (quality and quantity);
- Groundwater (quality and quantity);
- Air quality;
- Noise;
- Socio-economic; and
- Waste.

The below sub-sections describe the various aspects that need to be monitored in greater detail.

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

2 Seam has an existing groundwater monitoring system. After consideration of the proposed activities and geohydrological risks identified, the following improvements are proposed:

- Undertake quarterly geochemical monitoring of overburdened rock (footwall and high wall rock - this is the rock in contact with the coal seam). The rock samples should be subjected to ABA, NAG, Sulphur-speciation, XRD and static leach testing, to determine the acid/naturalisation potential of the overburden mixture. Understanding the AMD potential will help to plan for closure, understand the poor-quality seepage potential, and help determine what the long-term water liability could be.
- Drill six (6) additional monitoring boreholes downstream of the OC4 and OC4A area (Table 5 and Figure 1), and consider the proposed stream diversion, within the 50m buffer area that will be maintained. It is proposed that the boreholes be drilled before any stream diversion activities take place to verify the baseline groundwater conditions and verify the potential risks identified in this geohydrological assessment. The proposed borehole construction is shown in Figure 2. It is further proposed that the boreholes be integrated into the existing groundwater monitoring program after drilling and pump testing.

Table 5: Proposed drilling positions to improve groundwater detection system

Site	Type	Latitude	Longitude
2S-BH1	Groundwater	-26.155750	29.342977
2S-BH2	Groundwater	-26.156597	29.343480
2S-BH3	Groundwater	-26.157506	29.343991
2S-BH4	Groundwater	-26.158427	29.344850
2S-BH5	Groundwater	-26.159565	29.345520
2S-BH6	Groundwater	-26.160456	29.348999

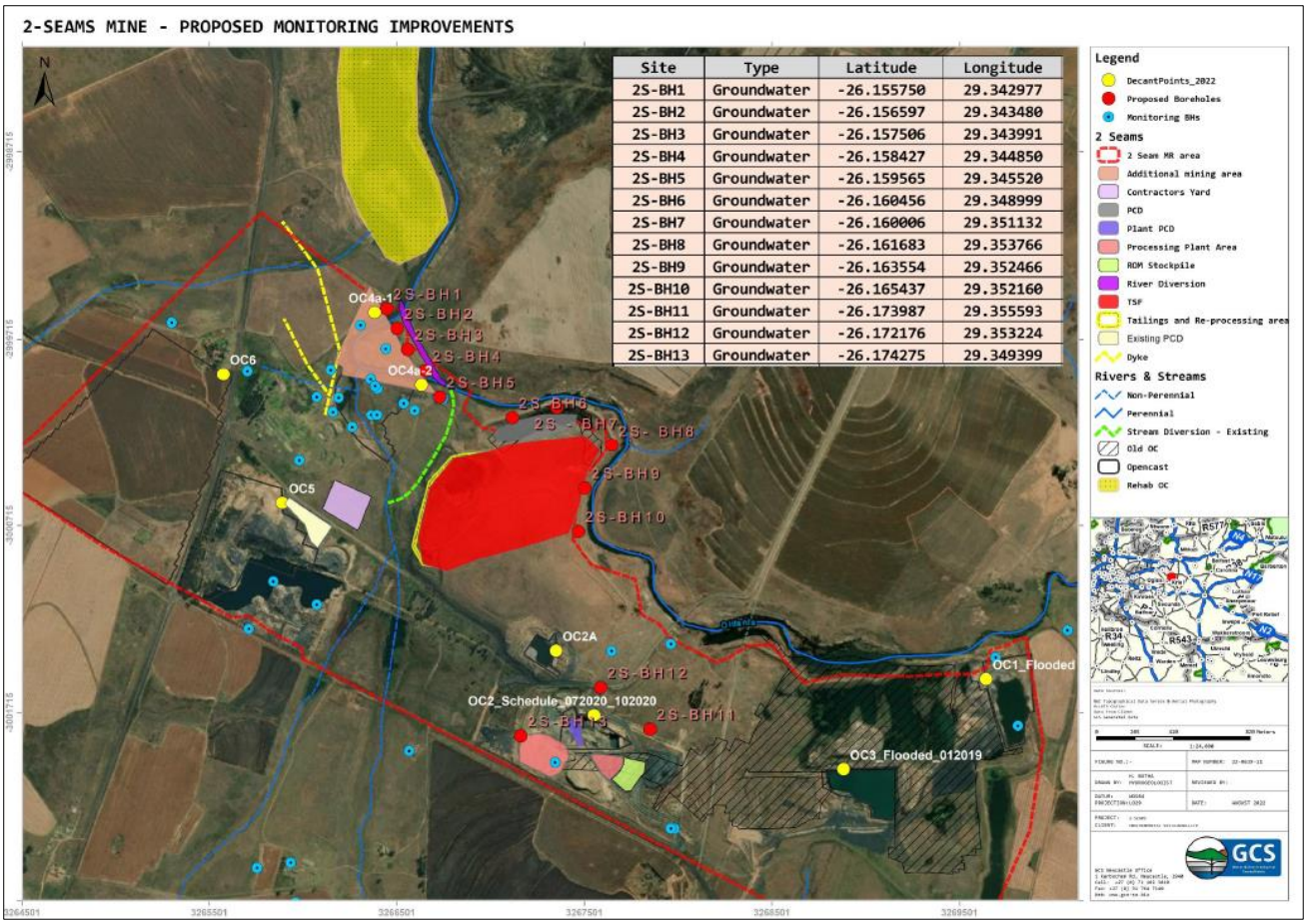

Figure 1: Proposed additional monitoring boreholes

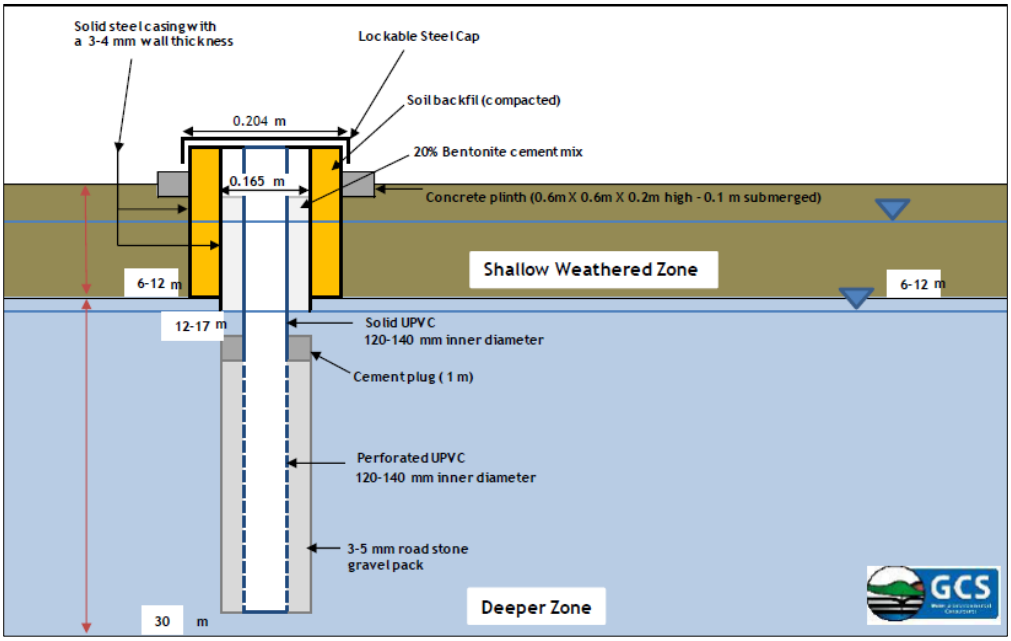

Figure 2: Proposed borehole construction

Groundwater Monitoring Network

The groundwater monitoring system must adhere to the criteria mentioned below.

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, SO_4)
  - Other parameters (EC)

Full Analysis

Physical Parameters:

- Groundwater levels

Chemical Parameters:

- Field measurements:
  - pH, EC
- Laboratory analyses:
  - Anions and cations (Ca, Mg, Na, K, NO_3, Cl, SO_4, 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."

As 2 Seam Mine is an existing mine, a monitoring network does exist. The boreholes are listed in Table 6. 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 6: Groundwater monitoring boreholes for the 2 Seam Mine

Site Label	Sampling Frequency	Bacteriological	Water Levels	Sampled (Y/N)	Reason, if not sampled	Description	Latitude	Longitude
BH1	Monthly	N/A	Monthly	Y		Monitoring borehole located West of Block 5, just below 4 seam floor	26°09’21.2” S	29°19’57.1”E
BH2	Monthly	N/A	Monthly	N	Borehole destroyed.	Monitoring borehole located Block 2 / Block 3A, Just below 2 seam floors.	26°10'31.50"S	29°21'3.79"E
BH3	Monthly	N/A	Monthly	N	Borehole destroyed.	Monitoring borehole located Block 1, Just below 2 seam floor	26°10'15.17"S	29°22'19.77"E
BH4	Monthly	N/A	Monthly	Y		Monitoring borehole located Block 5, Just below 4 seam floor	26° 9'44.45"S	29°20'19.69"E
BH5	Monthly	N/A	Monthly	Y		Monitoring borehole located Mined Out Block 1, Just below 2 seam floor / historical mining depth	26°10'14.16"S	29°21'13.54"E
ODW	Monthly	Yes	N/A	Y		Monitoring point for purpose of portable water uses	26°10’42.2” S	29°21’34.0”E
BH-1	Quarterly	N/A	Monthly	Y		Mining monitoring borehole located close to OC void	26°10'10.37"S	29°20'10.49"E

8.1.3 Surface Water Monitoring Programme

The mine has an existing Surface Water Monitoring Plan. The surface water monitoring points are indicated in Table 7.

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.

Table 7: Surface Water Monitoring Network

Site Label	Sampling Frequency	Sampled (Y/N)	Reason, if not sampled	Latitude	Longitude
2S_SW1	Monthly	Y		26°10'5.85"S	29°21'20.98"E
2S_SW2	Monthly	Y		26°10'10.03"S	29°22'26.91"E
2S_SW3	Monthly	Y		26° 9'9.71"S	29°20'44.10"E
2S_SW4	Monthly	Y		26° 9'52.2" S	29°20'36.7" E
2S_SW5	Monthly	N	Removed	26° 9'24.93"S	29°19'35.13"E
2S_SW6	Monthly	N	Removed	26° 9'11.31"S	29°20'28.73"E
2S_SW7	Monthly	Y		26°10'8.78"S	29°20'29.03"E
2S_SW8	Monthly	Y		26°10'13.28"S	29°20'35.96"E
2S_SW9	Monthly	Y		26°10'16.46"S	29°22'23.45"E
2S_SW10	Monthly	N	Removed	26°11'31.48"S	29°22'12.37"E
2S_SW11	Monthly	N	Removed	26°11'13.94"S	29°20'26.14"E
2S_SW12	Monthly	N	Removed	26°10'54.48"S	29°19'57.30"E
2S_SW13	Monthly	N	Removed	26°11'23.83"S	29°22'21.70"E
2S_SW14	Monthly	Y		26°10'34.49"S	29°22'20.12"E
2S_SW15	Monthly	N	Removed	26°10'30.44"S	29°22'19.30"E
2S_SW16	Monthly	Y		26°10'28.84"S	29°22'5.67"E
2S_SW17	Monthly	N	Removed	26°10'25.11"S	29°21'57.91"E
2S_SW18	Monthly	Y		26° 9'55.58"S	29°20'23.83"E
SWL01	Monthly	N	Removed	26° 9' 40.49" S	29° 19' 20.6" E
SWL02	Monthly	N	Removed	26° 9' 15.19" S	29° 20' 9.3" E
SWL03	Monthly	N	Removed	26° 9' 7.4" S	29° 20' 32.81" E
VLK-SW7	Monthly	Y		26°10'5.38"S	29°20'22.77"E

8.1.4 Wetland and Aquatic Monitoring, including Hydropedological

It must be noted that monitoring is ongoing on site. The main goal of the monitoring is to assess the efficiency of the rehabilitation process and to ensure that the methods and phases of the rehabilitation process are implemented. Most importantly the monitoring program is conducted to detect if the proposed rehabilitation methods, as designed, are efficient and operational.

Due to the complexity of the rehabilitation process, it is proposed that a specialist Aquatic Environmental Control Officer (AECO) be on site for the duration of the process. This is advised as the possible impacts on the aquatic ecosystem are of such a concern that a trained person be instated for the full length of the diversion process and pre and post phases. This period length is at the discretion of the ECO, the Developer, and the AECO and the Department of Water Affairs as seen in the WUL (tbc when WUL has been received). The AECO will be tasked with the health of the aquatic ecosystems through the identification and mitigation of any environmental problems encountered and will have the power to stop any activities impacting negatively on the aquatic and terrestrial ecosystems. This must be in line with the current state of the environment and targets to improve on the state of the environment through rehabilitation.

To assign a timetable for the monitoring of the impacts is not achievable since the duration of the various periods are not known. It is therefore suggested that at the discretion of the AECO, the developer and the contractor, the timetable be decided on an adaptive time basis to adjust to the needs of the parties. It is proposed that a weekly inspection and reporting be conducted. It is important to ensure the correct aspects are adhered to during the monitoring of the site (Table 8). This is only recommended and may differ in the water use licence.

Table 8: Aspects and monitoring requirements of the study site

ASPECT	MONITORING REQUIREMENTS
Baseline condition prior to the impact	This wetland and aquatic impact assessment report
Aspects requiring monitoring	Water quality parameters (WQP) if possible, General diversion related impacts, SASS 5, Fish population assemblage,
Monitoring location	Up and downstream of the diversion, At the outlet from Mistake Lake
Biomonitoring frequency	Six monthly/ Biannual
TWQR PARAMETERS	In situ
TWQR FREQUENCY construction	Monthly
TWQR FREQUENCY operational	Monthly
TWQR	As for aquatic ecosystems guideline by the Department of Water Affairs. Maximums can also be given in the WUL.

ASPECT	MONITORING REQUIREMENTS
Responsible Party	Owner and construction company creating the diversion should appoint the AECO. Remediation work is the responsibility of the construction crews.
Frequency of Monitoring, and/or Timeframes	6 Monthly assessments of the Fish population, SASS 5 (or aquatic macroinvertebrate assessment)
Targets for Each Aspect Monitored	The mining should have a neutral impact on the system and thus the *in-situ* conditions
Photographic Record of Construction and Impacts	A fixed-point photographic record must be kept of the area. Reference images should be taken from a fixed point, before, during and after the construction.
Indicators for Measuring the Progress of Each Target	Water Quality: the indicators should not exceed the parameters set out in the in-situ conditions. Photographic image references: should be used based on visual observations of change
Environmental Driver Monitoring	Rainfall, temperature
Corrective Actions Implemented If Monitoring Is Not Progressive	As per the AECO monthly reports.

8.1.5 Noise Monitoring Program

2 Seam will implement noise management measures to mitigate potential impacts during all phases of the project. This section details monitoring relating to noise management that will be implemented.

Noise monitoring is required to provide information necessary to determine potential noise impacts on sensitive receptors (i.e. nearby communities), as a result of construction, operation and closure activities of the project.

The objectives of the noise monitoring program are to ensure that:

- Measures to avoid, mitigate and manage potential noise impacts are achieving the set objectives;
- Noise is maintained at an acceptable level in compliance with all applicable legislation;
- Any potential noise impacts are identified; and
- Changes in noise levels that may be directly related to project activities are detected early to allow for appropriate mitigation measures to be implemented.

8.1.5.1 Applicable Noise Guidelines and Standards

The regulatory standards and guidelines relevant to noise monitoring that were adopted are:

- South African National Standard: SANS 10103:2008 - The measurement and rating of environmental noise with respect to annoyance and to speech communication; and

- World Health Organisation – Guidelines for Community Noise, 1999.

8.1.5.2 Proposed Noise Monitoring Points

Noise monitoring points will be established in high-risk noise areas within the project area (e.g. where blasting is occurring, or heavy machinery is being used) during construction and operations, to monitor potential impacts on employees.

8.1.5.3 Noise Guideline Values/Limits

Guideline values/limits for noise and vibration levels have been selected in order to meet legislative requirements and provide monitoring results relevant to the project.

Table 9 lists noise guideline values/limits for the project. Where a guideline value/limit is at different levels, the most stringent value will be adopted. Exceedance of guideline values/limits at any noise monitoring point will be identified and reported to management and relevant regulatory authorities and entered into the recording system described in **Section 7.10**. The following guideline values/limits will also apply to air over pressure monitoring, which is calculated by measuring the sound level pressure (dB (A)).

Table 9: Noise monitoring guideline values/limits

Area	World Health Organisation		SANS 10103:2008	
	Daytime dB(A)	Nighttime dB(A)	Daytime dB(A)	Nighttime dB(A)
Rural districts	55	45	45	35
Industrial districts	70	70	70	70

8.1.5.4 Noise Monitoring Frequency

It is recommended that noise monitoring should be undertaken monthly at the monitoring points that will be selected prior to construction, during the construction phase and quarterly during the operations phase for the life of the project. If the noise level measurements remain low during the operational phase, noise monitoring can be adjusted to be conducted annually.

Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference database. Regular checks should be carried out to ensure that equipment is not deteriorating and to detect increases which could lead to an increase in the noise impact over time and increased complaints.

8.1.5.5 Analysis of Monitoring Data

All noise monitoring will be undertaken by an appropriately trained professional, and the results will be reported quarterly.

8.1.6 Biodiversity Monitoring

Monitoring framework should be instigated and managed by the 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.
- Removal of alien and invasive species must continue for a two-year maintenance period after development, on a biannual basis.
- Adequate monitoring to detect changes in the surface and groundwater environment must be initiated by the applicant, with special focus on contaminants associated with coal and the possibility of formation of Acid Mine Drainage in the area
- Strictly implement wetland associated monitoring as may be described by the wetland specialist.

8.1.6.1 Flora

Vegetation Communities Monitoring

Vegetation communities will be visually inspected and assessed for vegetation condition and quality. The following specific vegetation characteristics will be assessed:

- The abundance, composition and condition of wetland communities;
- The abundance, presence and localities of SCC vegetation;
- Presence of hyper-accumulators on site that can be used for rehabilitation purposes;
- Ongoing impacts on flora as a result of project-related activities;
- Increases in the density and distribution of known exotic plant locations;
- Introduction of new exotic plant species; and
- Accumulation of organic litter.
- Photographs will be taken during these monitoring events so that an archive of photographs can be compiled for visual comparisons.

If vegetation condition deteriorates around these wetland habitats, 2 Seam will adhere to recommendations from the ecologists to rectify the issues.

8.1.6.2 Management of Alien Invasive Species

Areas with a high potential for, or susceptibility to, invasion by exotic plant species will be monitored bi-annually (particularly after rain events) or after disturbance events (e.g. clearing).

Monitoring for exotic plant species will include:

- Inspection for exotic plant outbreaks after the wet season and opportunistically after rain events;
- Recording the size of populations and the control treatment applied;
- Inspection for exotic plant species after significant germination events; and
- Recording the level of proliferation.

A detailed alien invader control plan should be developed during the construction phase of the project in order to ensure that timeous control of alien vegetation takes place throughout the study area and considering priority areas, areas of high recruitment and sensitive habitats. A detailed breakdown of control substances should be developed as part of the process.

Alien and invasive vegetation control should take place throughout all phases of the development and beyond decommissioning. An Alien Invasive Control Programme should be compiled and should be implemented as per recommendations from the ecologists.

8.1.7.3 Vegetation Clearance Monitoring

Areas that contain natural vegetation, which require clearing for the development of the project, will be inspected regularly (as the development takes place) to ensure that clearing activities are conducted in accordance with the terrestrial biodiversity measures in this EMPr.

Development of a rehabilitation plan by a suitably qualified specialist is of great importance. This plan should emphasise rehabilitation throughout all phases of the project. The plan must not only ensure structural rehabilitation but must also ensure that the functional attributes of the landscape are re-instated. Particular mention is made in this regard of the functional attributes of any disturbed wetlands. These aspects should be monitored as part of the ongoing activities. As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils and to reduce the percentage of the surface area which is paved. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping. This should also form part of the ongoing monitoring process.

Fauna

Fauna monitoring will involve fauna surveys (including counts of conservation significant species) by qualified and experienced personnel at selected sites to allow for the assessment of:

- Changes in the abundance, composition or condition of fauna species, particularly those associated with wetland and riparian habitats;
- The abundance, presence and localities of SCC fauna;
- Ongoing impacts on fauna as a result of project activities;
- Success of rehabilitation activities for vegetation as habitat;
- Increase in the density and distribution of pest fauna; and
- Introduction of previously unrecorded pest fauna.

Survey methods may include visual observations, spotlighting, bird census transects, trapping and active searching. Faunal monitoring will include:

- Preparing an inventory of fauna species for each of the surveyed habitat types;
- Conducting bi-annual surveys after each wet season for the presence of species of conservation significance;
- Recording fauna movements in the area including birds, butterflies and other species;
- Regular inspection of potential ‘faunal traps’ such as temporary trenches required during construction;
- Inspection of fencing, in the event of fauna accessing restricted areas;

- Recording animal deaths that occur as a direct result of project activities; and
- Monitoring the success of control techniques in reducing impacts due to pest animals in the project area.

Monitoring will be conducted bi-annually and prior to, during and following disturbance. Thenumber of sites to be sampled during monitoring will be calculated prior to each monitoring event to allow for valid statistical comparisons between control and impact sites.

The boundaries of the development footprint areas should be regularly monitored to remain as small as possible, should be clearly defined and it should be ensured that all activities remain within the defined footprint areas. Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed in all areas, particularly within areas of increased ecological sensitivity.

Alien species should be eradicated and controlled to prevent their spread beyond the development footprint areas.

All areas of increased ecological sensitivity beyond the development footprint should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel.

Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities.

Should any *Pyxicephalus adspersus* (Giant Bullfrog) be encountered within the study area, all activities must cease, and special care must be taken to catch and relocate them to a similar habitat within or in the vicinity of the study area. Relocation must be done by a suitably qualified person and must be done in conjunction with the faunal specialist. When avifaunal SCC is encountered, care must be taken not to put further stress on them. Most birds will utilise the area for foraging so while the birds are busy foraging they must not be disturbed. Education regarding identification of any faunal SCC that may be found within the study area should be given to all employees. The status and presence of possible SCC should be monitored on a continuous basis.

8.1.7 Heritage Monitoring Program, including Paleontological Features

Should any heritage remains be discovered during any phase of the development, all work shall stop, and a specialist should be consulted. A chance find procedure needs to be implemented by the mine.

8.1.8 Air/Dust Monitoring Program

2 Seam Mine has implemented an air quality monitoring programme to manage the air quality management measures to mitigate potential impacts on air quality during all phases of the project. Ongoing monitoring is required to provide information necessary to determine potential project impacts on air quality, which can pose potential health and environmental risks.

The objectives of the air quality monitoring program are to ensure that:

- The measures to avoid, mitigate and manage impacts on air quality are achieving set objectives;
- Assessment of compliance with dust control regulations.
- Facilitate the measurement of progress against environmental targets.
- Temporal trend analysis to determine the potential for nuisance impacts.

- Tracking of progress due to pollution control measure implementation.
- Informing the public of the extent of localised dust nuisance impacts occurring in the vicinity of the operations
- Any potential impacts on air quality are identified; and
- Changes in air quality that may be directly related to project activities are detected early to allow implementation of appropriate mitigation measures.

It is of importance that the mitigation and monitoring recommendations contained within the air quality impact assessment are utilised as a guideline for the mitigation of all impacts on air quality, and that monitoring should take place in accordance too the recommendations. An action plan should be developed utilising that document to ensure effective air quality management and monitoring thereof.

8.1.8.1 Applicable Air Quality Guidelines and Standards

The regulatory guidelines and standards relevant to air quality monitoring include:

- National Dust Control Regulations (NDCR); and
- South African National Ambient Air Quality Standards No. 1210.

The recommended guideline values under these standards are presented in Figure 3

Averaging period	Concentration	Allowed frequency of exceedance	Compliance date
Particulate Matter (PM_{10})			
24 hours	75 µg/m³	4	1 January 2015
1 year	40 µg/m³	0	1 January 2015
Particulate Matter ($PM_{2.5}$)			
24 hours	40 µg/m³	4	1 January 2016 – 31 December 2029
24 hours	25 µg/m³	4	1 January 2030
1 year	20 µg/m³	0	1 January 2016 – 31 December 2029
1 year	15 µg/m³	0	1 January 2030

Figure 3: Air quality standards for specific criteria pollutants (SA NAAQS)

Table 10: Acceptable dustfall rates

Restriction areas	Dustfall rate (D) in mg/m2/day over a 30-day average	Permitted frequency of exceedance
Residential areas	D < 600	Two within a year, not sequential months
Non-residential areas	600 < D < 1 200	Two within a year, not sequential months.

8.1.8.2 Air Quality Monitoring Locations

The dust monitoring points are reflected in Table 11 and shown in Figure 4 and are used to monitor dust impacts from the current mining activities.

Table 11: Dust Monitoring Locations

	Vlak D 1	Vlak D 2	Vlak D 4	Vlak D 5	Vlak D 6	Vlak D 7
Co-ordinates South	26°10'03.4	26°10'18.9	26°09'24.2	26°10'5.61"	26°10'15.2"	26°11'7.28"
Co-ordinates East	29°21'31.7	29°21'10,5	29°20'10.3	29°20'0.70"	29°22'14.6"	29°22'15.22"

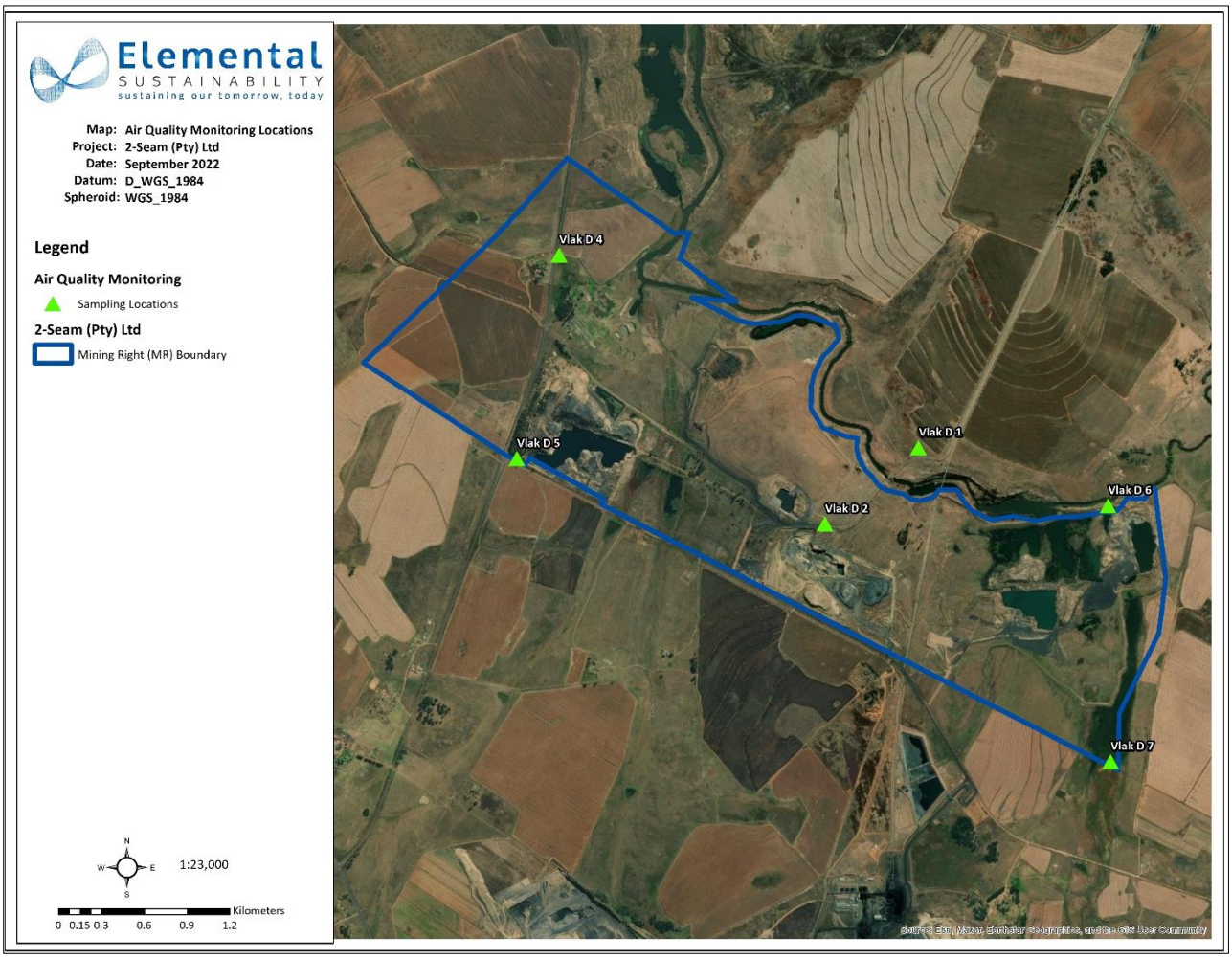

Figure 4: Air Quality Monitoring Locations

8.1.8.3 Air Quality Monitoring Frequency

It is recommended that air quality monitoring is undertaken monthly at the monitoring points for the dust fallout monitoring on an on-going basis for the life of the project to determine daily and annual averages. Dustfall sampling measures the fallout of windblown settleable dust. Single bucket fallout monitors are deployed following the American Society for Testing and Materials standard method for collection and analysis of dustfall

(ASTM D1739). This method employs a simple device consisting of a cylindrical container exposed for one calendar month (30 days, ±2 days).

8.1.8.4 Analysis and Reporting of Monitoring Data

All air quality monitoring data will be analysed by an appropriately qualified professional, and the results will be reported bi-annually to management. The National Dust Control Regulation (NDCR) requires monitoring reports to be submitted to the local air quality officer where exceedances of the dustfall standards occur. Such reports will therefore have to be compiled when this is applicable and submitted as requested. Reports have to be submitted to the authorities annually.

8.1.9 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.

8.1.10 Socio Economic Monitoring

Monitoring of stakeholder consultation will include the following:

- Records of attendance at public events and community meetings to gauge the success of stakeholder consultation and to improve ongoing stakeholder consultation;
- Records of feedback including the person's name and contact details, method of consultation, information communicated, responses and outcomes of the consultation in the stakeholder database; and
- Articles that appear in the media, particularly local newspapers in the peripheral communities.

Monitoring of the socio-economic impacts will include ongoing monitoring of the following indicators:

- Workforce statistics, including the number of 'local' and South African nationals
- Number and nature of complaints documented through grievance procedures, including the person's name and contact details, communication, action taken to resolve the complaint, outcomes and feedback from complainant;
- Service and goods supply statistics. These will include details regarding:
  - Type and quantity of goods/service;
  - Value;
  - Location of supplier;
- Community engagement, attitudes and interaction;

Ongoing socio-economic monitoring will be undertaken and reported as described in the approved SLP employed by the project;

8.1.11 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.

It must be noted that monitoring is ongoing on site. The main goal of the monitoring is to assess the efficiency of the rehabilitation process and to ensure that the methods and phases of the rehabilitation process are implemented. Most importantly the monitoring program is conducted to detect if the proposed rehabilitation methods, as designed, are efficient and operational.

Due to the complexity of the rehabilitation process of the proposed river diversion, it is proposed that a specialist Aquatic Environmental Control Officer (AECO) be on site for the duration of the process. This is advised as the possible impacts on the aquatic ecosystem are of such a concern that a trained person be instated for the full length of the diversion process and pre and post phases. This period length is at the discretion of the ECO, the Developer, and the AECO and the Department of Water Affairs as seen in the WUL (tbc when WUL has been received). The AECO will be tasked with the health of the aquatic ecosystems through the identification and mitigation of any environmental problems encountered and will have the power to stop any activities impacting negatively on the aquatic and terrestrial ecosystems. This must be in line with the current state of the environment and targets to improve on the state of the environment through rehabilitation.

To assign a timetable for the monitoring of the impacts is not achievable since the duration of the various periods are not known. It is therefore suggested that at the discretion of the AECO, the developer and the contractor, the timetable be decided on an adaptive time basis to adjust to the needs of the parties. It is proposed that a weekly inspection and reporting be conducted. It is important to ensure the correct aspects are adhered to during the monitoring of the site (Table 12). This is only recommended and may differ in the water use licence.

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, 2 Seam 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 Review of Monitoring Program

The monitoring program will be reviewed annually by management during the operational life of the mine. The review will consider:

- Consistency of monitoring results;
- Whether impacts vary from initial predictions;
- Significant changes to the configuration or operation of the project; and
- New company commitments, legislative requirements or stakeholder concerns.

As part of the monitoring program review, a schedule of internal and third-party audits will be established and implemented. The audits will objectively assess an array of monitoring records and management practices against documented procedures to determine whether procedures are being followed and company commitments are being adhered to.

Auditing will take place at pre-determined intervals, with priority given to aspects of the project that have the potential to cause significant environmental damage. Audit results will be reported annually to management, or sooner if deemed necessary by the person of authority. The process of auditing and subsequent management review will allow for:

- Early detection of potential environmental issues;
- Implementation of corrective actions before the issue becomes significant or irreversible;
- Continual environmental performance improvement;

- Confirmation that the system reflects operational practices;
- Assessment of the relevance of the monitoring program;
- Measurement of compliance to legal and other requirements and organisational commitments; and
- Verification of the effectiveness of corrective actions.

The following table is a summary of the monitoring measures, which should be read in conjunction with Section 8.

Table 12: Summary of proposed monitoring measures

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling Method	Variables
Soil, land, closure and rehabilitation	Soil	To ensure effective topsoil management throughout the project for availability for rehabilitation.	The project area (Site)	Continuous	Measurements (mm) Survey and visual	As per specialist advice
	Land	To prevent further degradation of the surrounding areas and those areas not affected on site.	The project area (Site-Local)	Continuous	Measurements (mm) Survey and visual	As per specialist advice
	Rehabilitation	To ensure effective rehabilitation practices for re-establishment of a suitable post-mining land use and land capability.	The project area (Site-Local)	Continuous	Measurements (mm) Survey and visual	As per specialist advice
	Closure	To ensure effective rehabilitation practices in order to effectively implement the approved Closure Plan.	The project area (Site-Local)	Continuous	Measurements (mm) Survey and visual	As per specialist advice
Surface water	Water uses related to surface water use as per Section 21 of the NWA	To monitor compliance against the WUL conditions.	As per WUL Conditions.	Annually	External WUL Audit Internal WUL Audit	-
	Surface water quality	Determine any deterioration in water quality as a result of the mining activities.	As shown in Table 7 and as recommended in the WUL.	Monthly	Grab sampling	EC, pH, TDS, SS, Cl, SO_4, NO_3, Na, F, Fe, Al, Mn, Total Alkalinity, Ca, Mg, K, Total Hardness.
				Annually	Grab sampling	Analyses to 95% charge balance, including all metals and hydrocarbons
	Water management infrastructure	Monitoring of condition of infrastructure. Identifying areas that require maintenance. Monitoring effectiveness of infrastructure.	Along clean & dirty water canals; clean & dirty water dams; all pipelines; sewage plant; and all other infrastructure areas.	Monthly/ After a big rain event	Visual	Evidence of erosion, cracks, lack of capacity, subsidence, overgrowth, etc.

	Dirty water systems	Determine the water quality and long-term chemical changes in the dirty water systems.	Dirty water sumps	Monthly	Grab sampling	EC, pH, TDS, SS, Cl, SO_4, NO_3, Na, F, Fe, Al, Mn, Total Alkalinity, Ca, Mg, K, Total Hardness
Groundwater	Water uses related to groundwater use as per Section 21 of the NWA	To monitor compliance against the WUL conditions	As per WUL	Annually	External WUL Audit Internal WU Audit	-
	Groundwater quality	To determine any impact on the groundwater quality as a result of the mining activities.	As recommended by GW Specialist.	Monthly for the first year, thereafter Quarterly	High integrity grab sampler	EC, pH, TDS, SS, Cl, SO_4, NO_3, Na, F, Fe, Al, Mn, Total Alkalinity, Ca, Mg, K, Total Hardness. Annually: Analyses to 95% charge balance, including all metals and hydrocarbons.
Mine water balance	Water levels in underground workings	To verify water balance and volume of water still to be dewatered before mining can commence.	All underground areas	Monthly	Survey & Water level meters	Height (mamsl)
	Dirty water recycled	To determine volume of dirty water abstracted & recycled for dust suppression.	Mine dewatering points as well as abstraction from PCD/sumps/Open cast pits	Monthly reading	Water flow meters	Volume (m^3)
	Water quantity (clean water) entering the mine	Determine the water quantity that enters the mine, the water management systems and structures.	All sumps and water management structures.	Monthly Per rainfall event	Rainfall station Water flow meters Survey & Water level meters	Millimetre (mm) Volume (m^3) Height (mamsl)
	Clean water	To determine volume of clean water abstracted.	Water supply abstraction points	Monthly reading	Water flow meters	Volume (m^3)
Biodiversity / Land use management	Terrestrial Ecological Monitoring	Ongoing vegetation and animal life monitoring.	The project area (Site-Local)	Annually	Survey and visual	As per specialist advice
	Biomonitoring	Ongoing monitoring of the aquatic resources in the vicinity of the mining activities.	The project area (Site-Local)	Bi-annual	Field survey Wet and Dry Season	As per specialist advice
	Alien vegetation	To monitor conformance with alien vegetation programme.	The project area (Site)	Monthly (during	Survey	Area (hectares)

				eradication programme)		
Air quality	Dust fallout	To determine the levels of dust fallout as a result of the project activities.	Refer to Figure 4.	Monthly	Single dust buckets	Settleable particles (mg/m^2/day)
Environmental noise	Noise levels	To determine the noise levels within the communities and sensitive areas.	Sensitive receptors	Quarterly	To be determined	dB(A)
Socio-Economic (including health, safety and visual)	Stakeholder consultation	Ongoing monitoring to allow identification of any impacts from the project on stakeholders and socio-economic conditions in the local communities and on the surrounding farms, including health and safety, as well as visual impacts	Site-Local	Continuously	Stakeholder forums and one on-one consultations.	-
	Social management and monitoring strategies.		Site-Local Regional	Monthly or as required	Review strategies and action plan.	-

9.1.3.4 Audit Protocol

In order to ensure compliance with this EMPr and to assess the continued appropriateness and adequacy of the EMPr, 2 Seam commits to:

- Appoint an Environmental Control Officer (ECO) to ensure compliance with this EMPr during the construction phase of the project. The ECO will ensure the following:
  - All conditions set in the various approvals are fully understood and measures implemented to ensure compliance with those authorisations and licences;
  - An ECO report will be compiled and submitted to the regulator as defined in the approvals;
  - Internal and external audits will be conducted as specified in all authorisations and licences;
  - Only infrastructure that was specified in this EMPr is to be constructed;
- Conduct the monitoring of the EMPr on an on-going basis;
- Conduct the performance assessments of the EMPr;
- Compile and submit a report on the compliance of the EMPr to the Director: Mineral Resources;
- The performance assessments / compliance audits of the EMPr and the compilation and submission of the reports will occur annually from the date of approval of the EMPr; and
- The first compliance audit of the EMPr will be scheduled to take place within 1 year of the approval of this EMPr report.

Refer to Table 13 for the mechanisms and responsibilities for implementation of the Impact Management Actions to ensure compliance with the EMPr.

Table 13: Mechanisms and responsibilities for implementation of Impact Management Actions

Aspect	Monitoring		
	Responsible person	**Frequency**	**Evidence of compliance**
Geology	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	External Qualified Consultant	Annual	Annual Rehabilitation Plan.
	External Qualified Consultant	Every 5 years.	Final Rehabilitation, Decommissioning and Closure Report.
	External Qualified Consultant	Annual	Rehabilitation Strategy and Implementation Programme (RSIP).
Topography	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	External Qualified Consultant	Annual	Annual Rehabilitation Plan.
	External Qualified Consultant	Every 5 years.	Final Rehabilitation, Decommissioning and Closure Report.
	External Qualified Consultant	Annual	Rehabilitation Strategy and Implementation Programme (RSIP).
Soil, Land Use and Land Capability	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	External Qualified Consultant	Annual	Annual Rehabilitation Plan.
	External Qualified Consultant	Every 5 years.	Final Rehabilitation, Decommissioning and Closure Report.
	External Qualified Consultant	Annual	Rehabilitation Strategy and Implementation Programme (RSIP).

Aspect	Monitoring		
	Responsible person	**Frequency**	**Evidence of compliance**
	Appointed Soil Specialist	Monthly	Internal Monitoring Results Report
Groundwater	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	External Qualified Consultant	Annual	Annual Rehabilitation Plan.
	External Qualified Consultant	Every 5 years	Final Rehabilitation, Decommissioning and Closure Report.
	External Qualified Consultant	Annual Rehabilitation	Strategy and Implementation Programme (RSIP).
	Mine Engineer Mine Geologist	Detailed Review of areas at risk of subsidence and high yielding zones as required.	Geotechnical Investigation
	Environmental Manager / Environmental Compliance Officer (ECO)	Monthly	Internal Monitoring Results Report
	External Qualified Consultant	Bi-Annual	Monitoring Reports Submitted to DWS
	Environmental Manager / Environmental Compliance Officer (ECO)	Annual	Internal WUL Report
	External Qualified Consultant	Annual	External WUL Report submitted to DWS
Flora	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	External Qualified Consultant	Annual	Annual Rehabilitation Plan.
	External Qualified Consultant	Every 5 years.	Final Rehabilitation, Decommissioning and Closure Report.

Aspect	Monitoring		
	Responsible person	**Frequency**	**Evidence of compliance**
	External Qualified Consultant	Annual	Rehabilitation Strategy and Implementation Programme (RSIP).
	Environmental Manager / Environmental Compliance Officer (ECO)	Annual Ecology Survey and Visual Inspection	Annual Internal Report
	Environmental Manager / Environmental Compliance Officer (ECO)	Monthly	Survey – Alien Vegetation Management Internal Report
	External Qualified Consultant	Annual	Review of Alien Vegetation Management Plan
Freshwater	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	External Qualified Consultant	Annual	Annual Rehabilitation Plan.
	External Qualified Consultant	Every 5 years.	Final Rehabilitation, Decommissioning and Closure Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.
	External Qualified Consultant	Annual	Rehabilitation Strategy and Implementation Programme (RSIP).
	Environmental Manager / Environmental Compliance Officer (ECO)	Monthly	Internal Monitoring Results Report
	External Qualified Consultant	Bi-Annual	Wet and Dry Season Bio-Monitoring Reports Submitted to DWS
	Accredited Laboratory	Monthly	Submission of laboratory monitoring results.
	Environmental Manager / Environmental Compliance Officer (ECO)	Annual	Internal WUL Report
	External Qualified Consultant	Annual	External WUL Report submitted to DWS
	Environmental Manager / Environmental Compliance Officer (ECO)	Monthly	Survey – Alien Vegetation Management Internal Report
Air Quality	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.

Aspect	Monitoring		
	Responsible person	**Frequency**	**Evidence of compliance**
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	External Qualified Consultant	Annual	Annual Rehabilitation Plan.
	External Qualified Consultant	Every 5 years.	Final Rehabilitation, Decommissioning and Closure Report.
	External Qualified Consultant	Annual	Rehabilitation Strategy and Implementation Programme (RSIP).
	Environmental Manager / Environmental Compliance Officer (ECO)	Monthly	Internal Monitoring Results Report
	External Qualified Consultant	Annual	Annual Air Quality Report
	Accredited Laboratory	Monthly	Submission of laboratory monitoring results.
Noise	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	External Qualified Consultant	Quarterly	Quarterly monitoring during construction and submission of report on results to mine.
	External Qualified Consultant	Annual	Annual monitoring during operational phase and submission of report on results to mine.
	Environmental Manager / Environmental Compliance Officer (ECO)	Monthly	Review of complaints register, if complaint is received, a qualified specialist must be appointed to conduct noise monitoring at the site immediately.
	Safety and Health Manager	Weekly	Weekly toolbox talks with employees regarding PPE.
Visual	Environmental Manager / Environmental Compliance Officer (ECO)	Monthly Visual Monitoring	Monthly Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.

Aspect	Monitoring		
	Responsible person	**Frequency**	**Evidence of compliance**
Heritage and Archaeological Aspects	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections during Construction	Monthly Report.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly ECO Inspections	Monthly Environmental Compliance Report.
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	Environmental Manager / Environmental Compliance Officer (ECO)	Weekly Inspections after Blasting	Monthly Report.
Socioeconomic	Community Manager Mine Management	Weekly Assessment of Complaint Register	Liaise with stakeholder that reported complaints and write internal report regarding the outcome
	Community Manager	Consultation Programme	Bi-annual internal report
	External Qualified Consultant	Annual EMP PA	Annual Report submitted to relevant state departments.
	Community Manager Health and Safety Manager Mine manager	Assessing the compliance with the Traffic Impact Assessment Weekly progress inspections	Monthly internal report
	Environmental Manager	Monthly review of air quality measurement results	Monthly Internal Air Quality Report
	Health and Safety Manager	Annual health awareness education programme	Internal report
	Community Manager Mine Management	Monthly assessment of programmes implemented	Monthly report

9.1.3.5 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.

9.1.3.6 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

This section outlines the environmental awareness plan that will be implemented by 2 Seam to advise its employees of the environmental risks and potential impacts that may occur as a result of the project. The provision of the environmental awareness plan meets the requirements of Appendix 4 1(m) of the *National*

Environmental Management Act Regulations GNR 982, which stipulates that an EMPr must include a plan that describes:

"(m) an environmental awareness plan describing the manner in which—

(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and

(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;..-"

In general, the purpose of the environmental awareness plan is to educate site personnel regarding the potential environmental and social issues that are associated with the project with the aim of reducing the potential of their occurrence, and to provide site personnel with the knowledge and means to rectify these issues through direct responses, or through the appropriate communication pathways.

The approach to the environmental awareness plan is to construct a multi-tiered induction, incidents and complaints strategy, whereby both site personnel that are directly related to the project (including contractors and staff) and the public can be educated in potential environmental issues as well as have an avenue to report environmental complaints and incidents. To achieve this, the environmental awareness plan will require the following steps:

- Develop an internal communication and awareness campaign to highlight environmental concerns and incidents;
- Develop an induction program, which details environmental management that all site personnel will be required to participate in;
- Implement a communication pathway so that all employees can report environmental concerns/incidents and can make suggestions for improvement; and
- Provide means for external communication so that the public can highlight concerns and report incidents.

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 Communication Pathways

Incidents that create impacts and near miss incidents can be reported to a relevant supervisor or the environmental manager. It must be reported as soon as possible, or within a maximum of 24 hours after the incident. Lodging of all incidents and near misses will allow for improvements to standard operating procedures, and recognition of areas where improvements need to be made. The process will be as follows:

- Report all impacts to the relevant supervisor as soon as possible, or at least within 24 hours after the incident/near miss/observation;
- The relevant supervisor, or environmental manager will arrange for someone to find out what caused it, and what to do to fix it, and to stop it from happening again; and
- All incidents/near misses/observations will be logged and will be discussed at each monthly Health, Safety and Environment Committee meeting.

9.1.4.4 External Communication

Avenues for the public to voice environmental concerns/incidents resulting from the project were made available. These concerns/incidents can be recorded in health, safety, environmental, community (HSEC) reports that will be made available to the public upon request. Public environmental concerns and incidents can be identified through the following pathways:

- Annual public meetings that will be held with major stakeholders to present and/or discuss HSEC issues regarding the project. Minutes will be recorded that will outline the discussion points of the proceedings. Feedback sheets will be handed to stakeholders upon registration and can be collected after the meeting. This will allow stakeholders to change their contact details and to comment or ask questions on HSEC. All feedback sheets that are submitted will be dealt with in accordance with fixed operating procedures;
- A HSEC external complaints register will be made available before the commencement of project activities. This register will be made available at the access gate to the mine. If a complaint and/or concern is raised, a formal investigation must be opened as part of the Environmental Management System (EMS) and managed and investigated in accordance with a fixed operating procedure; and
- A central complaints register will be kept and updated monthly by the environmental manager. External complaints will be recorded within this register and follow-up investigations will be undertaken within two days. Regular contact must be maintained with the complainant until the complaint has been addressed satisfactorily.

9.1.4.5 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.

9.1.4.6 Responsible Persons

Determination of the roles and responsibilities of all people working for the project is important so that each person is aware of the appropriate response that should be undertaken. The general roles and responsibilities are provided in the sections below.

Employees

Generally, all employees are responsible for:

- Preventing and managing any environmental incident;
- Minimising the impact of an environmental incident; and
- Reporting any environmental incident to the person responsible for the affected area as soon as possible.

Responsible Persons

Generally, all responsible persons are responsible for:

- Preventing environmental incidents by adhering to, and adopting the relevant procedures and code of practices;
- Implementing corrective actions where appropriate (i.e. reactionary measures);
- Implementing preventative action to prevent a reoccurrence of the environmental incident (i.e. preventative measures); and
- Reporting environmental incidents and emergencies to the project's environmental manager.

Environmental Manager

Generally, the environmental manager is responsible for:

- Testing the effectiveness of emergency procedures through the development of mock drills;
- Investigating all reported environmental incidents, determining their causes and checking whether the correct procedures were undertaken. A review of the emergency response procedures can be undertaken if the current procedures are deemed inadequate to prevent the incident from occurring again;
- Reporting incidents of a significant nature to the operations manager; and

- Reporting and discussing incidents with the management team.

9.1.4.7 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.

9.1.4.8 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.

9.1.4.9 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.

9.1.4.10 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 9.1.3.4).

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 (TO BE COMPLETED FOR FINAL EMPR TO BE SUBMITTED TO CA)

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.....on this.....

Signature of EA.....

Designation Environemental Assessment Practitioner.....

COMMITMENT/UNDERTAKING BY THE APPLICANT

I, ……, the undersigned and duly authorised thereto by the 2 Seam (Pty) Ltd. Mine 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.....on this..... day.....

Signature of applicant .....

Designation.....

-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

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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