



# EIA for the Swartberg Mine Expansion

Environmental Management Programme Report (EMPr)

19 June 2019

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## Signature Page

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# EIA for the Swartberg Mine Expansion

## Environmental Management Programme Report (EMPr)

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## Acronyms and Abbreviations

Name	Description
BMM	Black Mountain Mining
CBA	Critical Biodiversity Area
DAoI	Direct Area of Influence
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DM	District Municipality
DMA	District Management Area
DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Program
EPC	Engineering Procurement Construction
ERM	Environmental Resources Management
GDP	Gross Domestic Product
GNR	Government Notice Regulation
HDPE	High density polyethylene
IAoI	Indirect Area of Influence
I&AP's	Interested and Affected Parties
IDP	Integrated Development Plan
IRP	Integrated Regional Plan
ktpa	kilo tonnes per annum
LED	Local Economic Development
LHOS	Long-hole open stoping
LM	Local Municipality
LOM	Life of Mine
MAE	Mean annual evaporation
MAMSL	Metres above mean sea level
MBGL	Meters below ground level
MF	Monitoring Forum
MRPDA	Mineral and Petroleum Resources Development Act
MR	Mining Right
Mtpa	Million tonnes per annum
Mt	Million tonnes
NCDM	Northern Cape District Municipality
NCPGDS	Northern Cape Provincial Growth and Development Strategy
NDM	Namakwa District Municipality
NDP	National Development Plan
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NEMPAA	National Environmental Management: Protected Areas Act
NEMWA	National Environmental Management: Waste Act
NEMAQA	National Environmental Management: Air Quality Act
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act
NID	Notice of Intent to Develop
NWA	National Water Act
OCHSA	Occupational Health and Safety Act
PPE	Personal Protective Equipment
PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SDF	Spatial Development Framework
S&EIR	Scoping and Environmental Impact Report
WML	Waste Management Licence
WRD	Waste Rock Dump
WUL	Water Use Licence

## 1. INTRODUCTION

The following Environmental Management Programme (EMPr) has been prepared by Environmental Resources Management Southern Africa (Pty) Ltd (ERM), for Black Mountain Mining (Pty) Ltd (herein referred to as BMM), part of the global Vedanta Resources Plc.. BMM intends to expand the Swartberg mine at the existing Black Mountain Mine, located 10 km west of the town of Aggeneys, Northern Cape Province. It should be noted that the footprint of the existing Black Mountain Mine will not be expanded.

The current Swartberg mine is authorised through a previous Authorisation from the Department of Mineral Resources (NCS 30/5/1/2/3/2/1/517 EM). An approval for the development of a decline and the establishment of an open pit with associated workshops and infrastructure is included in this existing Authorisation. The proposed expansion of the Swartberg mine includes the expansion of the decline and the development of three more open pits (the Project).

The Project site is located in the Northern Cape Province of South Africa, approximately 10 km west of the town of Aggeneys, between the existing towns of Pofadder and Springbok. The Project site falls within the Black Mountain Mine, which is owned by BMM.

### 1.1 Purpose of this EMPr

The aim of the Environmental Management Programme report (EMPr) is to provide a set of guidelines and actions aimed at addressing potential biophysical and socio-economic impacts associated with the construction, operation and decommissioning phases of the project, and will be included in contract documentation between BMM and its Business partners.

The EMPr also provides assurance to regulators and stakeholders that their requirements with respect to biophysical and socio-economic performance will be met, and provides a framework for compliance auditing and inspection programs. It becomes a legally binding document should the Project receive Environmental Authorisation.

### 1.2 Legal Requirements of EMPs

In light of the nature of the Project, the following legislation are identified to be applicable:

- National Environmental Management Act (107 of 1998) (NEMA);
- Minerals and Petroleum Resources Development Act (28 of 2002) (MPRDA);
- National Heritage Resources Act (25 of 1999) (NHRA);
- Mine Health and Safety Act (29 of 1996);
- Noise Control Regulations under the Environmental Conservation Act (73 of 1989);
- Major Hazard Installation Regulations (GNR. 692 of 30 July 2001);
- Hazardous Substances Act (56 of 1973);
- Explosives Act (15 of 2003);
- National Environmental Management: Air Quality Act (39 of 2008) (NEM:AQA);
- National Environmental Management Act: Biodiversity Act (10 of 2004) (NEM:BA);
- National Environmental Management: Waste Act (59 of 2008) (NEM:WA); and
- National Water Act (36 of 1998) (NWA).

Despite the applicability of a suite of legislation, the NEMA and MPRDA are the body of legislation that govern the content, structure and approach to this EMPr. However, specific mitigation and management requirements in terms of the remaining aforementioned pieces of legislation will be met in this EMPr as well.

The specific legal requirements for an EMPr, as per the NEMA and MPRDA, are presented below, for ease of reference.

### 1.2.1 National Environmental Management Act (107 of 1998) (NEMA)

In terms of Section 24 (n) of the NEMA, an EMPr is required. Appendix 4 of the EIA Regulation GNR 326 (2017) outlines specific requirements for the compilation of an EMPr. The specific requirements in terms of the EIA Regulation GNR 326 are as follows:

**Table 1.1 Contents of a draft EMPr**

Requirements	Section
An EMPr must comply with section 24N of the Act and include—	
(a) details of –	
(i) the EAP who prepared the EMPr; and	Section 3
(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 3
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 4
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 2
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including—	
(i) planning and design;	Section 5
(ii) pre-construction activities	Section 5
(iii) construction activities;	Section 5
(iv) rehabilitation of the environment after construction and where applicable post closure; and	Section 5
(v) where relevant, operation activities;	Section 5
(e) a description and identification of impact management outcome required for the aspects contemplated in paragraph (d)	Section 5
(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraph (d) and (e) will be achieved, and must, where applicable, include actions to —	
(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 6
(ii) comply with any prescribed environmental management standards or practices;	Section 6
(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	Section 6
(iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 6
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 6
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 6
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 6
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 6

Requirements	Section
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 6
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 6
(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	Section 6
(iii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 6
(n) any specific information that may be required by the competent authority.	Section 6
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	

### 1.2.2 Mineral and Petroleum Resources Development Act (No. 28 of 2002)

The objectives of the MPRDA, *inter alia*, is to promote equitable access to South Africa's minerals and petroleum resources, expand opportunities for previously disadvantaged individuals, promote economic growth and mineral and petroleum resources development (objective), employment opportunities, and ensure that the holders of the mining right contribute to the socio-economic development on the surrounding communities.

The MPRDA identifies the state as the official custodian of South Africa's Mineral and Petroleum Resources. Therefore, all activities relating to reconnaissance, prospecting rights, mining rights, mining permits and retention permits are regulated by the State. An application must be submitted and approved by the National Department of Mineral Resources, before proceeding with such activities.

Black Mountain Mining (Pty) Ltd already has an existing mining right and approved EMPr for the mining activities that are currently being undertaken within the Project area. The subject of the present application for Environmental Authorisation is to obtain approval for the proposed Swartberg Mine expansion and amendment of the existing mining right to include the proposed activities covered by this application.

In terms of Section 102 of the MPRDA, amendments to an approved EMPr requires an EIA process to be undertaken in terms of NEMA. In addition, Section 39 of Regulation 527 of the MPRDA outlines specific information requirements for an EMPr, *inter alia*, are as follows:.



**Table 1.2 EMPr requirements of Section 39 of the MPRDA**

<b>Requirements</b>
39 (1) Every person who has applied for a mining right in terms of section 22 must conduct an environmental impact assessment and submit an environmental management programme within 180 days of the date on which he or she is notified by the Regional Manager to do so.
(2) Any person who applies for a reconnaissance permission, prospecting right or mining permit must submit an environmental management plan as prescribed.
(3) An applicant who prepares an environmental management programme or an environmental management plan must-
(a) establish baseline information concerning the affected environment to determine protection, remedial measures and environmental management objectives;
(b) investigate, assess and evaluate the impact of his or her proposed prospecting or mining operations on-
(i) the environment;
(ii) the socio-economic conditions of any person who might be directly affected by the prospecting or mining operation; and
(iii) any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;
(c) develop an environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment; and
(d) describe the manner in which he or she intends to--
(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
(ii) contain or remedy the cause of pollution or degradation and migration of pollutants; and
(iii) comply with any prescribed waste standard or management standards or practices

## 2. PROJECT EAP AND PROPONENT

### 2.1 Expertise of Environmental Assessment Practitioners

The requirement for environmental consultants to act independently and objectively is a well-established principle in South African law. The EIA regulations (GN R.326), specifically state: *“that an EAP (environmental assessment practitioner) (must have) no business, financial, personal or other interest in the activity, application or appeal in respect of which that EAP is appointed in terms of these Regulations other than fair remuneration for work performed in connection with that activity; or that there are no circumstances that may compromise the objectivity of that EAP in performing such work.”*

ERM is a global environmental consulting organisation employing over 5,000 people in over 150 offices in more than 40 countries. ERM Southern Africa employs over 150 environmental consultants across three offices: Johannesburg, Durban and Cape Town. ERM is a privately owned company registered in South Africa. ERM has no financial ties to, nor is ERM a subsidiary, legally or financially, of BMM. Remuneration for the services by the Proponent in relation to this EIA is not linked to an approval by the decision-making authority. Furthermore, ERM has no secondary or downstream interest in the development.

The role of the environmental consultants is to provide credible, objective and accessible information to government and other stakeholders, so that an informed decision can be made about whether the project should proceed or not. The ERM team selected for this Project possess the relevant expertise and experience to undertake this EIA. As such, ERM has signed the legally required declaration of independence to function as an objective Environmental Assessment Practitioner (EAP). The contact details of the EAP for the application are presented in *Box 2.1* and the core EIA team members involved in this EIA are listed in *Table 2.1*.

#### Box 2.1 Contact Details of the EAP

---

Environmental Resources Management Southern Africa (Pty) Ltd.  
Stephanie Gopaul  
Address: Postnet Suite 90, Private Bag X12, Tokai, 7966, Cape Town, South Africa  
Tel: +27 21 681 5400, Fax: +27 21 686 0736 Email: [Stephanie.gopaul@erm.com](mailto:Stephanie.gopaul@erm.com)

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**Table 2.1 The EIA Team**

Name	Role	Qualifications, Experience
Philip Johnson	Partner in Charge	BSc. (Hons), MSc, PIEMA, 14 years
Brendon Solik	Project Manager	B Soc Sci (hons), MSc 5 years
Stephanie Gopaul	Technical Specialist	BSc, MSc, 12 years

### 2.2 Project Proponent

BMM engages in mining operations in South Africa and produces primarily zinc concentrates, as well as lead, copper, and silver concentrates. BMM operates the Gamsberg, Swartberg, and Deeps mines and currently employ 1,667 individuals through direct employment and business partners. The contact details for the applicant are presented below:

#### Box 2.2 Contact Details of Project Proponent

---

Black Mountain Mining Company (Pty) Ltd  
Pieter David Venter (Environmental Manager)  
Address: Penge Rd, Aggeneys, 8893  
Tel: +27 54 983 9802 Email: [PVenter@vedantaresources.co.za](mailto:PVenter@vedantaresources.co.za)

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### 3. PROJECT DESCRIPTION

#### 3.1 Background

BMM is a producer of Copper, Lead and Zinc concentrates in the Northern Cape. BMM currently produce ore from two underground operations; the Deeps and Swartberg (both located on the Black Mountain Mine). Extensive exploration in the vicinity of Swartberg, to determine the extent of the orebody, has opened up the possibility of expanding the existing underground mine and establishing new open pits at Swartberg to levels on par with, or exceeding, the current Deeps mine. A pre-feasibility study completed in April 2017 concluded that the mining of the identified orebody at Swartberg is financially viable.

The bulk of the current ore production, approximately 1.3 million tonnes per annum (Mtpa), is produced from Deeps, and 400 kilo tonnes per annum (ktpa) from the Swartberg operations. The Black Mountain Mine also includes an existing ore processing plant, mine offices, maintenance facilities and other associated services and infrastructure necessary to sustain the existing underground operations. The Deeps Life of Mine (LOM) is scheduled to extend to March 2021. To secure the future of mining at BMM, it is proposed to ramp-up ore production from Swartberg Mine to a minimum of 1.7 Mtpa before Deeps mine is mined out. The expansion will advance the Swartberg LOM within the existing Mining Right Area (MR 517) by at least 19 years.

The expansion of Swartberg Mine will consist of the expansion of the current underground mine and three new open pit mines, and a total of 150,000,000 tons of ore mined from the Swartberg over the 19 year LOM. Of this expected tonnage, approximately 18,000,000 tons of lead and copper concentrate will be extracted. Lead and copper concentrate will be transported via existing rail and/or road networks and exported via the Port of Saldahna in the Western Cape.

BMM has a long-term view to mine additional resources to ensure mining at Black Mountain Mine continues.

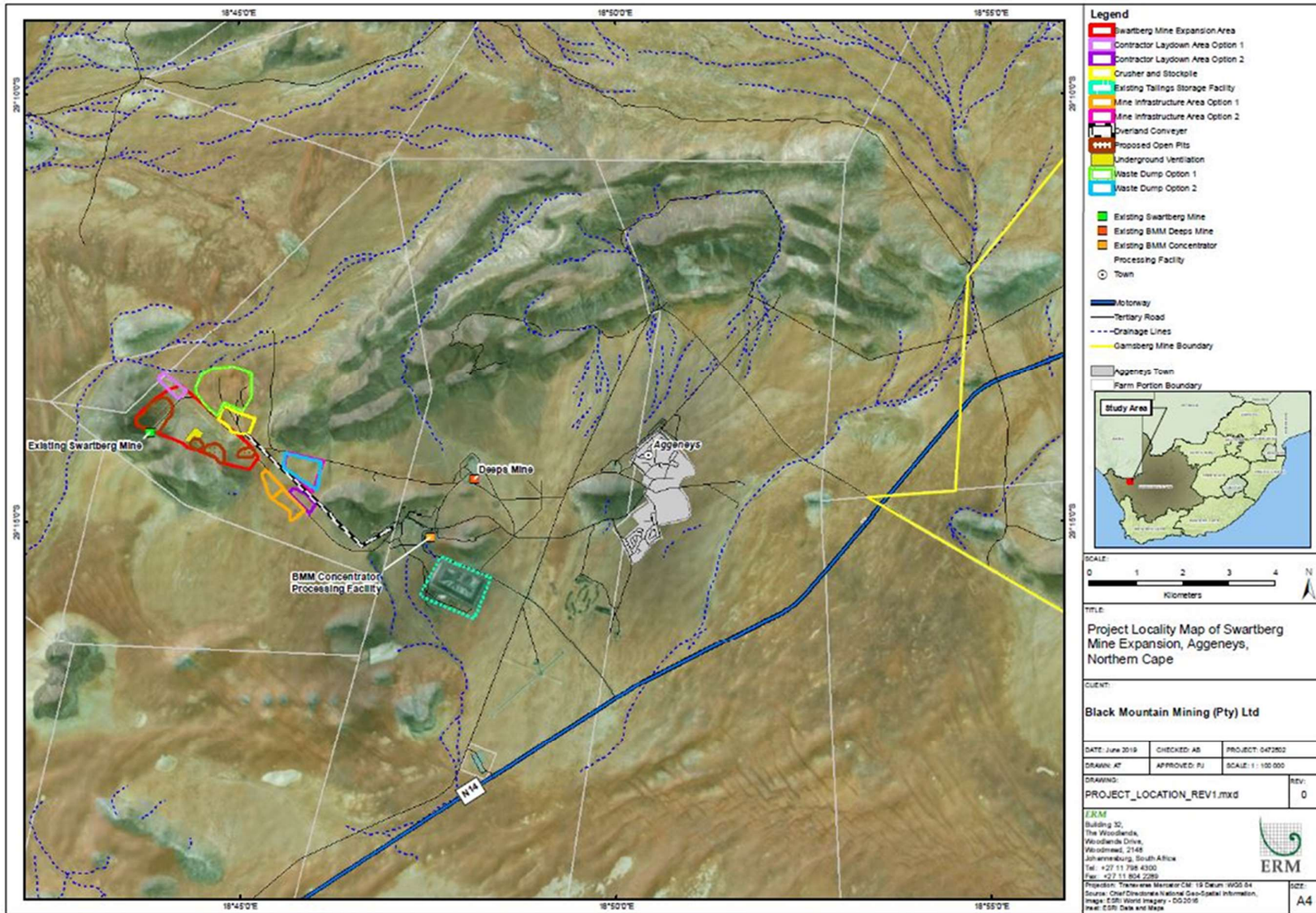
#### 3.2 Project Location

The Project site is located in the Northern Cape Province of South Africa, approximately 10 km west of the town of Aggeneys, between the existing towns of Pofadder and Springbok. The Project site falls within the Black Mountain Mine, which is owned by BMM. Table 2.1 shows the details of the property where the Project will be located and Figure 3.1 illustrates the Project Location.

**Table 3.1 Property Details**

<b>Farm Name</b>	Zuurwater 62
<b>Portion Number</b>	Portion 4
<b>SG21 Code</b>	C05300000000006200004
<b>Local Municipality</b>	Khai-Ma Local Municipality
<b>Magisterial District</b>	Namaqualand [C053]
<b>District Municipality</b>	Namakwa District Municipality

Figure 3.1 Project Location Map



## 4. ENVIRONMENTAL MANAGEMENT PROGRAMME

This section covers the environmental specifications and recommendations required during the following phases of the Project:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

The EMPr outlines the following:

- Potential impact to the receptor;
- Objective;
- Proposed mitigation / management and monitoring measures;
- Parameters for monitoring;
- Timing/frequency for implementation of mitigation / management and monitoring measures; and
- Responsibility for implementation.

### 4.1 Existing Environmental Management System

BMM has an Environmental Management System (EMS) that is certified to the ISO14001:2015 International Environmental Management Standard. This International Standard, as per *SANAS ISO14001: 2015 Edition, Environmental Management Systems - Requirements with guidance for use*, states that the Standard “*specifies requirements for an environmental management system to enable an organisation to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the organisation subscribes, and information about significant environmental aspects. It applies to those environmental aspects that the organisation identifies as those which it can control and those which it can influence. The system enables an organisation to develop an environmental policy, establish objectives and processes to achieve the policy commitments, take action as needed to improve its performance and demonstrate the conformity of the system to the requirements of the ISO14001 International Standard*”.

*“The ISO14001 Standard is based on the methodology known as Plan-Do-Check-Act, which is described as follows:*

- Plan: establish the objectives and processes necessary to deliver results in accordance with the organisation’s environmental policy;
- Do: implement the processes;
- Check: monitor and measure processes against environmental policy, objectives, targets, legal and other requirements, and report the results; and
- Act: take actions to continually improve performance of the environmental management system.”  
(SANAS ISO14001: 2004 Edition 2, Environmental Management Systems - Requirements with guidance for use)

The EMS is subjected to annual internal and external audits by competent, independent assessors. External assessors are accredited to the South African National Accreditation System (SANAS) which is an EMS certification body, and adjudicate whether or not the mine meets the minimum requirements of the ISO14001 Standard.

## 4.2 Management Plans

In addition to this EMPr the following standalone management plans will be developed or existing plans amended for the Expansion:

- Waste Management Plan (STD040) ;
- Water Management Plan;
- Emergency Response Plan;
- Hazardous Spill Response Plan (STD041);
- Air Quality Management Plan;
- Biodiversity Management Plan;
- Construction Management Plan;
- Traffic and Transportation Management Plan;
- Closure Plan;
- Mine Health and Safety Management Plan;
- Environmental Competence & Awareness (STD026);
- Environmental Aspects (STD027);
- Air Quality Monitoring (STD028);
- Communication & Environmental Reporting (STD031);
- Emergency Preparedness and Response (STD033);
- Environmental Management Systems Manual (STD034);
- Environmental Audits (STD035);
- Environmental Document Control & Record Keeping (STD036);
- Exploration Drilling (STD037);
- Hydrocarbon Management (STD038);
- Handling of Chemical Spillages (STD039);
- Handling, Storage and Disposal of Waste (STD040);
- Environmental Incident & Non-conformance (STD041);
- Legal Register & Compliance (STD042);
- Management of Domestic and Garden Refuse Dumps (STD043);
- Management Review Procedure (STD044);
- Management of Oxidation ponds (STD045);
- Setting of Objectives and Targets (STD046);
- Operating and Managing the Salvage Yard (STD048);
- Correct Storage of Hazardous Material (STD052); and
- Handling, Storage and Disposal of Medical Waste (STD053).

### 4.2.1 Biodiversity Offset Requirements

Currently, large extents of the study area are delineated as CBA 1, CBA 2 and ESA. However, based on the mostly hexagonal shapes of the CBA areas, it can be assumed that the current classification is based on the extrapolation of information from similar areas and then determined by relevant software, rather than the actual verification of the state and nature of the biodiversity present. In addition, of the vegetation types present as delineated by the latest SANBI Vegmap (available since May 2019), none have been declared as a Listed Threatened Ecosystem up to date.

Looking at the possible contribution that the affected areas may have towards the overall conservation status of the relevant original vegetation types, the following has been evaluation relative to overall and/or nearby comparable habitats where data could be extracted:

- Size of the vegetation type represented in the study area relative to the larger vegetation type;
- Plant species diversity of comparable habitats from the nearby Gamsberg Study (Desmet, 2013); and
- Ecological condition of the defined area.

The results are presented in Table 4-1 and Table 4-2 below.

**Table 4-1 Representative areas of vegetation type within the study area**

RSA Vegetation Type	Original Extent	Represented by Plant Association	Extent in study area
Aggeneys Gravel Vygieveld	±37,205 ha	Aggeneys Gravel Vygieveld Upper reaches of some Washes	Natural vegetation: ±75 ha (0.20%) Disturbed or modified: ±19 ha (0.05%)
Bushmanland Arid Grassland	±4,125,343 ha	Bushmanland Arid Grassland Washes Modified Plains	Natural vegetation: ±246 ha (0.006%) Disturbed or modified: ±178 ha (0.004%)
Bushmanland Inselberg Shrubland	±81,772 ha	Bushmanland Inselberg Shrubland Mountain Aprons Low Outcrops between Sandy Plains	Natural vegetation: ±118 ha (0.144%) Disturbed or modified: ±40 ha (0.049%)
Bushmanland Sandy Grassland	±267715 ha	Modified Dunes	Natural vegetation: 0 ha (0%) Disturbed or modified: ±134 ha (0.05%)
Namaqualand Klipkoppe Shrubland	±758,222 ha	Arid Inselberg Shrubland	Natural vegetation: ±48 ha (0.006%) Disturbed or modified: ±5 ha (0.0006%)

**Table 4-2 Species Diversity**

Habitat	Species Counts from Swartberg study	Species Counts from Gamsberg study
1. Aggeney's Gravel Vygieveld	71 Indigenous species	169 Indigenous species
2. Bushmanland Inselberg Shrubland	102 Indigenous species	99 Indigenous species
3. Arid Inselberg Shrubland	35 Indigenous species	150 Indigenous species
4. Mountain Aprons	70 Indigenous species	99 Indigenous species
5. Low Outcrops between Sandy Plains	46 Indigenous species	168 Indigenous species
6. Bushmanland Arid Grassland	64 Indigenous species	99 Indigenous species
7. Modified Dunes	40 Indigenous species	22 Indigenous species
8. Washes	79 Indigenous species	118 Indigenous species

From the above, it can be seen that the extent of the natural, undisturbed vegetation types within the study area are in all cases below to far below 1% of the original extent of the vegetation types. Of these extents, not all will be affected by the mining activities, hence it cannot be argued that the proposed mining activities will have any significant effect on the overall conservation status of the vegetation types at all. Further, when looking at the species diversity of the identified habitats, compared to similar habitats in close vicinity (i.e. Gamsberg prior to mining commencement), it can be seen that the species diversity is less significant, even in entirely undisturbed habitats. It would appear that the extent of the study area (that has not been historically disturbed) lies in a bit of a 'moisture-shadow' area – meaning that precipitation from fog or rainfall (originating mostly from the west/south-west) does not reach that area specifically, but passes over to the next mountain ridge.

From an ecological perspective, the vegetation within the extent of the area investigated does not qualify as CBA Irreplaceable, with only small sections of Bushmanland Inselberg Shrublands that could still qualify as CBA optimal, if at all. Rather, the area should be re-classified as ESA.

Layouts for the proposed mining activities, as far as was feasible, have been adapted to minimise any direct or induced (especially due to dust) impact on sensitive habitats.

Overall, it is considered that the necessity of an offset for the proposed expanded mining footprint cannot be justified on the grounds of flora components.

### 4.3 Mitigation and Monitoring Measures

Mitigation and monitoring measures presented in the tables below have been prescribed by the EIA and specialist studies. The EMPr will require updating with conditions of the Environmental Authorisation and on the basis of the results of any monitoring programmes



**Table 4.3 Construction Environmental Management Measures**

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
<b>Air Quality</b>						
Decreased Local Ambient Air Quality due to Dust Emissions	Control and/or avoidance of dust emissions during establishment.	<ul style="list-style-type: none"> <li>Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the EO.</li> <li>As far as practically possible, blasting should only be done under low- or no-wind conditions.</li> <li>Light Delivery Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas;</li> <li>Haul trucks should not exceed 80km/h on the haul road.</li> <li>Vehicles must be kept clean to avoid tracking dirt around and off the site.</li> <li>Vehicles transporting friable materials must be covered.</li> <li>Where feasible, surface binding agents must be used on exposed open earthworks and roads especially the haul road to the Crusher.</li> <li>Vegetation clearance must be phased to minimise the area of exposed soil.</li> <li>Topsoil stockpiles must be planted to bind the soil and minimise dust.</li> <li>The design of stockpiles should be optimised to retain a low profile with no sharp changes in shape.</li> <li>Drop heights of material must be minimised were possible.</li> <li>Where possible, wind breaks should be erected around high- dust generating activities.</li> <li>For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.</li> </ul>	Construction	Visual inspection and photographic record  Regular Dust Monitoring  South African Emission Standards	Environmental Manager, Environmental Officer	Throughout construction
<b>Noise</b>						
Increased Local Ambient Noise Levels due to Noise Propagation from Establishment Activities	Reduce Project noise levels to acceptable levels.	<ul style="list-style-type: none"> <li>Business Partners must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only.</li> <li>All diesel-powered construction and earth moving equipment must be well maintained. This must include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance.</li> <li>Vendors must be required to guarantee optimised equipment design noise levels.</li> <li>A mechanism to monitor noise levels, record and respond to complaints and mitigate impacts should be developed and implemented.</li> <li>Use of quieter powered mechanical equipment (PME) should be considered, where possible.</li> <li>Use of noise barriers/enclosures should be considered, where possible.</li> <li>Vibrating equipment such as crushers must be installed on vibration isolation mountings.</li> <li>Individual vehicle engine, transmission and body noise/vibration should be minimised through the implementation of an equipment maintenance program.</li> <li>Maintain road surfaces regularly to avoid corrugations, potholes etc.</li> <li>Avoid unnecessary idling times.</li> <li>Minimise the need for trucks/equipment reversing. This will reduce the frequency at which reverse warnings occur.</li> <li>Any complaints received by Business Partners regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers.</li> </ul>	Construction	Noise monitoring at any identified sensitive receptors  Complaints Register  South African Standards	Environmental Manager, Environmental Officer	Throughout construction
<b>Soils</b>						
Loss of soil resources as a result of site clearance and construction activities	Control soil erosion and compaction and promote soil reinstatement.	<ul style="list-style-type: none"> <li>Develop and implement a Soil Erosion, Control and Reinstatement Plan.</li> <li>Restrict extent of disturbance within the Project Site to the extent practicable.</li> <li>Minimise the period of exposure of the soil surface, including stockpiles, by revegetating temporary-use areas as soon as practicable after construction activities.</li> <li>Stockpiled soil must not to be compacted.</li> <li>Stockpiles are to be protected from erosion by keeping the stockpiles as low as possible with gentle gradients, and by planting as soon as possible.</li> <li>Topsoil stockpiles must not exceed 2 m in height.</li> </ul>	Construction	Visual inspection and photographic record	Environmental Manager, Environmental Officer	Throughout construction
<b>Terrestrial Flora</b>						
Loss of habitats of medium and high sensitivity and associated species due to	Minimise the loss of habitats of medium and high sensitivity	<ul style="list-style-type: none"> <li>All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods.</li> <li>Where possible, avoid any physical destruction of the Koppies north of the current Swartberg Decline Access Road.</li> <li>Minimise clearing and operations in habitats with a Very High to Medium-High sensitivity rating.</li> </ul>	Construction	Visual inspection and photographic record  Biodiversity Action Plan (BAP)	Environmental Manager, Environmental Officer	Throughout construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
construction activities		<ul style="list-style-type: none"> <li>• Avoid any direct activities on any surrounding or adjacent areas with sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species).</li> <li>• Where clearing for access purposes is essential, the maximum width to be cleared should only be reasonable.</li> <li>• Avoid blocking and/or destruction of the washes to the south-east of the study area, and those coming off plains and mountains north-east of the study area.</li> <li>• Avoid and where unable to avoid limit placing the waste rock pad within undisturbed natural habitats.</li> <li>• Use existing gravel roads and already disturbed areas to access mining operations as far as possible to avoid the creation of new roads or access routes across natural areas.</li> <li>• No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.</li> <li>• Avoid and/or minimise the loss of species of conservation concern by conducting a thorough pre-construction survey.</li> <li>• Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator.</li> <li>• A daily register must be kept of all relevant details of herbicide usage.</li> <li>• No herbicides must be used in riparian zones.</li> <li>• The pre-construction survey must be followed by implementing the necessary Search and Rescue actions prior to any groundworks taking place, whilst allowing planning that will minimise the destruction of indigenous trees and/or species of conservation concern.</li> <li>• Development and implement a detailed Plant Search- and Rescue, and Monitoring Plan in areas where infrastructure development impact on vegetation before any groundworks taking place.</li> <li>• Delineate all permissible areas so that all movement of vehicles and heavy machinery can be restricted to permissible areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas will be allowed.</li> <li>• Design and create berms to stop runoff from the mining areas and waste-rock dump during/after periodic/ extreme rainfall events from entering directly into existing washes.</li> <li>• Keep the clearing of natural vegetation to a minimum.</li> <li>• Cleared indigenous shrubs and trees can be shredded and used as mulch on top of topsoil stockpiles or on rehabilitated areas.</li> <li>• Ensure topsoils, where available, are first removed and correctly stored for rehabilitation purposes.</li> <li>• Reduce fragmentation of natural habitat by keeping long-term or permanently impacted areas as close together as possible (but avoiding the blockage of or increased impact on sensitive habitats), e.g. by using waste rock pad Alternative 2, which is closer to the planned open pits, thus also reducing transport requirements.</li> <li>• Parking and operational areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer (with the necessary storm water control) if oil and fuel spillages are likely to occur.</li> <li>• Reinforce portions of existing access routes that are prone to erosion or seasonal inundation, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas.</li> <li>• Install adequate drainage structures to ensure that water flows are never concentrated or blocked.</li> <li>• If filling material is to be used, this should be sourced from areas free of invasive species, and alien plant control measures are to be applied to all areas used for sourcing of fill materials.</li> <li>• Areas of high conservation significance in close proximity but outside the physical mining footprint need to be clearly demarcated with appropriate barriers and signage to ensure no further encroachment or disturbance. Any infringements will be reported and appropriate penalties are to be enforced on transgressing staff or Business partners.</li> <li>• - Alien invasive vegetation must be removed according to a plan (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a recognised waste disposal facility.</li> <li>• Efforts will be taken to minimise the footprint of short-duration activities and/or linear infrastructure. Efforts to minimise such footprints will include grouping all infrastructure to the same servitude and/or as close as possible to existing and planned long-term physical disturbances. This will also reduce fragmentation due to mining operations.</li> <li>• Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible. This will be according to a Rehabilitation Plan that needs to be compiled by a suitably qualified specialist and complement the current Biodiversity Management Plan (BMP). It will include the following: <ul style="list-style-type: none"> <li>▪ Installation of erosion control structures.</li> <li>▪ Re-vegetation measures of disturbed/modified areas using indigenous shrubs and grasses only.</li> </ul> </li> </ul>		<p>Rehabilitation Plan</p> <p>Training records</p>		

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
		<ul style="list-style-type: none"> <li>▪ Special attention will be paid to ensuring that critical topography is reconstructed as far as practical.</li> </ul>				
Loss of habitats of medium to low sensitivity and associated species due to construction activities	Minimise the loss of habitats of medium to low sensitivity	<ul style="list-style-type: none"> <li>• Minimise clearing and operations in natural habitats. For the location of waste rock pads, clearing of natural vegetation within at least 50 m of adjacent habitats with high sensitivity should be avoided.</li> <li>• Avoid any direct impacts on any surrounding or adjacent area with sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species).</li> <li>• Avoid blocking and/or destruction of the washes to the south-east of the study area, and those coming off plains and mountains north-east of the study area.</li> <li>• Avoid and where unable to avoid limit placing the waste rock pad within undisturbed natural habitats.</li> <li>• Use existing gravel roads and already disturbed areas to access mining operations as far as possible.</li> <li>• No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.</li> <li>• Conducting a thorough pre-construction survey to avoid and/or minimise the loss of species of conservation concern.</li> <li>• The pre-construction survey must be followed by implementing necessary Search and Rescue actions prior to any groundworks taking place, whilst allowing planning that will minimise the destruction of indigenous trees and/or species of conservation concern.</li> <li>• Delineate all permissible areas so that all movement of vehicles and heavy machinery can be restricted to permissible areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas will be allowed.</li> <li>• Design and create berms to stop runoff from the mining and waste-rock dump during/after periodic extreme rainfall events from entering directly into existing washes.</li> <li>• Keep the clearing of natural vegetation to a minimum.</li> <li>• Cleared indigenous shrubs and trees can be shredded and used as mulch on top of topsoil stockpiles or on rehabilitated areas.</li> <li>• Ensure topsoils, where available, are first removed and retained for rehabilitation purposes. Topsoils should not be stored in heaps higher than 1 m, may never be compacted and the growth of natural vegetation on such piles during storage should be encouraged.</li> <li>• Wheels of large machinery should be checked prior to entering topsoil storage sites and cleared of seed or any other plant material (especially of species with spiny or bur-like seeds) to reduce the introduction and spread of alien invasive plants. All such plant material removed must be burnt.</li> <li>• Reduce fragmentation of natural habitat by keeping long-term or permanently impacted areas as close as possible together (but avoiding the blockage of or increased impact on sensitive habitats).</li> <li>• Parking and operational areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer (with the necessary storm water control) if oil and fuel spillages are highly likely to occur.</li> <li>• Reinforce portions of existing access routes that are prone to erosion or seasonal inundation, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas.</li> <li>• Install adequate drainage structures to ensure that water flows are never concentrated or blocked in any way.</li> <li>• If filling material is to be used, this should be sourced from areas free of invasive species, and alien plant control measures are to be applied to all areas used for sourcing of fill materials.</li> <li>• Areas of high conservation significance in close proximity but outside the physical mining footprint need to be clearly demarcated with appropriate barriers and signage to ensure no further encroachment or disturbance. Any infringements will be reported and appropriate penalties are to be enforced on transgressing staff or Business partners.</li> <li>• Efforts will be taken to minimise the footprint of short-duration activities and/or linear infrastructure. Efforts to minimise such footprints will include grouping all infrastructure to the same servitude and/or as close as possible to existing and planned long-term physical disturbances.</li> <li>• Compilation of a Rehabilitation Plan by a suitably qualified specialist to complement the Biodiversity Management Plan (BMP). It will include the following: <ul style="list-style-type: none"> <li>▪ Installation of erosion control structures.</li> <li>▪ Re-vegetation of disturbed/modified areas using indigenous shrubs and grasses only.</li> <li>▪ Special attention will be paid to ensuring that critical topography is reconstructed as far as practical.</li> </ul> </li> </ul>	Construction	<p>Monitoring: Visual inspection and photographic record</p> <p>Biodiversity Action Plan (BAP)</p> <p>Rehabilitation Plan</p> <p>Training records</p>	Environmental Manager, Environmental Officer	Throughout construction
Loss of plant species of conservation concern due to	Minimise the loss of plant species of conservation concern	<ul style="list-style-type: none"> <li>• If possible, avoid any physical destruction of the Koppies north of the current Swartberg Decline Access Road. In general, minimise clearing and operations in habitats with a Very High to Medium-High sensitivity rating.</li> <li>• Avoid and/or minimise the loss of species of conservation concern by conducting a thorough pre-construction survey.</li> </ul>	Construction,	<p>Visual inspection and photographic record</p> <p>Training records</p>	Environmental Manager, Environmental Officer	Throughout construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
construction activities		<ul style="list-style-type: none"> <li>The pre-construction survey must be followed by implementing the necessary Search and Rescue actions prior to any groundworks taking place whilst allowing planning that will minimise the destruction of indigenous trees and/or species of conservation concern.</li> <li>The following activities will be prohibited for staff and Business Partners or any other person that may be present within or have access to the BMM mining concession area: <ul style="list-style-type: none"> <li>Purchase or transport of any wildlife/indigenous plant products from local communities or passing traders who cannot prove that they have valid permits for having such plants in their possession.</li> <li>Collection of any plants or plant- products for trade, consumption, medicinal use or cultivation, unless such person has the permission of the mine management as well as a valid permit from the responsible authorities.</li> </ul> </li> <li>Plants of conservation concern that will be directly affected by planned mining operations could be used for research purposes, if this will not critically reduce the viability of natural populations, and only with the necessary permits and permissions from the responsible authorities and BMM management.</li> <li>Any unauthorised driving to areas not directly affected by the mine, but which may contain species of conservation concern and/or natural habitat within the BMM mining concession, will not be allowed.</li> <li>Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible and continue progressively during all phases of mining.</li> <li>Where possible, rescued plants can be used as part of the rehabilitation efforts.</li> </ul>		<p>Biodiversity Action Plan (BAP)</p> <p>Plant Search- and Rescue, and Monitoring Plan</p> <p>Rehabilitation Plan</p>		
Reduced ecological function and degradation due to altered soil surfaces due to construction activities	Minimise impacts to soils to avoid reduced ecological function	<ul style="list-style-type: none"> <li>If possible, avoid any physical destruction of the Koppies north of the current Swartberg Decline Access Road. Minimise clearing and operations in habitats with a Very High to Medium-High sensitivity rating.</li> <li>Avoid any direct impacts on any surrounding or adjacent area with sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species).</li> <li>Avoid blocking and/or destruction of the washes to the south-east of the study area, and those coming off plains and mountains north-east of the study area.</li> <li>Use existing gravel roads and already disturbed areas to access mining operations as far as possible to avoid the creation of new roads or access routes across natural areas.</li> <li>Keep the clearing of natural vegetation to a minimum.</li> <li>Indigenous cleared shrubs and trees can be shredded and used as mulch on top of topsoil stockpiles or on rehabilitated areas.</li> <li>Reinforce portions of existing access routes that are prone to erosion or seasonal inundation, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas.</li> <li>Install adequate drainage structures to ensure that water flows are never concentrated or blocked in any way.</li> <li>Dust levels from blasting and haulage must be controlled and minimised at all times. <ul style="list-style-type: none"> <li>As far as practically possible, blasting should only be done under low- or no-wind conditions.</li> <li>Once the extent of possible dust deposition has been modelled and is known, it will be advisable to search the area affected for plant species of conservation concern. In areas with a high(er) concentration of such species, dust monitoring programmes, coinciding with monitoring programmes of the plants affected should be implemented to advise management if any immediate remedial action will be required, or if possible offset or relocation measures will need to be implemented if affected species start dying off at increased rates due to dust deposition.</li> <li>Strict speed limits must be set and adhered to in order to reduce dust fall out.</li> </ul> </li> <li>Prior to rehabilitation, landscaping of disturbed areas needs to be undertaken in a way that ensures sufficient surface roughness, but also blends in with natural runoff and drainage patterns, whilst still preventing the start of rill- or gully erosion.</li> <li>As part of rehabilitation, all compacted soils need to be ripped to a depth of at least 30 cm to prevent soil-surface crusting.</li> <li>All signs of accelerated erosion after a large rainfall event must be mitigated as soon as possible.</li> <li>Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible.</li> </ul>	Construction	<p>Monitoring: Visual inspection and photographic record</p> <p>Biodiversity Action Plan (BAP)</p> <p>Rehabilitation Plan</p> <p>Dust monitoring in affected areas</p>	Environmental Manager, Environmental Officer	Throughout construction
Increase in alien invasive vegetation due to construction activities	Reduce the spread of alien and invasive species below the current rate of infestation. In addition, create awareness about	<ul style="list-style-type: none"> <li>Wheels of large machinery should be checked prior to entering the site and cleared of seed or any other plant material (especially of species with spiny or bur-like seeds). All such plant material removed must be burnt.</li> <li>If filling material is to be used, this should be sourced from areas free of invasive species, and alien plant control measures are to be applied to all areas used for sourcing fill materials.</li> <li>Conduct a detailed Alien Invasive Survey within the BMM concession area, and if possible also along approximately 20 -50 km of all major access routes leading to the mine. From this:</li> </ul>	Construction	<p>Visual inspection and photographic record</p> <p>Training records</p> <p>Biodiversity Action Plan (BAP)</p>	Environmental Manager, Environmental Officer	Throughout construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
	the potential impacts of alien invasive species.	<ul style="list-style-type: none"> <li>▪ Create and implement a suitable (alien) Invasive Plant Management Plan (following DEA standards for an Alien Management Control Plan).</li> <li>▪ Destruction of regenerative material of cleared alien species by burning in a protected area is encouraged.</li> <li>▪ Be aware of alien species that may be newly introduced to the area and act immediately to eradicate once detected.</li> </ul> <p>Rehabilitate:</p> <ul style="list-style-type: none"> <li>• Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible and progressively during all phases of the mine. This will be according to a Rehabilitation Plan to be compiled by a suitably qualified specialist and complement a Biodiversity Action Plan (BAP). It will include the following: <ul style="list-style-type: none"> <li>▪ Re-vegetation measures of disturbed/modified areas using indigenous shrubs and grasses only. The selection of species used for rehabilitation may not include any species that are not suitable to the receiving environment (i.e. must occur there naturally), and also no species that are indicative of habitat degradation.</li> </ul> </li> </ul>		Invasive Plant Management Plan  Rehabilitation Plan		
<b>Terrestrial Fauna</b>						
Loss of medium, high and very high sensitivity areas of faunal habitat	Minimise impact on faunal habitat due to construction activities	<ul style="list-style-type: none"> <li>• As far as possible, minimize disturbance and habitat loss within the high and very high sensitivity areas such as drainage lines.</li> <li>• The final design mine footprint areas should be clearly demarcated and all mining activities restricted to these areas. In the event that the final design differs from that presented in this EIA, an additional walkover of the area to confirm conditions.</li> <li>• Any exploration trenches, pits or boreholes that pose a danger to fauna should be filled-in or covered to prevent fauna from falling and becoming trapped.</li> <li>• Use existing gravel roads and already disturbed areas to access mining operations as far as possible to avoid the creation of new roads or access routes across natural habitats.</li> <li>• No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.</li> <li>• There should be waste bins with lids distributed at strategic points across the site to ensure that litter is well-managed. No food waste or other waste that might attract fauna should be left exposed.</li> <li>• There should be a preconstruction search and rescue for fauna prior to vegetation clearing within areas where there are identified fauna resident and which might be killed by construction activities.</li> <li>• Design and create berms to stop runoff from the mining and waste-rock dump during/after periodic extreme rainfall events from entering directly into existing washes.</li> <li>• If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects.</li> <li>• Keep the clearing of natural vegetation to a minimum.</li> <li>• Reduce fragmentation of natural habitat by keeping long-term or permanently impacted areas as close together as possible (but avoiding the blockage of or increased impact on sensitive habitats).</li> <li>• Parking and operational areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer.</li> <li>• Areas of high faunal significance in close proximity to, but outside the physical mining footprint need to be clearly demarcated with appropriate barriers and signage to ensure no further encroachment or disturbance. Any infringements will be reported and appropriate penalties are to be enforced on transgressing staff or contractors.</li> <li>• Efforts will be taken to minimise the footprint of short-duration activities and/or linear infrastructure. Efforts to minimise such footprints will include grouping all infrastructure to the same servitude and/or as close as possible to existing and planned long-term physical disturbances. This will also reduce fragmentation due to mining operations.</li> <li>• Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible and progressively during all phases of the mine. This will be according to a Rehabilitation Plan to be compiled by a suitably qualified specialist and complement a Biodiversity Action Plan (BAP).</li> <li>• No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.</li> <li>• No poaching will be tolerated under any circumstances.</li> <li>• No deliberate or intentional killing of fauna is allowed.</li> </ul>	Construction	Visual inspection and photographic record  Training records  Biodiversity Action Plan (BAP)  Rehabilitation Plan	Environmental Manager, Environmental Officer	Throughout construction
Loss of fauna due to mining activities	Minimise impacts on fauna during	<ul style="list-style-type: none"> <li>• Waste bins with lids should be distributed at strategic points across the site to ensure that litter is well-managed. No food waste should be left exposed.</li> </ul>	Construction,	Visual inspection and photographic record	Environmental Manager, ECO	Throughout construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
	construction activities	<ul style="list-style-type: none"> <li>A preconstruction search and rescue for fauna prior to vegetation clearing must be undertaken within areas where there are identified fauna resident which might be affected by construction activities.</li> <li>All fauna threatened by mining activities should be removed to safety by an appropriately trained person.</li> <li>All mine staff and contractors should receive an induction highlighting the need to respect the environment, no littering, no persecution of fauna, no illegal hunting, poaching or harvesting of natural products from the environment.</li> <li>All construction vehicles should adhere to a low speed limit (30kph for heavy vehicles and 40kph for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises.</li> <li>All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.</li> <li>All open water sources such as reservoirs, waste water, evaporation dams etc should be covered with shade cloth, fine mesh or similar to prevent fauna accessing these areas and from falling into the reservoirs and drowning.</li> <li>Provide signage to indicate the right of way of fauna such as tortoises. Any roadkill should be recorded and all areas where repeated events occur should be inspected to see if additional mitigation can be applied.</li> </ul>		<p>Training records</p> <p>Biodiversity Action Plan (BAP)</p>		
<b>Groundwater</b>						
Impact of contaminants on the groundwater resource	Minimise degradation of the groundwater resource due to contaminants	<ul style="list-style-type: none"> <li>Prior to construction of the WRDs (enlarged foot print area), the ground of the facility's footprint should be prepared to reduce the hydraulic conductivity of the material, ie through means of compaction, so that seepage water is forced out of the facility at ground level rather than infiltrating into groundwater.</li> <li>Toe drains (interception trenches) must be constructed along the base of both WRDs to intercept drainage and convey seepage to a return water dam.</li> <li>The numerical groundwater flow and transport model should be updated/validated as additional information becomes available (ie SEEP/W model results, geophysics results and hydraulic conductivity of WRDs material) prior to construction to ensure assumptions made during the development of the model remain valid.</li> </ul>	Construction	<p>Monitoring: Groundwater quality monitoring must be undertaken in the vicinity of contamination sources and in radially increasing distance from them. The monitoring data should be stored in an appropriate data management tool/database. It is recommended that additional groundwater monitoring boreholes be constructed for the planned WRDs.</p> <p>Effluent quality meeting DWS requirements</p>	Environmental Manager, Environmental Officer	Throughout construction
<b>Socio-Economic</b>						
Employment, skills enhancement and local business opportunities	To build local capacity in the Project-affected communities to enable local recruitment and contracting to be realised and successful.	<ul style="list-style-type: none"> <li>The Mine will establish a Recruitment Policy which prioritises the employment of South African and local residents (originating from the Local Municipality) over foreigners. All contractors will be required to recruit in terms of the Project's Recruitment Policy, where practical.</li> <li>The Khâi-Ma Local Economic Development (LED) Forum should be consulted in the process of unlocking opportunities for local businesses.</li> <li>The Project will advertise job opportunities and criteria for skills and experience needed through local media, at least three months ahead of recruitment. This information should also be provided to all relevant authorities, community representatives and organisations on the interested and affected party database.</li> <li>The Recruitment Policy and Procedure should promote the employment of women as a means of ensuring that gender equality is attained.</li> <li>No employment will take place at the entrance to the site. Only formal channels for employment will be used.</li> </ul>	Construction	<p>Recruitment Policy</p> <p>Social and Labour Plan</p> <p>Grievance mechanism records</p>	Environmental Manager, Community Relations Officer	Prior to and during construction
Presence of the workforce and jobseekers	Minimise impacts on the local population due to the presence of the work force and job seekers	<ul style="list-style-type: none"> <li>BMM will ensure that their security personnel work in close collaboration with the police to monitor any illegal activity.</li> <li>BMM and its appointed business partners will conform on the current induction programme and Code of Conduct for all workers directly or indirectly employed by the Mine. The Code of Conduct should be available in all relevant languages and at a minimum, English, Afrikaans and Setswana. The Code of Conduct should address the following aspects: <ul style="list-style-type: none"> <li>Respect for all communities and traditions;</li> <li>No unauthorised taking of natural resources;</li> <li>Respect for the natural environment and no littering or illegal dumping;</li> <li>Zero tolerance of illegal activities by Project related employees including: soliciting prostitutes; illegal sale and purchase of alcohol; sale, purchase or consumption drugs; illegal gambling or fighting; and engaging in sexual acts with minors;</li> </ul> </li> </ul>	Construction	<p>Code of Conduct</p> <p>HIV/AIDS Policy</p> <p>Stakeholder Engagement Records</p> <p>Training records</p> <p>Grievance mechanism records</p>	Environmental Manager, Community Relations Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
		<ul style="list-style-type: none"> <li>Compliance with the traffic regulations on site and all road traffic regulations; and</li> <li>Description of disciplinary measures for infringement of the Code of Conduct and company rules.</li> <li>The Mine will follow the current grievance procedure that is easily accessible to the local community, through which complaints related to business partner or employee behaviour can be lodged and responded to. The Mine will respond in a serious manner to any such complaints.</li> <li>The BMM HIV/AIDS Policy and information document for all workers directly related to the Project will apply. The information document will address factual health issues as well as behaviour change issues around the transmission and infection of HIV/AIDS.</li> </ul>				
Pressure on Social Infrastructure and Services	To ensure pressure is not exerted on the local social amenities which will reduce the availability and access of services to the local community.	<p>The Project will implement a grievance procedure that is easily accessible to the local community, through which complaints related to business partner or employee behaviour can be lodged and responded to. The Project will respond in a serious manner to any such complaints. Key steps include:</p> <ul style="list-style-type: none"> <li>Development of an Employment Management Plan.</li> <li>Regular Engagement with Khai Ma Municipality to understand impact to the social infrastructure.</li> <li>Circulation of contact details of 'grievance officer' or other key Project contact.</li> <li>Awareness raising among the local community regarding the grievance procedure and how it works.</li> <li>Establishment of a grievance register to be updated and maintained by the Project.</li> </ul>	Construction	<p>Employment Management Plan</p> <p>Stakeholder Engagement Records</p> <p>Training records</p> <p>Grievance mechanism records</p>	Environmental Manager, Community Relations Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning
Impact on human health due to air emissions and dust generation	To reduce the health impact on Project-affected communities to the lowest possible level.	<ul style="list-style-type: none"> <li>The Mine will develop and implement a Grievance Mechanism to address stakeholder concerns related to the Project in a timely manner.</li> </ul>	Construction	Grievance mechanism records	Environmental Manager, Community Relations Officer, Environmental Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning
Risk to workers' health and safety due to hazardous construction activities	To reduce the risk associated with occupational health and safety.	<ul style="list-style-type: none"> <li>The Mine will implement a rigorous induction programme for all employees outlining health and safety risks.</li> <li>The Project will comply with all applicable South African legislation in terms of health and safety, and worker rights, which will include access to workman's compensation for loss of income resulting from an onsite incident.</li> <li>As part of the business partner and supplier selection process, the Project will take into consideration performance with regard to worker management, worker rights, health and safety as outlined in South African law and the Project's policies.</li> <li>The Mine will provide support to business partners and sub-business partners to ensure that labour and working conditions are in line with South African law through capacity building.</li> <li>Workers will be provided with primary health care and basic first aid at construction camps /worksites.</li> <li>Facilities and operations will be developed, planned and maintained such that robust barriers are in place to prevent accidents. All employees have the duty to stop any works if adequate systems to control risks are not in place.</li> <li>In line with the worker code of conduct, employees should not be under the influence of intoxicants which could adversely affect the ability of that employee to perform the work or adversely affect the health and safety of other employees, other persons or the environment.</li> <li>The Project will provide of Personal Protective Equipment (PPE), training and monitoring as well as ongoing safety checks and safety audits.</li> <li>The Project will implement the current BMM Grievance Mechanism to address employee concerns related to the Project in a timely manner.</li> </ul>	Construction	<p>Induction records</p> <p>Training records</p> <p>Grievance mechanism records</p>	Project Manager, Environmental Manager, Community Relations Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning
Increase in traffic volumes	Minimise the impact of the quality of local roads as well as other road users	<ul style="list-style-type: none"> <li>All vehicles will be regularly checked and maintained, including tyre wear.</li> <li>Contact details will be displayed on vehicles to allow other road users to report bad driving at any time.</li> <li>All drivers will be sensitised about potential accident risks to local users and will be periodically checked for alcohol consumption.</li> <li>All driver will be appropriately licensed.</li> <li>BMM will ensure that vehicles are correctly and safely loaded to avoid accidents, and all loads are secured and covered where they pose a risk of windblown dust or material spillage.</li> <li>BMM will work in conjunction with SANRAL to erect appropriate road traffic signage and road markings at the intersections of loop 10 and the Aggeneys access road with the N14.</li> <li>The Mine will develop and implement a Grievance Mechanism to address employee concerns related to the Project in a timely manner.</li> </ul>	Construction	<p>Traffic Management Plan</p> <p>License record</p> <p>Training records</p> <p>Vehicle maintenance records</p> <p>Grievance mechanism</p>	Environmental Manager, Environmental Officer	Prior to construction and to be implemented throughout construction
<b>Archaeology and Cultural Heritage</b>						
Impacts on local archaeology and	To avoid, minimise, manage and	<ul style="list-style-type: none"> <li>Development of a facility Environmental Management Programme (EMPr) that takes cognizance of heritage resources in the event of any future extensions of roads or other infrastructure.</li> </ul>	Construction	Chance Find Procedure	Environmental Manager,	Throughout construction,

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
cultural heritage due to construction activities	mitigate the impact on local archaeology and cultural heritage resources	<ul style="list-style-type: none"> <li>Provision for on-going heritage monitoring in a facility EMPr which also provides guidelines on what to do in the event of any major heritage feature being encountered during any phase of construction/maintenance.</li> <li>If any evidence of archaeological sites or remains, fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit will immediately be alerted as per section 35(3) of the NHRA.</li> <li>If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit will be alerted immediately as per section 36(6) of the NHRA.</li> <li>If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, will be contracted as soon as possible to inspect the heritage resource.</li> <li>Officials from relevant heritage authorities (National and Provincial) must be permitted to inspect the operation at any time in relation to the heritage component of the EMPr.</li> </ul>		Grievance mechanism records	Community Relations Officer, Environmental Officer	operations and decommissioning
<b>Unplanned Events</b>						
Occupational Health and Safety	To reduce the risk associated with occupational health and safety.	<ul style="list-style-type: none"> <li>Development of an Occupational Health and Safety Management Plan (OHSMP). Inductions, training, H&amp;S records and remediating actions, risk assessments of all activities and provision of PPE.</li> <li>The OHSMP should cover all workers on site, including temporary workers and Business partners.</li> <li>Carry out regular monitoring and audits of the OHSMP and update as required.</li> </ul>	Construction	Occupational Health and Safety Management Plan Training records H&S audit records	Environmental Manager, Community Relations Officer	Throughout construction, operations and decommissioning
Accidental spills of equipment fuel, oils, and chemicals	Reduce the risk of accidental spills of equipment fuels and oils.	<ul style="list-style-type: none"> <li>Adhere to best practice principles.</li> <li>Construction equipment should be up to industry standard and serviced regularly to prevent oil spills.</li> <li>A spill response plan should be in place and construction workers should be trained accordingly.</li> <li>On-site storage areas for hydrocarbons and other chemicals should be constructed in a way that potential tank failures can be contained including bunds and surface hardstanding.</li> <li>Hazardous material storage will be constructed on an impermeable surface and the bulk storage facility will be bunded. The Project will restrict storage and handling of hazardous materials and fuels to bunded areas of sufficient capacity to contain a release.</li> <li>Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages into the ground. Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused, treated by incineration or removed by a local business partner. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hardstanding surface.</li> <li>Leaking equipment must be repaired immediately or be removed from site to facilitate repair.</li> <li>The Mine will develop a detailed hazardous material spill response plan, which includes community sensitisation/ notifications when required. The Project will maintain spill clean-up and response capability adequate for addressing spills for all phases of the Expansion. All spills will be immediately contained and cleaned up. Contaminated areas will be remediated and post remediation verification will be carried out.</li> <li>Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available.</li> <li>Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.</li> </ul>	Construction	Spill Response Plan Training records Equipment maintenance records Incident register	Environmental Manager, Environmental Officer	Throughout construction, operations and decommissioning
Vehicle Accidents	Reduce the risk and potential impact of vehicle accidents on site and for all Project related activities.	<ul style="list-style-type: none"> <li>All new drivers employed throughout the course of the Mine's operations will be required to undergo Defensive Driver Training.</li> <li>Speed limits will be enforced for all vehicles.</li> <li>Speed limits of 40kph will be enforced along all internal roads except haul roads where the limit is 80kph.</li> <li>The Mine will regularly consult with the relevant local and regional government to ensure the roads used are well maintained, and that potential problems or hazards are communicated to the relevant authority timeously. Expansion planning for construction traffic must be done in consultation with the government.</li> <li>The status of the integrity of proposed Project transportation routes with respect to structural properties (load limits, traffic volume limits), functionality (condition of road surface) and safety (signage, markings, and potential public safety hazard areas) must be confirmed. Additional measures required to upgrade transportation routes and minimise traffic congestion must be carried out in consultation with the local authorities.</li> <li>The Project will undertake sensitisation in the local communities, including appropriate warning signs and notifications of the risks of traffic accidents.</li> </ul>	Construction,	Training records Grievance mechanism	Project Manager, Environmental Manager, Environmental Officer	Throughout construction, operations and decommissioning



**Table 4.4 Operational Environmental Management Measures**

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
<b>Air Quality</b>						
Decreased Local Ambient Air Quality due to Dust Emissions	Control and/or avoidance of dust emissions during operations.	<ul style="list-style-type: none"> <li>Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the EO.</li> <li>As far as practically possible, blasting should only be done under low- or no-wind conditions.</li> <li>Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas;</li> <li>Haul truck speeds on haul roads should not exceed 80km/h</li> <li>Vehicles must be kept clean to avoid tracking dirt around and off the site.</li> <li>Vehicles transporting friable materials must be covered.</li> <li>Where feasible, surface binding agents must be used on exposed open earthworks and roads especially haul roads.</li> <li>Vegetation clearance must be phased to minimise the area of exposed soil.</li> <li>Topsoil stockpiles must be planted to bind the soil and minimise dust.</li> <li>The design of stockpiles should be optimised to retain a low profile with no sharp changes in shape.</li> <li>Drop heights of material must be minimised where possible.</li> <li>Where possible, wind breaks should be erected around high- dust generating activities.</li> <li>For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.</li> </ul>	Operations	Visual inspection and photographic record  South African Emission Standards	Environmental Manager, Environmental Officer	Throughout operations
<b>Noise</b>						
Increased local ambient noise levels due to noise propagation from operational activities	Reduce Project noise to acceptable levels.	<ul style="list-style-type: none"> <li>Business Partners must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only.</li> <li>All diesel-powered construction and earth moving equipment must be well maintained. This must include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance.</li> <li>Vendors must be required to guarantee optimised equipment design noise levels.</li> <li>A mechanism to monitor noise levels, record and respond to complaints and mitigate impacts should be developed and implemented.</li> <li>Use of quieter powered mechanical equipment (PME) should be considered, where possible.</li> <li>Use of noise barriers/enclosures should be considered, where possible.</li> <li>Vibrating equipment such as crushers must be installed on vibration isolation mountings.</li> <li>Individual vehicle engine, transmission and body noise/vibration should be minimised through the implementation of an equipment maintenance program.</li> <li>Maintain road surfaces regularly to avoid corrugations, potholes etc.</li> <li>Avoid unnecessary idling times.</li> <li>Minimise the need for trucks/equipment reversing. This will reduce the frequency at which reverse warnings occur.</li> <li>Any complaints received by Business Partners regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers.</li> </ul>	Operations	Noise monitoring at any identified sensitive receptors	Environmental Manager, Environmental Officer	Throughout operations
<b>Terrestrial Flora</b>						
Loss of habitats of medium and high sensitivity and associated species due to construction activities	Minimise the loss of habitats of medium and high sensitivity	<ul style="list-style-type: none"> <li>Where possible, avoid any physical destruction of the Koppies north of the current Swartberg Decline Access Road.</li> <li>Avoid any direct activities on any surrounding or adjacent areas with sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species).</li> <li>No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.</li> <li>Pits should be backfilled as soon as possible (if possible).</li> <li>Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible according to the Rehabilitation Plan</li> </ul>	Operations	Visual inspection and photographic record  Biodiversity Action Plan (BAP)  Rehabilitation Plan  Training records	Environmental Manager, Environmental Officer	Throughout operations
Loss of habitats of medium to low sensitivity and associated species due to	Minimise the loss of habitats of medium to low sensitivity	<ul style="list-style-type: none"> <li>Minimise clearing and operations in natural habitats.</li> <li>Avoid any direct impacts on any surrounding or adjacent area with sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species).</li> <li>No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.</li> </ul>	Operations	Visual inspection and photographic record  Biodiversity Action Plan (BAP)  Rehabilitation Plan	Environmental Manager, Environmental Officer	Throughout operations

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
operational activities		<ul style="list-style-type: none"> <li>Delineate all permissible areas so that all movement of vehicles and heavy machinery can be restricted to permissible areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas will be allowed.</li> <li>Wheels of large machinery should be checked prior to entering topsoil storage sites and cleared of seed or any other plant material (especially of species with spiny or bur-like seeds) to reduce the introduction and spread of alien invasive plants. All such plant material removed must be burnt.</li> <li>Parking and operational areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer (with the necessary storm water control) if oil and fuel spillages are highly likely to occur.</li> <li>Maintenance of access routes that are prone to erosion or seasonal inundation.</li> <li>If filling material is to be used, this should be sourced from areas free of invasive species, and alien plant control measures are to be applied to all areas used for sourcing of fill materials.</li> <li>Areas of high conservation significance in close proximity but outside the physical mining footprint need to be clearly demarcated with appropriate barriers and signage to ensure no further encroachment or disturbance. Any infringements will be reported and appropriate penalties are to be enforced on transgressing staff or contractors.</li> <li>Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible according to the Rehabilitation Plan</li> </ul>		Training records		
Loss of plant species of conservation concern due to operational activities	Minimise the loss of plant species of conservation concern	<ul style="list-style-type: none"> <li>If possible, avoid any physical destruction of the Koppies north of the current Swartberg Decline Access Road. In general, minimise clearing and operations in habitats with a Very High to Medium-High sensitivity rating.</li> <li>The following activities will be prohibited for staff and contractors or any other person that may be present within or have access to the BMM mining concession area: <ul style="list-style-type: none"> <li>Purchase or transport of any wildlife/indigenous plant products from local communities or passing traders who cannot prove that they have valid permits for having such plants in their possession.</li> <li>Collection of any plants or plant- products for trade, consumption, medicinal use or cultivation, unless such person has the permission of the mine management as well as a valid permit from the responsible authorities.</li> </ul> </li> <li>Any unauthorised driving to areas not directly affected by the mine, but which may contain species of conservation concern and/or natural habitat within the BMM mining concession, will not be allowed.</li> <li>Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible according to the Rehabilitation Plan</li> </ul>	Operations	<p>Visual inspection and photographic record</p> <p>Training records</p> <p>Biodiversity Action Plan (BAP)</p> <p>Rehabilitation Plan</p>	Environmental Manager, Environmental Officer	Throughout operations
Reduced ecological function and degradation due to altered soil surfaces due to operational activities	Minimise impacts to soils to avoid reduced ecological function	<ul style="list-style-type: none"> <li>If possible, avoid any physical destruction of the Koppies north of the current Swartberg Decline Access Road. Minimise clearing and operations in habitats with a Very High to Medium-High sensitivity rating.</li> <li>Avoid any direct impacts on any surrounding or adjacent area with sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species).</li> <li>Maintain existing access routes that are prone to erosion or seasonal inundation.</li> <li>Dust levels from blasting and haulage must be controlled and minimised at all times. <ul style="list-style-type: none"> <li>As far as practically possible, blasting should only be done under low- or no-wind conditions.</li> <li>Speed limits (40kph) must be adhered to in order to reduce dust fall out.</li> <li>Haul truck on haul road must adhere to 80km/h speed limit</li> </ul> </li> <li>All signs of accelerated erosion after a large rainfall event must be mitigated as soon as possible.</li> <li>Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible.</li> </ul>	Operations	<p>Visual inspection and photographic record</p> <p>Biodiversity Action Plan (BAP)</p> <p>Rehabilitation Plan</p> <p>Dust monitoring in affected areas</p>	Environmental Manager, Environmental Officer	Throughout operations
Increase in alien invasive vegetation due to operational activities	Reduce the spread of alien and invasive species below the current rate of infestation. In addition, create awareness about the potential impacts of alien invasive species.	<ul style="list-style-type: none"> <li>Wheels of large machinery should be checked prior to entering the site and cleared of seed or any other plant material (especially of species with spiny or bur-like seeds). All such plant material removed must be burnt.</li> <li>If filling material is to be used, this should be sourced from areas free of invasive species, and alien plant control measures are to be applied to all areas used for sourcing fill materials.</li> <li>Destruction of regenerative material of cleared alien species by burning in a protected area is encouraged.</li> <li>Be aware of alien species that may be newly introduced to the area and act immediately to eradicate once detected.</li> <li>Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible according to the Rehabilitation Plan.</li> </ul>	Operations	<p>Visual inspection and photographic record</p> <p>Training records</p> <p>Biodiversity Action Plan (BAP)</p> <p>Rehabilitation Plan</p>	Environmental Manager, Environmental Officer	Throughout operations
<b>Terrestrial Fauna</b>						
Loss of medium, high and very high sensitivity areas of faunal habitat	Minimise impact on faunal habitat due to operational activities	<ul style="list-style-type: none"> <li>The mine footprint areas should be clearly demarcated and all mining activities restricted to these areas.</li> <li>Any exploration trenches, pits or boreholes that pose a danger to fauna should be filled-in or covered to prevent fauna from falling and becoming trapped.</li> </ul>	Operations	<p>Monitoring: Visual inspection and photographic record</p> <p>Training records</p>	Environmental Manager, Environmental Officer	Throughout operations

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
		<ul style="list-style-type: none"> <li>No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.</li> <li>There should be waste bins with lids distributed at strategic points across the site to ensure that litter is well-managed. No food waste or other waste that might attract fauna should be left exposed.</li> <li>If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects.</li> <li>Parking and operational areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer.</li> <li>Areas of high faunal significance in close proximity to, but outside the physical mining footprint need to be clearly demarcated with appropriate barriers and signage to ensure no further encroachment or disturbance. Any infringements will be reported and appropriate penalties are to be enforced on transgressing staff or contractors.</li> <li>Pits should be backfilled as soon as possible, all stockpiles must be, as far as possible, obliterated and/or landscaped to merge into the surroundings.</li> <li>Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible and progressively during all phases of the mine. This will be according to a Rehabilitation Plan to be compiled by a suitably qualified specialist and complement a Biodiversity Action Plan (BAP).</li> </ul>		<p>Biodiversity Action Plan (BAP)</p> <p>Rehabilitation Plan</p>		
Loss of fauna due to mining activities	Minimise impacts on fauna during operational activities	<ul style="list-style-type: none"> <li>Waste bins with lids should be distributed at strategic points across the site to ensure that litter is well-managed. No food waste should be left exposed.</li> <li>All mine staff and contractors should receive an induction highlighting the need to respect the environment, no littering, no persecution of fauna, no illegal hunting, poaching or harvesting of natural products from the environment.</li> <li>All vehicles on-site should adhere to a low speed limit (40km/h for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises.</li> <li>Haul truck on haul road must adhere to 80km/h speed limit</li> <li>All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.</li> <li>All open water sources such as reservoirs, waste water, evaporation dams etc should be covered with shade cloth, fine mesh or similar to prevent fauna accessing these areas and from falling into the reservoirs and drowning.</li> <li>Provide signage to indicate the right of way of fauna such as tortoises. Any roadkill should be recorded and all areas where repeated events occur should be inspected to see if additional mitigation can be applied.</li> </ul>	Operations	<p>Visual inspection and photographic record</p> <p>Training records</p> <p>Biodiversity Action Plan (BAP)</p> <p>Rehabilitation Plan</p>	Environmental Manager, Environmental Officer	Throughout operations
<b>Groundwater</b>						
Impact of contaminants on the groundwater resource	Minimise degradation of the groundwater resource due to contaminants	<ul style="list-style-type: none"> <li>Toe seepage from the WRD's is expected to be contaminated and suitable management measures should be in place to prevent the release of this contaminated water into the environment. It is recommended that as much water as possible should be recycled and re-used.</li> <li>The numerical groundwater flow and transport model should be updated/validated as additional information becomes available (ie SEEP/W model results, geophysics results and hydraulic conductivity of WRDs material) prior to construction to ensure assumptions made during the development of the model remain valid.</li> <li>Pumped water from the pit following heavy rain events is expected to be contaminated and will need to be contained or treated to applicable standards if it is to be released into the environment, in accordance with the Water Use Licence (WUL) requirements.</li> </ul>	Operations	<p>Groundwater quality monitoring in the vicinity of contamination sources and in radially increasing distance from them. The monitoring data should be stored in an appropriate data management tool/database.</p> <p>Effluent quality meeting DWS requirements</p>	Environmental Manager, Environmental Officer	Throughout operations
Impact of contaminants on groundwater users	Minimise the impact on groundwater users due to contamination of the groundwater resource	<ul style="list-style-type: none"> <li>Should monitoring data confirm an impact on private users, the client will compensate affected farmers for their loss or replace the lost water supply source.</li> </ul>	Operations	<p>Groundwater quality should be monitored at the existing (known) private boreholes at regular intervals to confirm modelling results.</p> <p>Effluent quality meeting DWS requirements</p>	Environmental Manager, Environmental Officer	Throughout operations
Impact of drawdown or dewatering on the groundwater resource	Minimise impacts to the groundwater resource due to drawdown or dewatering	<ul style="list-style-type: none"> <li>The monitoring data should be stored in an appropriate data management tool/database.</li> <li>Groundwater models should be validated and updated using the monitoring data such that drawdown predictions can be updated. This will lead to models with a higher confidence level that can be used as management tools throughout the operational phase (ie update predicted impacts in order to be proactive etc) and for planning of the post-closure phase of the project to ensure appropriate provisions are made.</li> </ul>	Operations	<p>Groundwater levels in the vicinity of the pits as well as in each of the known farm boreholes (Witputs BH, Koeris 54BH1 and Koeris 54BH2), must be monitored on a regular basis.</p>	Environmental Manager, Environmental Officer	Throughout operations

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
Impact of drawdown or dewatering on groundwater users	Minimise the impact on groundwater users due to drawdown or dewatering of the groundwater resource	<ul style="list-style-type: none"> <li>Should monitoring confirm that any of the private boreholes are affected by lowering of the groundwater table, rendering boreholes unusable (ie loss of water supply source), the client will compensate affected farmers for their loss, or replace the lost water supply source.</li> <li>This can be achieved by drilling new boreholes for the affected farmers outside of the drawdown cone, by increasing the depth of the existing boreholes or by providing an alternative good quality water source.</li> </ul>	Operations	Groundwater levels in each of the known farm boreholes must be monitored.	Environmental Manager, Environmental Officer	Throughout operations
<b>Socio-economic</b>						
Employment, skills enhancement and local business opportunities	To build local capacity in the Project-affected communities to enable local recruitment and contracting to be realised and successful.	<ul style="list-style-type: none"> <li>The Mine will establish a Recruitment Policy which prioritises the employment of South African and local residents (originating from the Local Municipality) over foreigners. All contractors will be required to recruit in terms of the Project's Recruitment Policy, where practical.</li> <li>The Khâi-Ma Local Economic Development (LED) Forum should be consulted in the process of unlocking opportunities for local businesses.</li> <li>The Project will advertise job opportunities and criteria for skills and experience needed through local media, at least three months ahead of recruitment. This information should also be provided to all relevant authorities, community representatives and organisations on the interested and affected party database.</li> <li>The Recruitment Policy and Procedure should promote the employment of women as a means of ensuring that gender equality is attained.</li> <li>No employment will take place at the entrance to the site. Only formal channels for employment will be used.</li> </ul>	Operations	Recruitment Policy and Procurement Policy Grievance mechanism records	Environmental Manager, Community Relations Officer	Throughout operations
Presence of the workforce and jobseekers	Minimise impacts on the local population due to the presence of the work force and job seekers	<ul style="list-style-type: none"> <li>BMM will ensure that their security personnel work in close collaboration with the police to monitor any illegal activity.</li> <li>All new employees directly or indirectly employed by the Project to go through the induction programme and a Code of Conduct. The Code of Conduct is to form part of induction of all employees related to the Project and it is to be signed by each employee. The Code of Conduct should be available in all relevant languages and at a minimum, English, Afrikaans and Setswana.</li> <li>Grievance procedure to be in place that is easily accessible to the local community, through which complaints related to contractor or employee behaviour can be lodged and responded to. The Project will respond in a serious manner to any such complaints.</li> </ul>	Operations	Stakeholder Engagement Records Training records Grievance mechanism records	Environmental Manager, Community Relations Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning
Pressure on Social Infrastructure and Services	To ensure pressure is not exerted on the local social amenities which will reduce the availability and access of services to the local community.	<ul style="list-style-type: none"> <li>Implementation of the Grievance Mechanism</li> </ul>	Construction, operations and decommissioning	Stakeholder Engagement Records Training records Grievance mechanism records	Environmental Manager, Community Relations Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning
Impact on human health due to air emissions	To reduce the health impact on Expansion - affected communities to the lowest possible level.	<ul style="list-style-type: none"> <li>The Project will develop and implement a Grievance Mechanism to address stakeholder concerns related to the Project in a timely manner.</li> </ul>	Operations	Grievance mechanism records	Environmental Manager, Community Relations Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning
Risk to workers' health and safety due to hazardous operation activities	To reduce the risk associated with occupational health and safety.	<ul style="list-style-type: none"> <li>The Mine must comply with all applicable South African legislation in terms of health and safety, and worker rights, which will include access to workman's compensation for loss of income resulting from an onsite incident.</li> <li>As part of the contractor and supplier selection process the Mine will take into consideration performance with regard to worker management, worker rights, health and safety as outlined in South African law and the Project's policies.</li> <li>The Project will provide support to contractors and subcontractors to ensure that labour and working conditions are in line with South African law through capacity building.</li> <li>Workers will be provided with primary health care and basic first aid at construction camps /worksites.</li> <li>Facilities and operations will be developed, planned and maintained such that robust barriers are in place to prevent accidents. All employees have the duty to stop any works if adequate systems to control risks are not in place.</li> </ul>	Operations	Training records Grievance mechanism records H&S Audits	Project Manager, Environmental Manager, Community Relations Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
		<ul style="list-style-type: none"> <li>In line with the worker code of conduct employees should not be under the influence of intoxicants which could adversely affect the ability of that employee to perform the work or adversely affect the health and safety of other employees, other persons or the environment.</li> <li>The Mine will provide Personal Protective Equipment (PPE), training and monitoring as well as ongoing safety checks and safety audits.</li> <li>The Mine will develop and implement a Grievance Mechanism to address employee concerns in a timely manner.</li> </ul>				
Increase in traffic volumes	Minimise the impact of traffic on the quality of local roads as well as other road users	<ul style="list-style-type: none"> <li>BMM will develop a Traffic Management Plan to limit the disruption of the roads when high volumes of abnormal freight are expected on the N14 and N7.</li> <li>All vehicles will be regularly checked and maintained, including tyre wear.</li> <li>Contact details will be displayed on project vehicles to allow other road users to report bad driving at any time.</li> <li>All project drivers will be sensitised about potential accident risks to local users and will be periodically checked for alcohol consumption.</li> <li>BMM will ensure that vehicles are correctly and safely loaded to avoid accidents, and all loads are secured and covered where they pose a risk of windblown dust or material spillage.</li> <li>BMM will work in conjunction with SANRAL to erect appropriate road traffic signage and road markings at the intersections of loop 10 and the Aggeneys access road with the N14.</li> <li>The Mine will develop and implement a Grievance Mechanism to address employee concerns related to the Project in a timely manner.</li> </ul>	Operations, decommissioning	Traffic Management Plan Training records Vehicle maintenance records Grievance mechanism	Environmental Manager, Environmental Officer	Throughout operations and decommissioning
<b>Unplanned Events</b>						
Occupational Health and Safety	To reduce the risk associated with occupational health and safety.	<ul style="list-style-type: none"> <li>Development or upgrade of an Occupational Health and Safety Management Plan (OHSMP). Inductions, training, H&amp;S records and remediating actions, risk assessments of all activities and provision of PPE.</li> <li>The OHSMP should cover all workers on site, including temporary workers and contractors.</li> <li>Carry out regular monitoring and audits of the OHSMP and update as required.</li> </ul>	Construction, operations and decommissioning	Occupational Health and Safety Management Plan Training records H&S records	Environmental Manager, Community Relations Officer	Throughout construction, operations and decommissioning
Accidental spills of equipment fuel, oils, and chemicals	Reduce the risk of accidental spills of equipment fuels and oils.	<ul style="list-style-type: none"> <li>Adhere to best practice principles.</li> <li>Equipment should be up to standards and serviced regularly to prevent oil spills.</li> <li>A spill response plan should be in place and construction workers should be trained accordingly.</li> <li>On-site storage areas for hydrocarbons and other chemicals should be constructed in a way that potential tank failures can be contained including bunds and surface hardstanding.</li> <li>Hazardous material storage will be constructed on an impermeable surface and the bulk storage facility will be bunded. The Project will restrict storage and handling of hazardous materials and fuels to bunded areas of sufficient capacity to contain a release.</li> <li>Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages into the ground. Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused, treated by incineration or removed by a local contractor.</li> <li>Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hardstanding surface.</li> <li>Implement the detailed hazardous material spill response plan, which includes community sensitisation/ notifications when required. The Project will maintain spill clean-up and response capability adequate for addressing spills for all phases of the Project. All spills will be immediately contained and cleaned up. Contaminated areas will be remediated and post remediation verification will be carried out.</li> </ul>	Construction, operations and decommissioning	Spill Response Plan Training records Records of spill clean up and post remediation verification	Environmental Manager, Environmental Officer	Throughout construction, operations and decommissioning
Vehicle Accidents	Reduce the risk and potential impact of vehicle accidents on site and for all Project related activities.	<ul style="list-style-type: none"> <li>All new drivers employed throughout the course of the Project's operations will be required to undergo training.</li> <li>Speed limits will be enforced for all Project vehicles.</li> <li>Speed limits of 40km/h for light vehicles and 80km/h for haul trucks on the haul road will be enforced along all internal roads.</li> <li>The Project will work with the relevant local and regional government to ensure the roads used by Project vehicles are well maintained, and that potential problems or hazards are communicated to the relevant authority timeously.</li> </ul>	Construction, operations and decommissioning	Training records Grievance mechanism	Project Manager, Environmental Manager	Throughout construction, operations and decommissioning

**Table 4.5 Decommissioning Environmental Management Measures**

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
<b>Air Quality</b>						
Decreased local ambient air quality due to dust emissions	Control and/or avoidance of dust emissions during decommissioning.	<ul style="list-style-type: none"> <li>Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the EO.</li> <li>As far as practically possible, blasting should only be done under low- or no-wind conditions.</li> <li>Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas;</li> <li>Vehicles must be kept clean to avoid tracking dirt around and off the site.</li> <li>Vehicles transporting friable materials must be covered.</li> <li>Where feasible, surface binding agents must be used on exposed open earthworks and roads.</li> <li>Vegetation clearance must be phased to minimise the area of exposed soil.</li> <li>Topsoil stockpiles must be planted to bind the soil and minimise dust.</li> <li>The design of stockpiles should be optimised to retain a low profile with no sharp changes in shape.</li> <li>Drop heights of material must be minimised where possible.</li> <li>Where possible, wind breaks should be erected around high- dust generating activities.</li> <li>For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.</li> </ul>	Decommissioning	Visual inspection and photographic record  South African Emission Standards	Environmental Manager, Environmental Officer	Throughout decommissioning
<b>Noise</b>						
Increased Local Ambient Noise Levels due to Noise Propagation from Decommissioning Activities	Reduce noise levels to acceptable levels.	<ul style="list-style-type: none"> <li>Business Partners must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only.</li> <li>All diesel-powered construction and earth moving equipment must be well maintained. This must include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance.</li> <li>Vendors must be required to guarantee optimised equipment design noise levels.</li> <li>A mechanism to monitor noise levels, record and respond to complaints and mitigate impacts should be developed and implemented.</li> <li>Use of quieter powered mechanical equipment (PME) should be considered, where possible.</li> <li>Use of noise barriers/enclosures should be considered, where possible.</li> <li>Vibrating equipment such as crushers must be installed on vibration isolation mountings.</li> <li>Individual vehicle engine, transmission and body noise/vibration should be minimised through the implementation of an equipment maintenance program.</li> <li>Maintain road surfaces regularly to avoid corrugations, potholes etc.</li> <li>Avoid unnecessary idling times.</li> <li>Minimise the need for trucks/equipment reversing. This will reduce the frequency at which reverse warnings occur.</li> </ul> <p>Any complaints received by Business Partners regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers.</p>	Decommissioning	Noise monitoring at/ near identified sensitive receptors  Complaints register	Environmental Manager, Environmental Officer	Throughout decommissioning
<b>Terrestrial Flora</b>						
Increase in alien invasive vegetation due to decommissioning activities	Minimise the spread of alien and invasive species post decommissioning and closure	<ul style="list-style-type: none"> <li>Wheels of large machinery should be checked prior to entering the site and cleared of seed or any other plant material (especially of species with spiny or bur-like seeds). All such plant material removed must be burnt.</li> <li>If filling material is to be used, this should be sourced from areas free of invasive species, and alien plant control measures are to be applied to all areas used for sourcing fill materials.</li> </ul> <p>Rehabilitate:</p>	Decommissioning, post closure	Visual inspection and photographic record  Training records  Rehabilitation Plan	Environmental Manager, Environmental Officer	Throughout decommissioning

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
		<ul style="list-style-type: none"> <li>Rehabilitate and revegetate all areas that have been disturbed. This will be according to a Rehabilitation Plan to be compiled by a suitably qualified specialist and complement a Biodiversity Action Plan (BAP). It will include the following: <ul style="list-style-type: none"> <li>As part of rehabilitation, all compacted soils need to be ripped to a depth of at least 30 cm to prevent soil-surface crusting.</li> <li>Re-vegetation measures of disturbed/modified areas using indigenous shrubs and grasses only. The selection of species used for rehabilitation may not include any species that are not suitable to the receiving environment (i.e. must occur there naturally), and also no species that are indicative of habitat degradation.</li> </ul> </li> <li>After decommissioning, if access roads or portions thereof will not be of further use to the landowner(s), remove all foreign material and rip area to a depth of at least 30 cm to facilitate the establishment of vegetation, followed by a suitable revegetation program.</li> </ul>				
<b>Groundwater</b>						
Impact on groundwater quality of the groundwater resource	Minimise degradation of the groundwater resource due to contaminants	<ul style="list-style-type: none"> <li>Operational mitigation measures have to be maintained post closure.</li> <li>Final profiling of the WRDs should be aimed at reducing erosion and minimising further water infiltration.</li> <li>Higher confidence groundwater models (developed/updated using monitoring data collected throughout the construction and operational phases) should be used for post-closure planning and to determine the extent and frequency of post-closure groundwater level monitoring.</li> </ul>	Decommissioning, post closure	<p>It is expected that the DWS Water Use Licence requirements will indicate that the mining site and regionally identified boreholes that are off-site of the project area should be monitored (groundwater levels and water quality) for at least 10 years after mine closure.</p> <p>Indicators: Effluent quality meeting DWS requirements</p>	Environmental Manager; Environmental Officer	Throughout decommissioning and post closure
Impact of contaminants on groundwater users	Minimise the impact on groundwater users due to contamination of the groundwater resource	<ul style="list-style-type: none"> <li>Should monitoring data confirm impact on private users, the client will compensate affected farmers for their loss, or replace the lost water supply source.</li> <li>The numerical groundwater flow and transport model which must have been updated at regular intervals becomes available to ensure assumptions made during the development of the model remain valid and that model predictions remain current.</li> </ul>	Decommissioning, post closure	<p>It is expected that the DWS Water Use Licence requirements will indicate that the mining site and regionally identified boreholes that are off-site of the project area should be monitored (groundwater levels and water quality) for at least 10 years after mine closure.</p> <p>Indicators: Effluent quality meeting DWS requirements</p>	Environmental Manager, Environmental Officer	Throughout decommissioning and post closure
Impact of drawdown or dewatering on the groundwater resource	Minimise impacts to the groundwater resource due to drawdown or dewatering	<ul style="list-style-type: none"> <li>Higher confidence groundwater models (developed/updated using monitoring data collected throughout the operational phase) should be used for post-closure planning and to determine the extent and frequency of post-closure groundwater level monitoring.</li> </ul>	Decommissioning, post closure	<p>It is expected that the DWS Water Use Licence requirements will indicate that the mining site and regionally identified boreholes that are off-site of the project area should be monitored (groundwater levels and water quality) for at least 10 years after mine closure.</p>	Environmental Manager, Environmental Officer	Throughout decommissioning and post closure
Impact of drawdown or dewatering on groundwater users	Minimise the impact on groundwater users due to drawdown or dewatering of the groundwater resource	<ul style="list-style-type: none"> <li>Higher confidence groundwater models (developed/updated using monitoring data collected throughout the construction and operational phases) should be used for post-closure planning and to determine the extent and frequency of post-closure groundwater level monitoring.</li> <li>Should monitoring confirm that any private boreholes are affected by lowering the groundwater table, rendering boreholes unusable (ie loss of water supply source), the client will compensate affected farmers for their loss, replacing the lost water supply source.</li> </ul>	Decommissioning, post closure	<p>It is expected that the DWS Water Use Licence requirements will indicate that the mining site and regionally identified boreholes that are off-site should be monitored for at least 10 years after mine closure.</p>	Environmental Manager, Environmental Officer	Throughout decommissioning and post closure
<b>Socio-economic</b>						
Loss of Employment and Contract Opportunities	To minimise the negative impact of the loss of jobs and termination of contracts due to the	<ul style="list-style-type: none"> <li>The company should develop a Decommissioning Plan for the ultimate closure of the mine to ensure that all social aspects are considered, including human resource management, retrenchment packages, retraining and transferable skills.</li> </ul>	Decommissioning	<p>Decommissioning Plan</p> <p>Grievance mechanism records</p>	Project Manager, Community Relations Officer	Prior to decommissioning

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
	decommissioning and closure of the mine.					
Presence of the workforce and jobseekers	Minimise impacts on the local population due to the presence of the work force and job seekers	<ul style="list-style-type: none"> <li>BMM will ensure that their security personnel work in close collaboration with the police to monitor any illegal activity.</li> <li>All new employees directly or indirectly employed by the Project to go through the induction programme and a Code of Conduct. The Code of Conduct is to form part of induction of all employees related to the Project and it is to be signed by each employee. The Code of Conduct should be available in all relevant languages and at a minimum, English, Afrikaans and Setswana.</li> <li>Grievance procedure to be in place that is easily accessible to the local community, through which complaints related to contractor or employee behaviour can be lodged and responded to. The Project will respond in a serious manner to any such complaints.</li> </ul>	Decommissioning	Stakeholder Engagement Records Training records Grievance mechanism records	Environmental Manager, Community Relations Officer	Prior to construction and to be implemented throughout construction, operations and decommissioning
Pressure on Social Infrastructure and Services	To ensure pressure is not exerted on the local social amenities which will reduce the availability and access of services to the local community.	<ul style="list-style-type: none"> <li>Implementation of the Grievance Mechanism.</li> </ul>	Construction, operations and decommissioning	Stakeholder Engagement Records Training records Grievance mechanism records	Project Manager, Environmental Manager, Community Relations Officer	Throughout Project life
Impact on human health due to air emissions and dust generation	To reduce the health impact on Project-affected communities to the lowest possible level.	<ul style="list-style-type: none"> <li>The Mine will develop and implement a Grievance Mechanism to address stakeholder concerns related to the Project in a timely manner.</li> </ul>	Construction, operations and decommissioning	Grievance mechanism records	Environmental Manager, Community Relations Officer	Throughout Project life
Risk to workers' health and safety due to hazardous Decommissioning activities	To reduce the risk associated with occupational health and safety.	<ul style="list-style-type: none"> <li>The Mine will implement a rigorous induction programme for all employees outlining health and safety risks.</li> <li>The Project will comply with all applicable South African legislation in terms of health and safety, and worker rights, which will include access to workman's compensation for loss of income resulting from an onsite incident.</li> <li>As part of the contractor and supplier selection process the Project will take into consideration performance with regard to worker management, worker rights, health and safety as outlined in South African law, international standards and the Project's policies.</li> <li>The Project will provide support to contractors and subcontractors to ensure that labour and working conditions are in line with South African law through capacity building.</li> <li>Workers will be provided with primary health care and basic first aid at construction camps /worksites.</li> <li>Facilities and operations will be developed, planned and maintained such that robust barriers are in place to prevent accidents. All employees have the duty to stop any works if adequate systems to control risks are not in place.</li> <li>In line with the worker code of conduct, employees should not be under the influence of intoxicants which could adversely affect the ability of that employee to perform the work or adversely affect the health and safety of other employees, other persons or the environment.</li> <li>The Project will provide of Personal Protective Equipment (PPE), training and monitoring as well as ongoing safety checks and safety audits.</li> <li>The Project will develop and implement a Grievance Mechanism to address employee concerns related to the Project in a timely manner.</li> </ul>	Decommissioning	Training records Grievance mechanism records H&S Audits	Project Manager, Environmental Manager, Community Relations Officer	Throughout Project life
<b>Unplanned Events</b>						



Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase	Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
Occupational Health and Safety	To reduce the risk associated with occupational health and safety.	<ul style="list-style-type: none"> <li>Development or upgrade of an Occupational Health and Safety Management Plan (OHSMP). Inductions, training, H&amp;S records and remediating actions, risk assessments of all activities and provision of PPE.</li> <li>The OHSMP should cover all workers on site, including temporary workers and contractors.</li> <li>Carry out regular monitoring and audits of the OHSMP and update as required.</li> </ul>	Construction, operations and decommissioning	Occupational Health and Safety Management Plan Training records H&S Audits	Environmental Manager, Community Relations Officer	Throughout construction, operations and decommissioning
Accidental spills of equipment fuel, oils, and chemicals	Reduce the risk of accidental spills of equipment fuels and oils.	<ul style="list-style-type: none"> <li>Adhere to industry best practice principles.</li> <li>Equipment should be up to standards and serviced regularly to prevent oil spills.</li> <li>A spill response plan should be in place and construction workers should be trained accordingly.</li> <li>On-site storage areas for hydrocarbons and other chemicals should be constructed in a way that potential tank failures can be contained including bunds and surface hardstanding.</li> <li>Hazardous material storage will be constructed on an impermeable surface and the bulk storage facility will be bunded. The Project will restrict storage and handling of hazardous materials and fuels to bunded areas of sufficient capacity to contain a release.</li> <li>Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages into the ground. Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused, treated by incineration or removed by a local contractor. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hardstanding surface.</li> <li>Implement the detailed hazardous material spill response plan, which includes community sensitisation/ notifications when required. The Project will maintain spill clean-up and response capability adequate for addressing spills for all phases of the Project. All spills will be immediately contained and cleaned up. Contaminated areas will be remediated and post remediation verification will be carried out.</li> </ul>	Construction, operations and decommissioning	Spill Response Plan Training records Records of spill clean up and post remediation verification	Environmental Manager, Environmental Officer	Throughout construction, operations and decommissioning
Vehicle Accidents	Reduce the risk and potential impact of vehicle accidents on site and for all Project related activities.	<ul style="list-style-type: none"> <li>All new drivers employed throughout the course of the Project's operations will be required to undergo appropriate levels of training.</li> <li>Speed limits will be enforced for all Project vehicles.</li> <li>Speed limits of 30kph (for heavy vehicles and 40kph for light vehicles) will be enforced along all internal roads.</li> <li>The Mine will work with the relevant local and regional government to ensure the roads used by Project vehicles are well maintained, and that potential problems or hazards are communicated to the relevant authority timeously.</li> </ul>	Construction, operations and decommissioning	Training records Grievance mechanism	Project Manager, Environmental Manager	Throughout construction, operations and decommissioning

## 5. IMPLEMENTATION OF THE EMPR

### 5.1 Proponent Roles and Responsibilities

BMM is committed to provide resources essential to the implementation and control of the EMPr. Resources include the appropriate human resources with the necessary skills. BMM has and will have dedicated personnel judged to be competent on the basis of appropriate education, training, and experience to manage and oversee the environmental and social aspects of project operations.

Specific roles and responsibilities of the Proponents key positions are provided in Table 5.1.

**Table 5.1 BMM Roles and Responsibilities**

Position	Responsibility
Project Manager	<ul style="list-style-type: none"><li>• Oversee the project team and coordinate all activities pertaining to the Project.</li></ul>
Environmental Manager	<ul style="list-style-type: none"><li>• Ensure that the Project and all its Business partners operate in accordance with applicable regulatory requirements and the Project EMPr;</li><li>• Liaise with regulators on the Project's behalf; and</li><li>• Oversee programs associated with environmental management.</li></ul>
Site Manager	<ul style="list-style-type: none"><li>• Manage, and ensure the efficient functioning of all site activities by the Project staff and by engineering, procurement, and Business partners and Business partners;</li><li>• Support the HSE Manager with matters related to HSE compliance and enforcement including implementation of EMPr.</li></ul>
Community Relations Manager	<ul style="list-style-type: none"><li>• Liaise with the communities on the Project's behalf, including in relation to works being carried out by Business partners and Business partners;</li><li>• Oversee programs associated with local employment and social and community development initiatives;</li><li>• Maintain the Project's grievance procedure.</li></ul>
Environmental Officer <sup>1</sup>	<ul style="list-style-type: none"><li>• BMM will utilise the current permanent environmental officers for construction and operational phase;</li><li>• The officers will advise BMM to manage on third party specialist's appointment to undertake monitoring as stipulated in the EMPr. The officers will be responsible to oversee the specialist during their period on site;</li><li>• The officers will also manage third party services to undertake audits as per the EMPr;</li><li>• The officers must:<ul style="list-style-type: none"><li>• Be fully knowledgeable with the contents and the conditions of the Environmental Authorisation (s) including all subsequent amendments;</li><li>• Be fully knowledgeable with the contents of the EMPr(s).</li><li>• Be fully knowledgeable of all the Project licences and permits issued to the site and ensure communication to the relevant personnel on the conditions contained therein;</li><li>• Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with them;</li></ul></li><li>• Ensure that the contents of this document are communicated to the Business partner site staff and that the Site Manager and Business partner are constantly made aware of the contents through regular discussion;</li></ul>

<sup>1</sup> BMM has indicated that the role typically referred to as ECO is currently fulfilled by the title of Environmental officer at the project site

Position	Responsibility
	<ul style="list-style-type: none"> <li>• Ensure that the compliance of the EMPr (s), EA(s) and legislation is monitored through regular and comprehensive inspection of the site and surrounding areas;</li> <li>• Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements;</li> <li>• Ensure that activities on site comply with all relevant environmental legislation;</li> <li>• Keep record of all environmental activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken;</li> <li>• Ensure that the compilation of progress reports for submission to the Project Company, with input from the Site Manager, takes place on a regular basis, Weekly, Monthly Reports including the Final Post-Construction Audit Report.</li> <li>• Monitor and report on the compliance and performance of the Project with respect to the execution of the EMPr;</li> <li>• Carry out regular on-site inspection;</li> </ul> <p>Monitor and enforce compliance and performance of Business partners and any Business partners;</p>

As a general mitigation strategy, the Environmental officers should be present at the onset, for the site preparation to ensure the correct demarcation of no-go areas, and facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment).

Thereafter monthly site compliance inspections would probably be sufficient, provided that compliance with the requirements of the EA, EMPr and environmental legislation is maintained. Any Ad-hoc environmental issues which may arise after that will also be dealt with by the site Environmental Officer and Business partners.

In addition, the appointed Business partner will be required to establish and maintain a similar HSE organization.

Business partners are responsible for the overall execution of the activities envisioned in the construction phase including the implementation and compliance with recommendations and conditions of the EMPr and all project permits as stipulated by BMM. It is important that the Business partner is fully aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Business partner is responsible for informing employees and sub-Business partners of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts.

**Table 5.2 Business Partner Roles and Responsibilities**

<b>Position</b>	<b>Responsibility</b>
Business Partner Project Manager	<ul style="list-style-type: none"> <li>• Oversee and coordinate all activities; ultimately responsible for HSE compliance of the Business partner;</li> <li>• Be fully knowledgeable with the contents of the EIA Reports and risk management;</li> <li>• Be fully knowledgeable with the contents and conditions of the Environmental Authorisations and related amendments;</li> <li>• Be fully knowledgeable with the contents of the EMPr;</li> <li>• Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these;</li> <li>• Have overall responsibility of the EMPr and its implementation;</li> <li>• Ensure that audits are conducted to ensure compliance to the EMPr;</li> <li>• Ensure there is communication with the Project Manager, the ECO, the EO/ Environmental Representative, and relevant discipline engineers on matters concerning environmental compliance;</li> <li>• Be fully knowledgeable with the contents of all Project licences and permits;</li> <li>• Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.</li> </ul>
Business Partner Site Manager	<ul style="list-style-type: none"> <li>• Ensure that all work by the Business partner and by all Business partners is done in compliance with applicable regulatory environmental requirements and the Project HSE plans. Responsible for coordination with project Community Relations Manager for all community relations issues including upcoming works.</li> <li>• The Site Manager has the same responsibilities as the Project Manager and is more responsible for the day to day of the EMPr.</li> </ul>
Business partner HSE Manager	<ul style="list-style-type: none"> <li>• Ensure that the Business partner organization operates in accordance with applicable regulatory environmental requirements and the Project HSE plans.</li> </ul>
Business partner Environmental Officer (if appointed)	<ul style="list-style-type: none"> <li>• The Business partner's EO/ Environmental Representative, employed by the Business partner on a fulltime basis. The EO will be responsible for full day-to-day implementation of this EMPr and should be appointed prior to any commencement of the activities. The Business partner's EO/ Environmental Representative should:               <ul style="list-style-type: none"> <li>• Understand the relevant environmental legislation and processes and the implementation thereof;</li> <li>• Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance;</li> <li>• Keep accurate and detailed records of all EMPr-related activities on site. The EO shall keep a daily diary for monitoring the site-specific activities as per project schedule;</li> <li>• The EO is responsible for managing the day-to-day on-site implementation of this EMPr and other Project Permits/ Authorisations;</li> <li>• Train and induct all Business partners employees prior to commencement of any works;</li> <li>• Compilation of Weekly and Monthly Monitoring Reports to be submitted to BMM, and Site Manager;</li> <li>• In addition, the EO/ Environmental Representative must act as project liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager, and Business partner.</li> </ul> </li> </ul>

It is important to note that it is the responsibility of the Business partner (and delegated sub-Business partners) to enforce the day-to-day implementation of the enhancement and mitigation measures for the construction phase specified in this EMP. The Business partner must be contractually required to perform all work in compliance with relevant national HSE legislation and regulations, and the EMP.

## 5.2 Training and Environmental Awareness on Site

BMM will identify, plan, monitor, and record training needs for personnel whose work may have a significant adverse impact upon the environment or social conditions. BMM recognises that it is important that employees at each relevant function and level are aware of the Project's environmental and social management measures; potential impacts of their activities; and roles and responsibilities in achieving conformance with the commitments and procedures. Training and awareness-raising therefore forms a key element of the EMP.

Key staff will, therefore, be appropriately trained in key areas of environmental and social management and operational control with core skills and competencies being validated on an on-going basis. The identification of training and awareness requirements and expediting of the identified training/awareness events will be the responsibility of the Safety Manager, Environmental Manager and EO.

This will be achieved through a formal training process. Employee training will include awareness and competency with respect to:

- Environmental and social impacts that could potentially arise from their activities;
- Key sensitive no-go areas as identified in the EMPs;
- Legal requirements in relation to environmental and social performance;
- Necessity of conforming to the requirements of the EIA and EMP, in order to avoid or reduce those impacts;
- Activity-specific training on waste management practices, documentation systems and community interactions; and
- Roles and responsibilities to achieve that conformity, including those in respect of change management and emergency response.

The Safety Manager and the Environmental manager for BMM have a responsibility to ensure that their personnel are adequately trained. The BMM training Manager is responsible for coordinating the training, maintaining employee training records, and ensuring that these are monitored and reviewed on a regular basis. The Safety Manager and the Environmental manager for BMM will also periodically verify through discussion and observations that staff are performing competently.

The BMM Training Manager is responsible for coordinating training, maintaining employee-training records, and ensuring that these are monitored and reviewed on a regular basis. The BMM Training Manager will also periodically verify that staff is performing competently through discussion and observation.

The EO is responsible for site environmental awareness training for personnel working on the job sites. The Business partners are also responsible for identification of any additional training requirements to maintain required competency levels.

### 5.3 Recordkeeping

BMM will control HSE documentation, including management plans; associated procedures; and checklists, forms and reports, through a formal procedure. All records will be kept on site and kept in both hard copy and soft copy formats. The Environmental Manager and Safety Manager is responsible for maintaining a master list of applicable HSE documents.

### 5.4 Grievance Mechanism

The management of grievances is a vital component of stakeholder management and an important aspect of risk management for the project, since grievances can be an indication of growing stakeholder concerns (real and perceived). Grievances may be verbal or written and are usually either specific claims for damages/injury or complaints or suggestions about construction or operational activities.

When a grievance has been brought to the attention of BMM it will be logged and evaluated. The person or group with the grievance is required to present grounds for making a complaint or claiming loss so that a proper and informed evaluation can be made. Where a complaint or claim is considered to be valid then steps are required to be undertaken to rectify the issue. Where there remains disagreement on the outcome then an arbitration procedure may be required to be overseen by a third party (e.g. government official). Stakeholders will be informed of the grievance procedure.

An existing six-step grievance procedure will be used for the project. These are as follows:

- Step 1: Receive and Log Grievance;
- Step 2: Acknowledge Grievance;
- Step 3: Assess and Prioritise Grievance and Forward to Relevant Department;
- Step 4: Investigate and Resolve Grievance;
- Step 5: Sign-off on Grievance; and
- Step 6: Monitor.

### 5.5 Monitoring Programme

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts. Monitoring parameters are included in the EMPr.

### 5.6 Auditing

Beyond the routine inspection and monitoring activities conducted, audits will be carried out internally by BMM to ensure compliance with regulatory requirements. The audit shall be performed by qualified staff and the results shall be reported to the Site management to be addressed.

The audit will include a review of compliance with the requirements of the EMPr and include, at a minimum, the following:

- Completeness of HSE documentation, including planning documents and inspection records;
- Conformance with monitoring requirements;
- Efficacy of activities to address any non-conformance with monitoring requirements; and
- Training activities and record keeping.

## **5.7 Corrective Action**

Potential impacts and associated risks should be identified. Investigating a 'near miss' or actual incident after it occurs can be used to obtain valuable lessons and information that can be used to prevent similar or more serious occurrences in the future.

BMM will implement a formal non-compliance and corrective action tracking procedure for investigating the causes of, and identifying corrective actions to, accidents or environmental or social non-compliances. This ensures coordinated action between the Site and its Business partners. The BMM Environmental manager is responsible for keeping records of corrective actions and for overseeing the modification of environmental or social protection procedures and/or training programs to avoid repetition of non-conformances and non-compliances.

## **5.8 Reporting**

BMM will provide appropriate documentation of EHS related activities, including internal inspection records, training records, and reports to the DMR as required.

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