

**Application for Amendment of  
the Approved Environmental  
Management Programme in  
Respect of the Portion 1 of Farm  
Gams 60, Namaqualand,  
Northern Cape**

DMR Ref: NC-00085-MR/102

**Basic Assessment  
Report and  
Environmental  
Management Plan  
Version 02**

Gamsberg East & South  
Prospecting

**On behalf of:** Black Mountain Mining



June 2018

## Declaration of Consultant Independence

This report has been prepared by EndemicVision Environmental Services (Pty) Limited, with all reasonable skill, care and diligence within the terms of the contract with the client. EndemicVision Environmental Services is a multidisciplinary environmental management and consulting company with more than 20 years of experience in field. The technical appointments for this project are detailed below.

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The author of this report, EndemicVision Environmental Services, does hereby declare that it is an independent consultant and has no business, financial, personal or other interest in the activity, application or appeal in respect of which it was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of the persons performing such work. All opinions expressed in this report are its own.



Signed: **C.D. Neethling**

Dated: **22 June 2018**

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## Project Summary

Scope of Environmental Impact Assessment	
This impact assessment identifies and evaluates the actual and potential environmental consequences associated with the proposed activity. Furthermore, the potential for mitigation of negative impacts and enhancement of positive impacts (DEAT, 2014) are described.	
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<b>Property reference</b>	Farm Gams No 60 - Portion 1
<b>Surveyor General Property Code</b>	Gams 60, Portion 1: C05300000000006000001
<b>Local Municipality</b>	Khâi-Ma Local Municipality
<b>Magisterial district</b>	Namakwa District Municipality
<b>District Municipality</b>	Namakwa District Municipality
<b>Province</b>	Northern Cape

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## List of Abbreviations

<b>AIA</b>	Archaeological Impact Assessment
<b>ABP</b>	Area Based Plans
<b>DAFF</b>	Department of Agriculture, Forestry & Fisheries
<b>DMR</b>	Department of Mineral Resources
<b>DWS</b>	Department of Water and Sanitation
<b>EAP</b>	Environmental Assessment Practitioner
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EMPr</b>	Environmental Management Programme
<b>HIA</b>	Heritage Impact Assessment
<b>I&amp;APs</b>	Interested and Affected Parties
<b>IUCN</b>	International Union of Conservation of Nature
<b>LRAD</b>	Land Redistribution for Agricultural Development
<b>MPRDA</b>	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
<b>NEMA</b>	National Environmental Management Act, 1998 (Act No. 107 of 1998)
<b>NEM-AQA</b>	National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004)
<b>NEMPAA</b>	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
<b>NEMBA</b>	The National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)
<b>NHRA</b>	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
<b>PIA</b>	Palaeontological Impact Assessment
<b>PPP</b>	Public Participation Process
<b>SAHRA</b>	South African Heritage Resource Agency
<b>SAHRIS</b>	South African Heritage Resource Information System
<b>SANBI</b>	South African National Biodiversity Institute
<b>SANBIS</b>	South African National Biodiversity Information System



**mineral resources**Department:  
Mineral Resources  
**REPUBLIC OF SOUTH AFRICA**

## **BASIC ASSESSMENT REPORT and ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (Act No. 107 of 1998) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (Act No. 28 of 2002) (MPRDA) (AS AMENDED).

**NAME OF APPLICANT:** Black Mountain Mining (Pty) Ltd

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**FAX NO:** +27 (0) 54 983 9353

**POSTAL ADDRESS:** Private Bag X01, Aggeneys, 8893

**PHYSICAL ADDRESS:** 1 Penge Road, Aggeneys, 8893

**FILE REFERENCE NUMBER SAMRAD:** NC-00085-MR/102

## 1. Important notice

In terms of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act No. 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

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

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

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

## 2. Objective of the basic assessment process

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

- (a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- (b) identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) describe the need and desirability of the proposed alternatives;
- (d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
  - (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
  - (ii) the degree to which these impacts—
    - (aa) can be reversed;
    - (bb) may cause irreplaceable loss of resources; and
    - (cc) can be managed, avoided or mitigated;
- (e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
  - (i) identify and motivate a preferred site, activity and technology alternative;
  - (ii) identify suitable measures to manage, avoid or mitigate identified impacts; and
  - (iii) identify residual risks that need to be managed and monitored.

## PART A: SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

### 3. Contact person and correspondence address

#### a) Details of EAP

##### i) Details of the EAP

Name of the Practitioner: EndemicVision Environmental Services (Pty) Ltd  
Chrizette Neethling

Tel No.: +27 (0) 53 723 1379

Fax No.: +27 (86) 590 7261

E-mail address: cdn@endemicvision.co.za

##### ii) Expertise of the EAP

Please refer to the Appendix A for the Curriculum Vitae of Chrizette Neethling

##### 1. The qualifications of the EAP

Please refer to the Appendix A for the Curriculum Vitae of Chrizette Neethling

##### 2. Summary of the EAP's past experience

Please refer to the Appendix A for the Curriculum Vitae of Chrizette Neethling

#### b) Location of the overall Activity

The following table presents the location and associated cadastral details associated with the proposed project area.

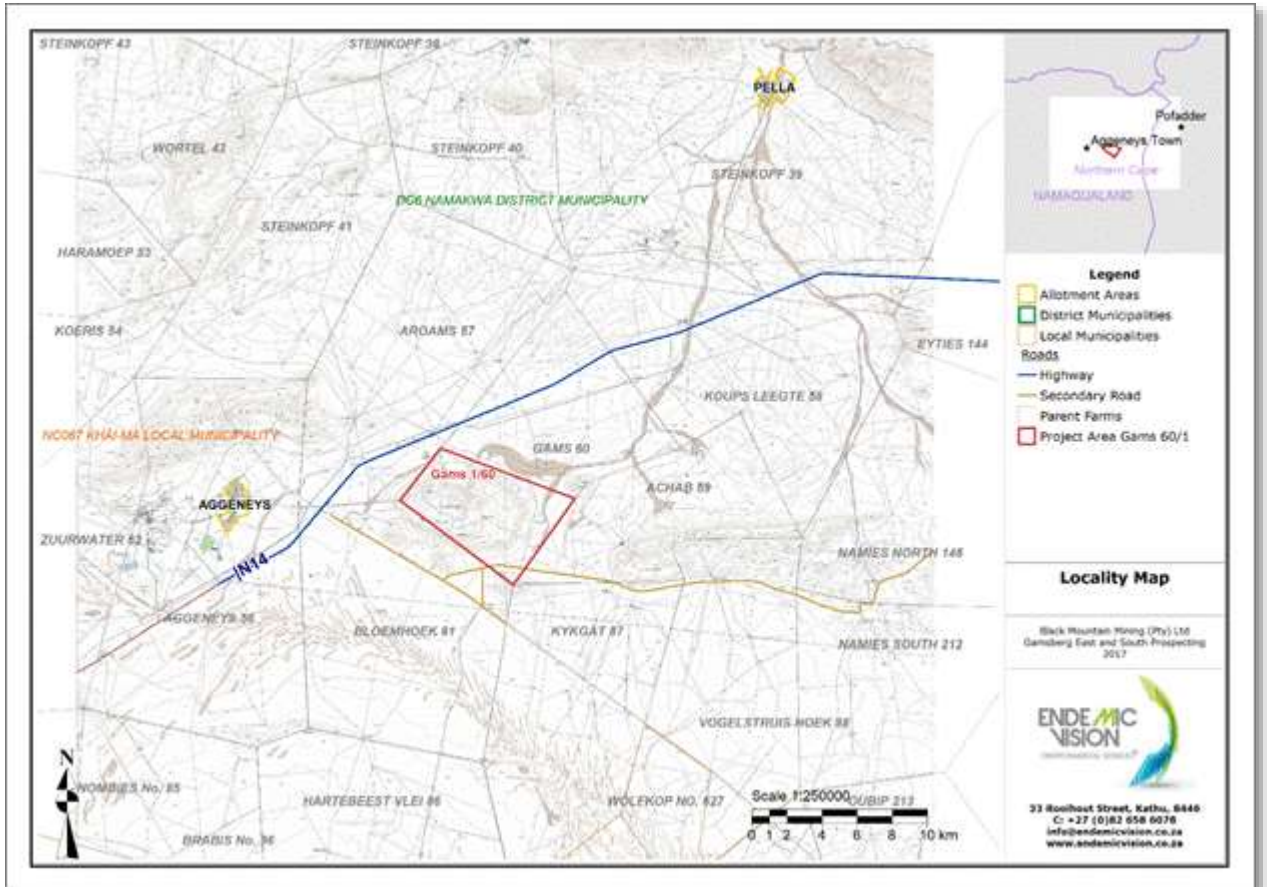
**Table 1: Project Locality Details**

<b>Farm Name:</b>	Farm Gams No 60 Portion 1
<b>Application area (Ha)</b>	7.6 ha
<b>Magisterial district:</b>	Namaqualand [C053]
<b>Distance and direction from nearest town</b>	The prospecting expansion area of interest is located on BMM property, Portion 1 of Farm Gams 60 within the Khâi-Ma Local Municipality and Namakwa District Municipality, Northern Cape Province. The areas are situated approximately 11 km East from the Aggeneys town.
<b>21-digit Surveyor General Code for each farm portion</b>	Gams 60, Portion 1: C05300000000006000001

### c) Locality map

*Show nearest town; scale not smaller than 1:250 000*

\*All maps are available on request in a greater quality and will be added as a map file for submission to the regulator. The following figure illustrates the farm associated with the proposed Prospecting Area, as well as the Regional Setting.



**Figure 1: Regional Location of the Prospecting Right Application Area**

The prospecting expansion area of interest is located on BMM property, Portion 1 of Farm Gams 60 within the Khâi-Ma Local Municipality and Namaqualand District Municipality, Northern Cape Province. The area is situated approximately 11 km East of the Aggeneys town.

The following figure illustrates the setting of the proposed Prospecting Area within the borders of the Khai-Ma Local Municipality.

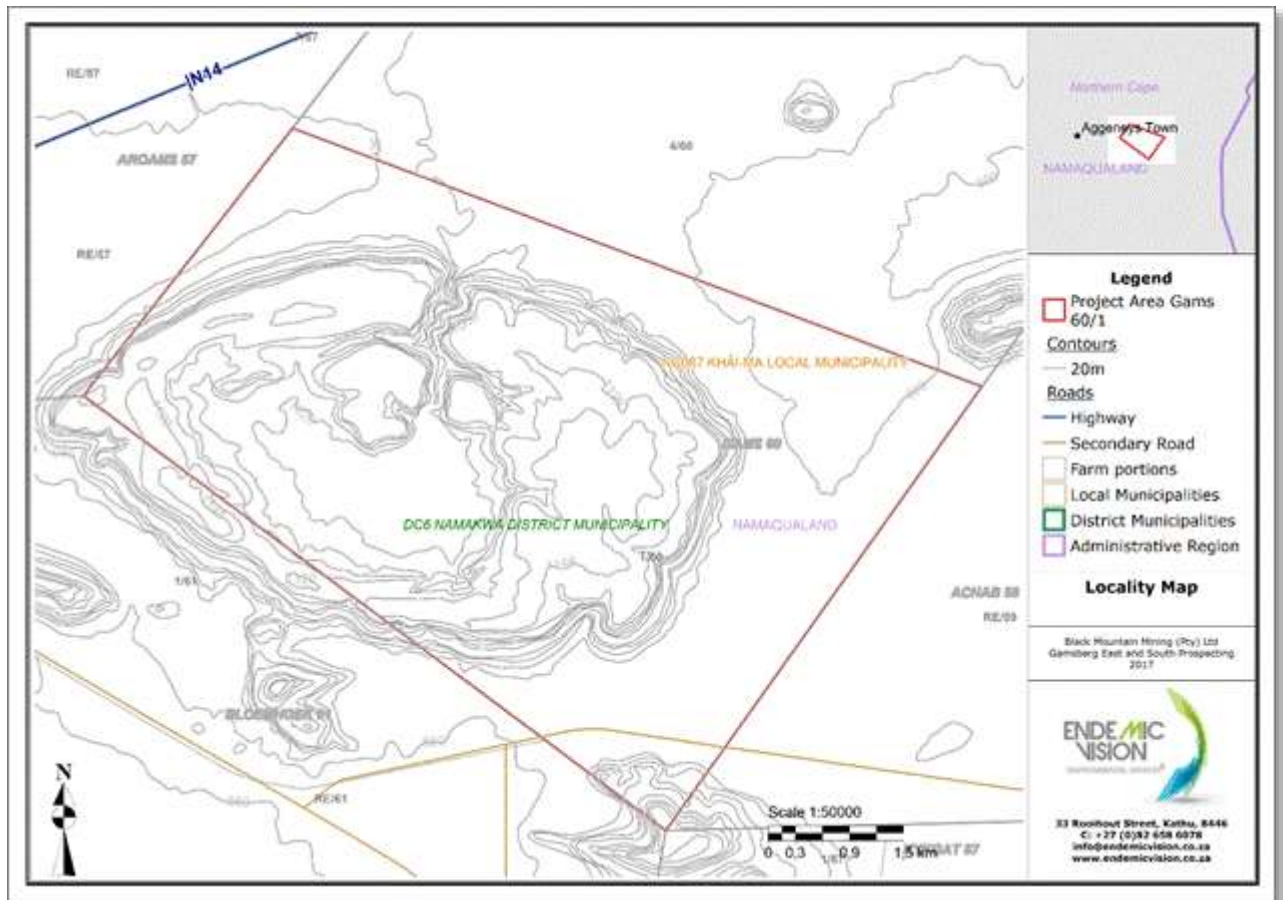


Figure 2: Local Setting of the Prospecting Right Area within the Namaqualand Administrative Region

The scope of the proposed Prospecting area is provided in the table below:

Table 2: Property Scope

Property scope	Gamsberg East & South Prospecting
<b>Total landholding size (Ha)</b>	3 858
<b>Application area (Ha)</b>	7.6
<b>Project footprint as percentage of total landholding</b>	0,2%
<b>Project location description</b>	The prospecting expansion area of interest is located on BMM property, Portion 1 of farm Gams 60 within the Khâi-Ma Local Municipality and Namaqualand District Municipality, Northern Cape Province. The area is situated approximately 11 km east from Aggeneys.
<b>Distance from nearest town boundary (km)</b>	10.69km east from Aggeneys
<b>Distance from nearest residential settlement (km)</b>	10.69km
<b>Distance from nearest neighbour (km)</b>	1.29km
<b>Project Central Location Coordinates (Decimal Degrees) South</b>	<b>Project Central Location Coordinates (Decimal Degrees) East</b>

29,2473118	18,9884616
<b>Project Corner Coordinates (Decimal Degrees) South</b>	<b>Project Corner Coordinates (Decimal Degrees) East</b>
29,2153591	18,9624986
29,241068	19,0407131
29,2851811	19,0048354
29,2419363	18,9387229

#### d) Description of the scope of the proposed overall activity

*Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site*

The project can be described as the expansion of the exploration prospecting for base minerals on the property of Black Mountain Mine (Farm Gams 60 Portion 1 East and South) which is part of the existing mining right area in order to identify further potential sources of future resources and reserves to ensure sustainability of the BMM projects.

Currently there are two high priority areas where BMM will focus the prospecting activities from 2018 to 2021 which include Gamsberg South and Gamsberg East. The areas are situated approximately 11 km East of the Aggeneys town.

The objective of the prospecting works is to determine the possibility of accessing ore bodies for the purpose of future underground mining. Activities will include the reopening and utilisation of previously existing access tracks / prepared roadways, passing & turning areas and demarcated laydown areas, access or clearance and drilling on drill sites on Gamsberg East and South. Existing old boreholes and access roads will be utilised again and the additional boreholes and access road constructed to complete the drilling program.

The proposed prospecting programme involves both non-invasive and invasive prospecting methods. Initially, prospecting activities will be non-invasive and restricted to a desktop study which will include historical records and existing data, geophysical surveys, interpretation and modelling of data. Subsequent phases will be of the invasive type and entails the re-drilling of historical drill sites and drilling of additional boreholes to confirm continuity of mineralisation and potential deposit size.

Standard sizes diamond drilling (NQ and HQ diameter) will be used. Down-hole gyroscopic surveys will be done every 50m in each hole to ensure holes intersect the desired targets. The applicant's sampling and logging procedure standards will be applied to mark, log, photograph and sample the core. Rotary Air Blast (RAB) or Reverse Circulation (RC) drilling may be carried out for pre-collaring of diamond drill boreholes or for sampling if significant depth of cover is encountered over particular targets. Advanced directional and wedge drilling techniques will be applied to drill several holes per site.

The drilling takes place by tracked diamond drill rigs and use existing roads as far as possible. In locations where, historic drill pads and roads are not available, new access roads and drill pads will be constructed. A total of 2,05 km of new access tracks will be made within less critical habitat types. Drill sites are prepared by constructing a gravel single track to access the sites, the construction of a drill site cleared and levelled for this purpose of approximately 15 meters x 15 meters.



**Scope of works applied for**

Both non-invasive and invasive phases will be implemented to identify further potential sources of future resources and reserves to ensure sustainability of BMM projects. Two main priority areas, Gamsberg East and Gamsberg South, were identified where prospecting activities will be focused. Two additional prospecting areas, Gamsberg North and Gamsberg Far East, will also be investigated. The location, extent and depth of the boreholes to be drilled will be determined by the preceding non-invasive phases. Any change in drill planning resulting from the initial testing will not exceed the scope, provision and impact outlined in this document. The prospecting program will include the use of existing access tracks and boreholes and the construction of new access tracks and boreholes to complete the drilling program. No drill camps will be constructed for this project. Life of project is anticipated to be 3 years with a total footprint of 7.6 ha (hectares).

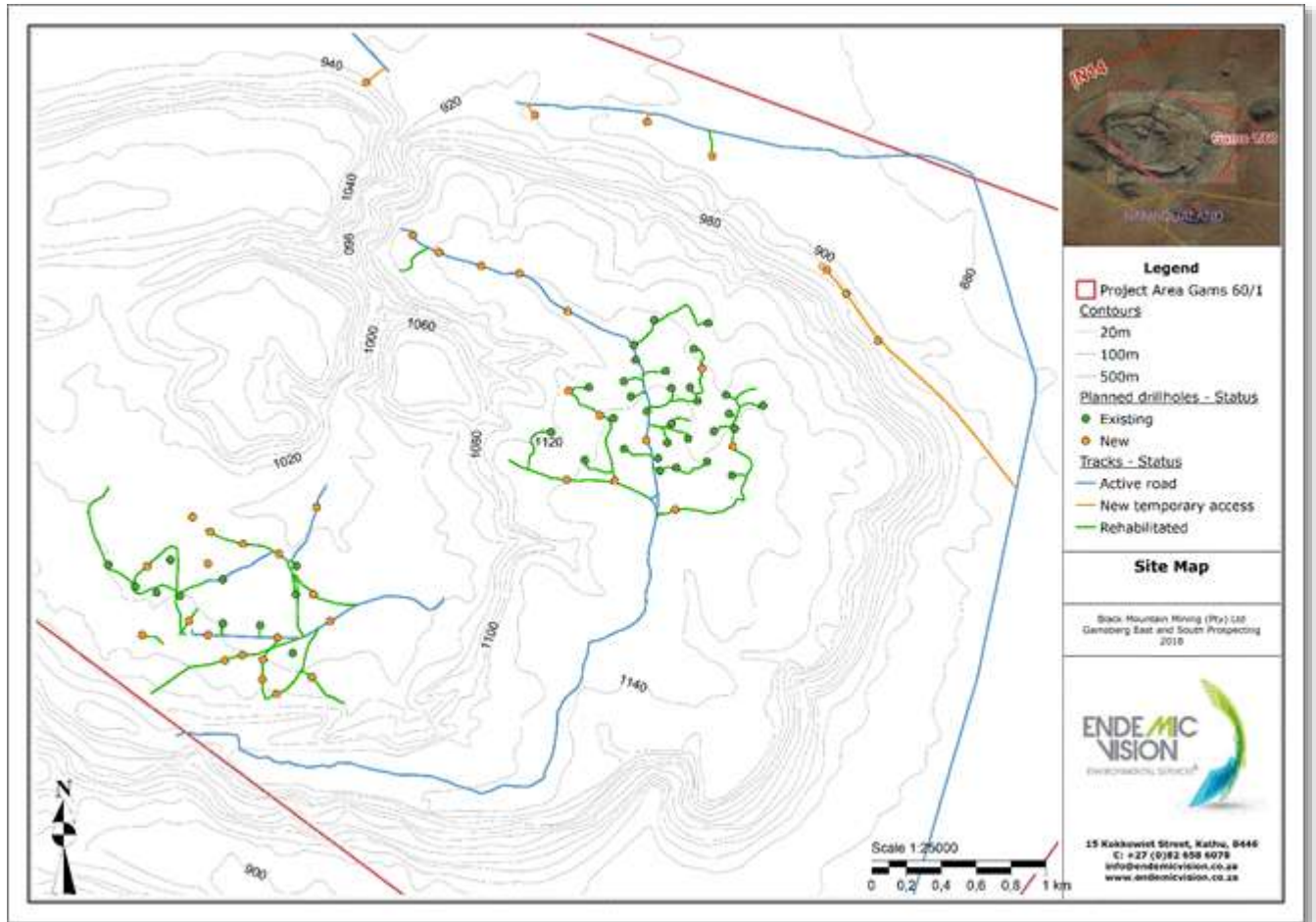


Figure 3: Planned Site Layout Plan



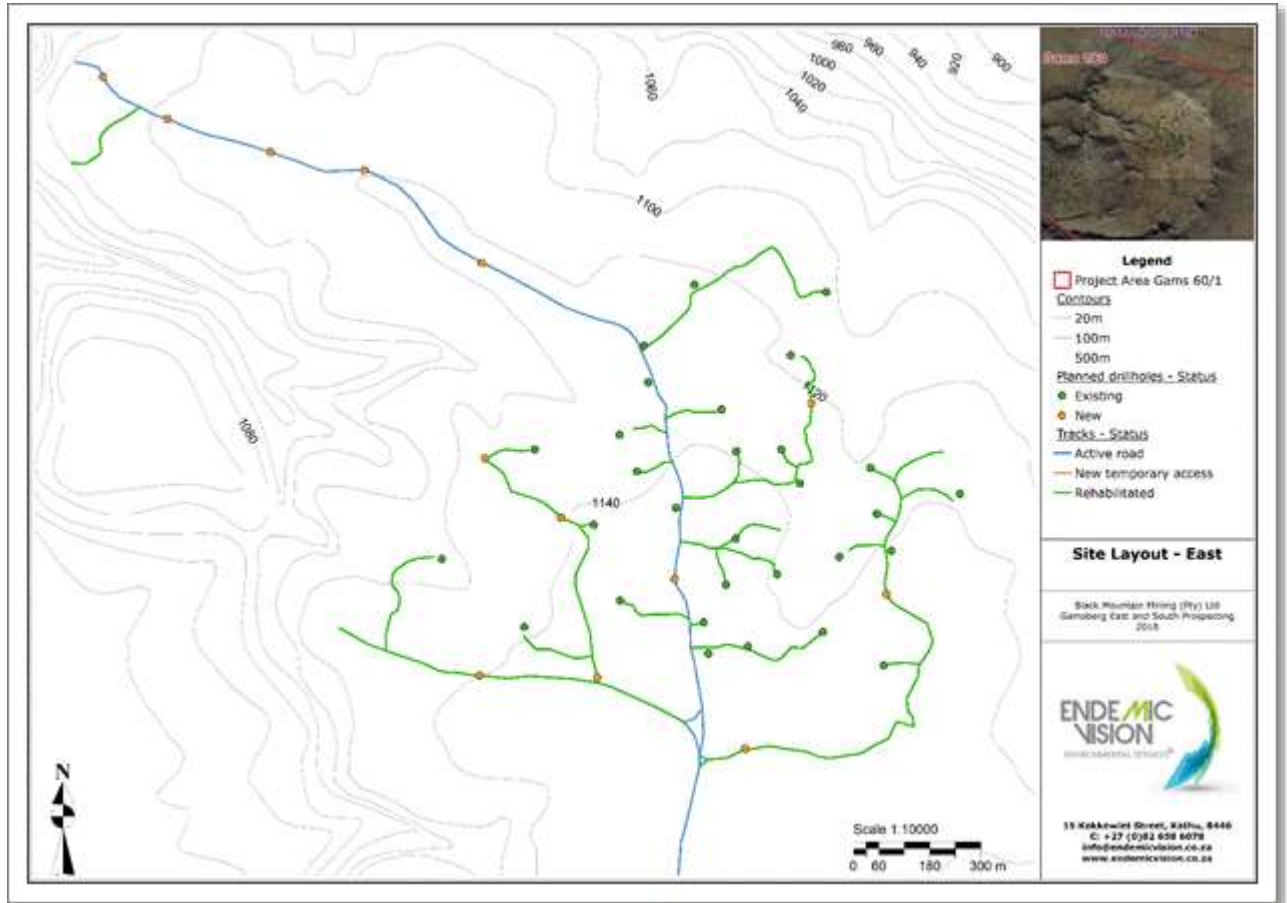


Figure 4: Planned Site Layout on the East side

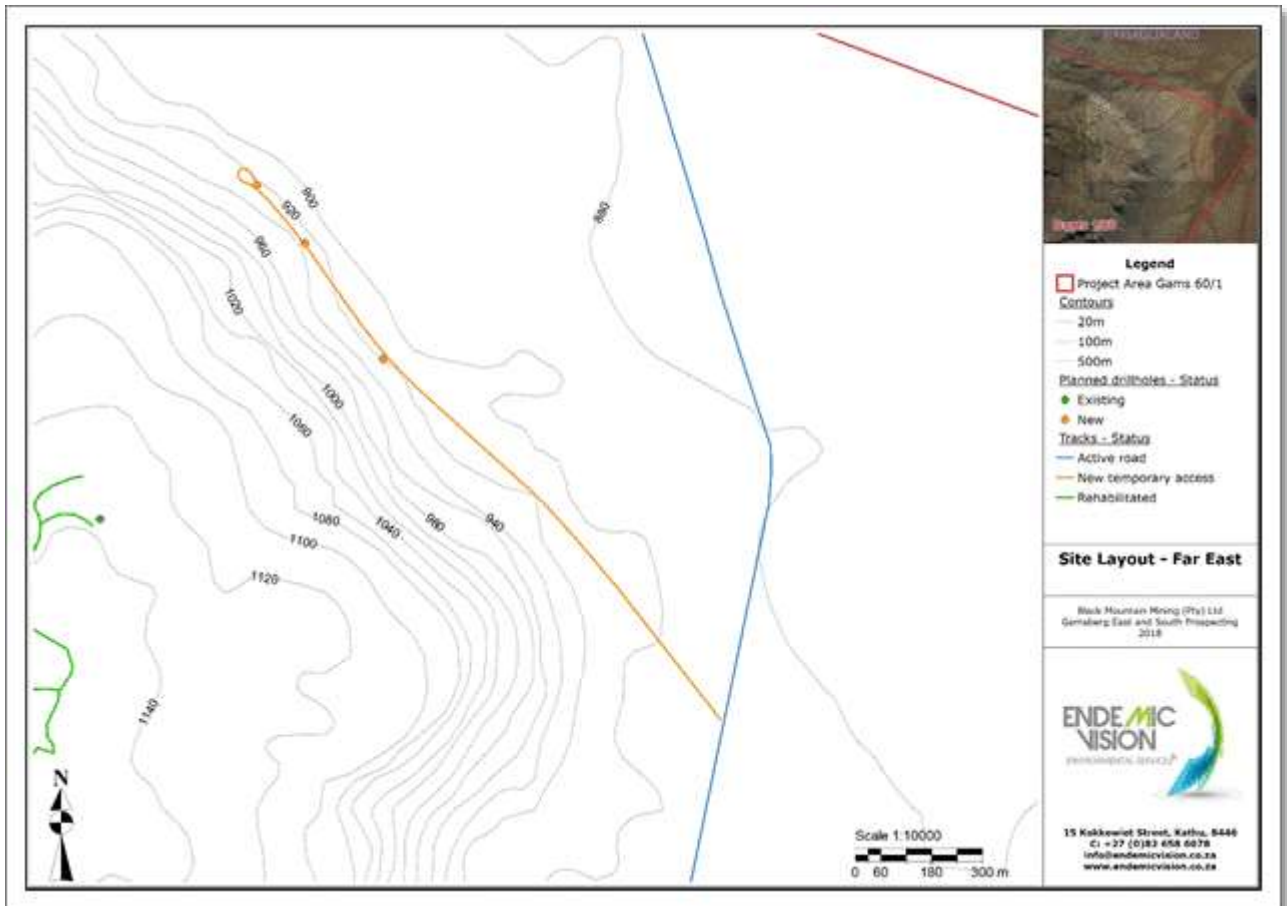


Figure 5: Planned Site Layout on the Far East side

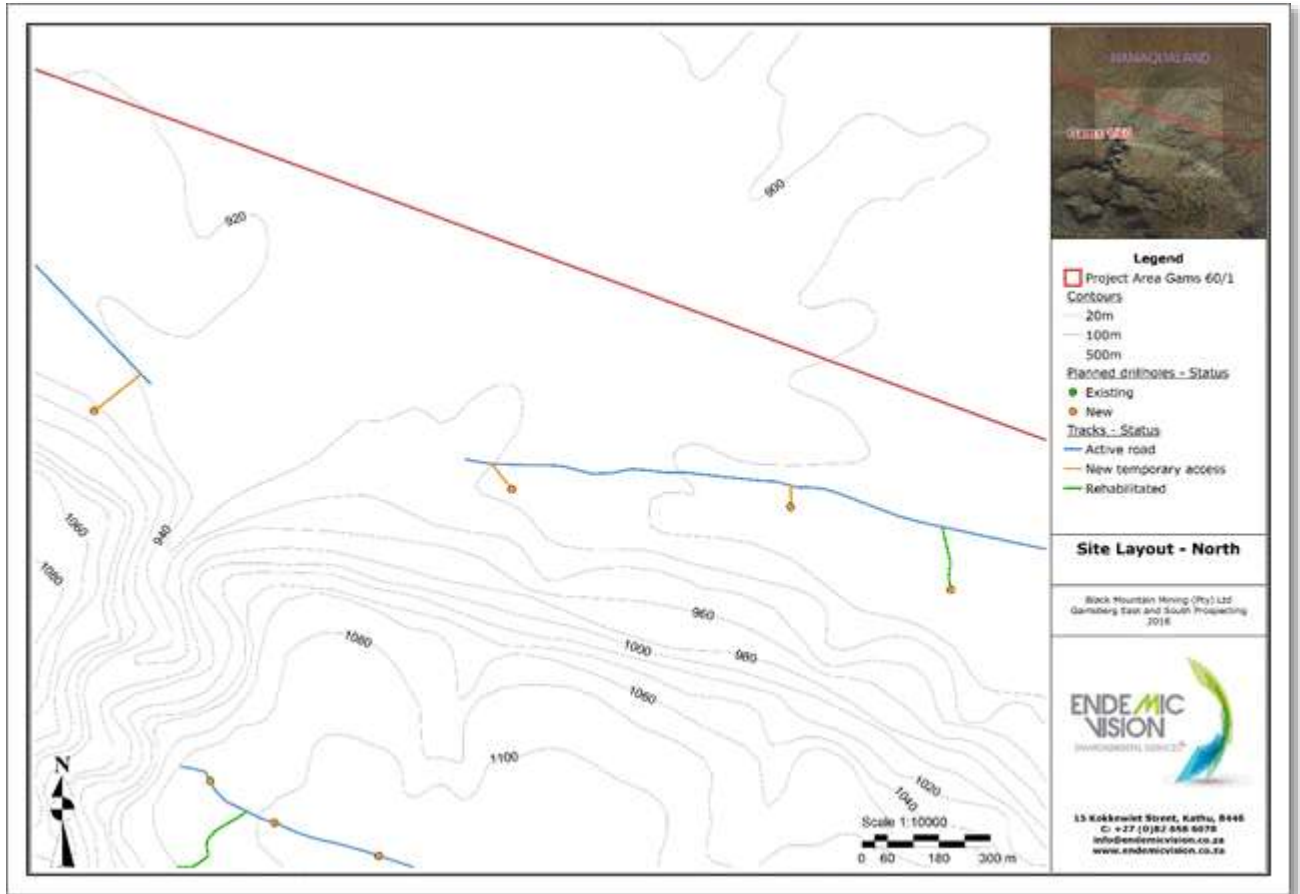


Figure 6: Planned Site Layout on the North side

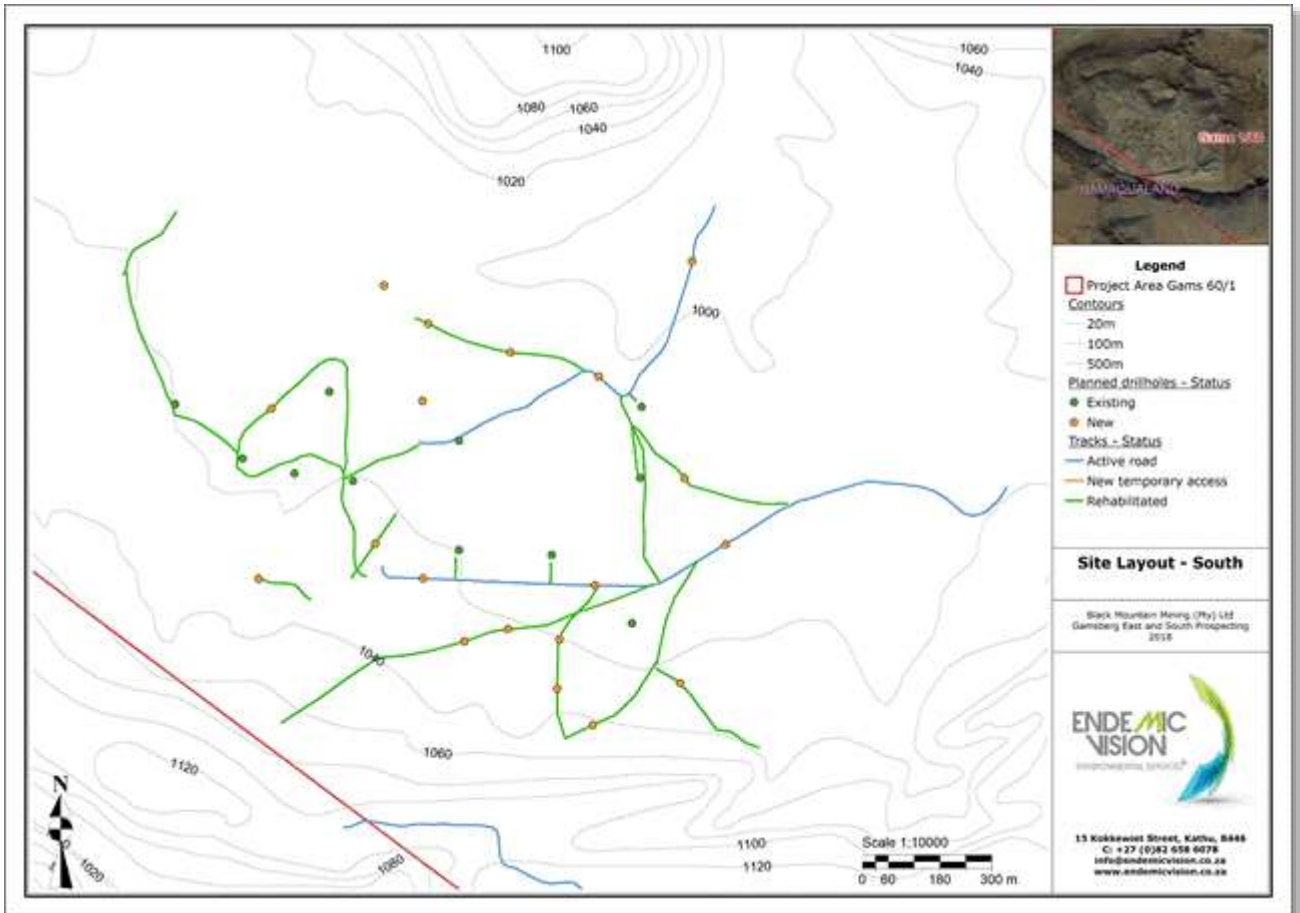


Figure 7: Planned Site Layout on the South side

**Table 3: Planned Footprint of Development Activities**

Access tracks totals*				
Infrastructure type	Width	Length (m)	Total Area (m <sup>2</sup> )	Road area excluding drill pads (m <sup>2</sup> )*
Active Main Roads	4	18375	73500	72767
Rehabilitated Tracks	4	13089	53026	50369
New Access Tracks	4	2055	8222	7934
	<b>Total</b>	<b>33519</b>	<b>134749</b>	<b>131070</b>

\*Drill pads in roads are subtracted from road footprint

Drill pad totals (includes contingency)			
Infrastructure type	Drill pad Area (m <sup>2</sup> ) per site	Planned number of drill sites	Total drill pad area (m <sup>2</sup> )
Existing Drill Pad	225	41	9225
New Drill Pad	225	39	8775
	<b>Total</b>	<b>80</b>	<b>18000</b>

Declared footprint	
Infrastructure type	Area (m <sup>2</sup> )
Road area excluding drill pads (m <sup>2</sup> )*	131070
Active Main Roads	72767
Total drill pad area (m <sup>2</sup> )	18000
<b>Impact footprint</b>	<b>76303</b>

Drilling totals (actually planned)		
Target Area	Actual Meters planned	Actual No. Planned BH's
Gamsberg East	152000	264
Gamsberg South	55000	102
Other (prospecting)	19000	18
	<b>226000</b>	<b>384</b>

**Table 4: Activity Schedule**

Access tracks by work phase			
	Phase 1 / Year 1	Phase 2 / Year 2	Phase 3 / Year 3
<b>Tracks</b>	All tracks will be reinstated in year 1		

Gamsberg total drilling by work phase (includes contingency)			
	Phase 1 / Year 1	Phase 2 / Year 2	Phase 3 / Year 3
<b>Drill pads</b>	20	30	30
<b>Number of Boreholes</b>	85	140	170
<b>Meters of drilling</b>	50000	80000	100000

**Table 5: Planned Scope of Works**

<b>Gamsberg total drilling per area</b>				
<b>Area</b>	<b>Existing</b>	<b>New</b>	<b>New drill pads in existing road footprint</b>	<b>Total</b>
Gamsberg East	30	13	13	<b>43</b>
Gamsberg Far East	0	3	0	<b>3</b>
Gamsberg North	0	4	1	<b>4</b>
Gamsberg South	11	19	18	<b>30</b>
<b>Total</b>	<b>41</b>	<b>39</b>	<b>32</b>	<b>80</b>

A summary of the development scope is provided in the table below:

**Table 6: Development Scope of the Project**

<b>Development scope</b>	
<b>Development objective</b>	Expansion of the exploration prospecting for base minerals (zinc and lead) on the property of Black Mountain Complex as part of the existing mining right.
<b>Type of impact (industry)</b>	Prospecting
<b>Mineral Type</b>	Zinc and lead ore
<b>Impact Description</b>	The proposed prospecting programme involves both non-invasive and invasive prospecting methods. Initially, prospecting activities will be non-invasive and restricted to a desktop study which will include a literature survey, aerial photograph and satellite image interpretation, ground validation of targets, geophysical surveys, interpretation and modelling of data. Subsequent phases will be of the invasive type and entails the re-drilling of historical drill sites and drilling of additional boreholes to confirm continuity of mineralisation and potential deposit size.
<b>Impact Period</b>	2019 - 2022
<b>Total impact footprint</b>	7.6 ha
<b>Existing infrastructure</b>	Historical drill sites, access roads and laydown areas.
<b>Planned infrastructure</b>	<b>Access Roads:</b> Existing single-track gravel roads transecting the mine area will be used as far as possible. Where roads do not exist, a single-track road will be planned. <b>Drill sites:</b> Cleared and demarcated area for drilling.
<b>Affected Vegetation Types</b>	SKr 18 - Bushmanland Inselberg Shrubland SKr 19 - Aggeneys Gravel Vygiveld Washes
<b>Affected Water Resources</b>	Non-perennial rivers
<b>Affected Sensitive Habitats</b>	Biodiversity no-go zone
<b>Affected Heritage Resources</b>	No-go areas (SG1, SG4 and SG7)
<b>Main Activities and Infrastructure</b>	
<b>1</b>	Construction of Roads
<b>2</b>	Non-invasive Prospecting
<b>3</b>	Invasive Prospecting: Drilling
<b>4</b>	Rehabilitation
<b>Project Life Cycle Phases Applicable</b>	
<b>1</b>	Plan & Design
<b>2</b>	Site Clearance
<b>3</b>	Operational
<b>4</b>	Closure

The scope of the properties and zone of influence of the project is limited to the property as held by Black Mountain Mine Pty (Ltd). The property scope in this regard is detailed below:

**Figure 8: Project overview - zone of influence**

<b>Project Overview - Zone of Influence</b>	
<b>Formal land use zonation</b>	Mining
<b>Current land use</b>	Mining
<b>Existing Land Users</b>	Black Mountain Mining (Pty) Ltd / Vedanta Plc
<b>Adjacent land users</b>	Farm Gams 60, Portion 4: Black Mountain Mine Farm Achab 59: Black Mountain Mine Farm Bloemhoek 61, Remaining extend: Albertus Roux Farm Kykgat 87, Portion 1: Tertius Visser Farm Bloemhoek 61, Portion 1: Black Mountain Mine Farm Aroams 57, Remaining extend: Black Mountain Mine
<b>Main stakeholder groups</b>	Adjacent landowners Local and District Municipalities Authorities: DWS, DENC, SAHRA, Land Affairs, DMR
<b>Main organised forums</b>	Farmers Union Succulent Society of South Africa (SSSA) Succulent Karoo Ecosystem Programme (SKEP) Endangered Wildlife Trust (EWT) BirdLife South Africa
<b>Significant receptors</b>	Aggeneys community & adjacent landowners
<b>Main Government commenting authorities</b>	
1	Department of Environmental Affairs
2	Department of Water Affairs
3	Department of Land Affairs
<b>Authorising and competent authorities</b>	
1	Department of Mineral Resources
2	South African Heritage Resources Association



**(i) Listed and specified activities**

Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) requires, upon request by the Minister that an Environmental Management Plan be submitted and that the applicant must notify and consult with Interested and Affected Parties (I&APs). Section 24 of the NEMA requires that activities, which may impact on the environment, must obtain an environmental authorisation from a relevant authority before commencing with the activities. Such activities are listed under Regulations Listing Notice 1 Government Notice (GN) 327 and Listing Notice 3 GN 324 (2017) of NEMA. The activities (listed and not listed) that require environmental authorisation in terms of the EIA Regulations of April 2017 are indicated in the table below.

**Table 7: Applicable Listed Activities for the Project**

<b>Listed Activities</b>	
<b>Applicable Listing Notice</b>	<b>Activity referenced in listing notice</b>
NEMA LISTING NOTICE 01 (GNR983)	<p>20. Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—</p> <p>(a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or</p> <p>(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies.</p>
NEMA LISTING NOTICE 01 (GNR983)	<p>22. The decommissioning of any activity requiring –</p> <p>(i) a closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); or</p> <p>(ii) a prospecting right, mining right, mining permit, production right or exploration right, where the throughput of the activity has reduced by 90% or more over a period of 5 years excluding where the competent authority has in writing agreed that such reduction in throughput does not constitute closure.</p> <p>but excluding the decommissioning of an activity relating to the secondary processing of a –</p> <p>(a) mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource; or</p> <p>(b) petroleum resource, including the refining of gas, beneficiation, oil or petroleum products; –</p> <p>in which case activity 31 in this Notice applies.</p>

NEMA LISTING NOTICE 01 (GNR983)	<p>27. The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>
NEMA LISTING NOTICE 03 (GNR985)	<p>12. The clearance of an area of 300 square meters or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>g. Northern Cape-</p> <p>(i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>(ii) Within critical biodiversity areas identified in bioregional plans;</p> <p>(iii) Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or</p> <p>(iv) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.</p>

## (ii) Description of the activities to be undertaken

*Describe Methodology or technology to be employed, including the type of commodity to be prospected / mined and for a linear activity, a description of the route of the activity*

The following section presents a detailed description of all the activities associated with the proposed Prospecting Application. The application is for a prospecting right for zinc and lead. It is planned to determine the mineral resource and distribution for this project by means of non-invasive as well as invasive prospecting methods.

The non-intrusive phase is expected to cover the whole area while drilling will take place according to the different prospecting areas and phases as outlined below. Timeline for exploration is a projection and completely dependent on zinc prices and budget availability for exploration activities.

**Table 8: Project Activities and life cycle**

The following activities according to the project cycle is applicable to this application	
<b>Non-invasive Prospecting</b>	Initially, prospecting activities will be non-invasive and restricted to a desktop study which will include a literature survey, plus aerial photograph and satellite image interpretation, ground validation of targets, geophysical surveys, interpretation and modelling of data.



<b>Clearing Indigenous Vegetation</b>	Concurrent search and rescue transplantation of protected species will take place.
<b>Construction of Roads</b>	Vehicles will use existing gravel roads transecting the mine as far as possible. Where roads do not exist, 4-meter-wide single-track gravel road with T turning points and in identified areas widening for vehicles to pass will be brush cut.
<b>Clearing Soils</b>	Topsoil will be cleared and stock piled for rehabilitation for the drill sites before invasive prospecting phases takes place. Soil clearance is the exception as drilling will take place without soil clearance as far as possible.
<b>Invasive Prospecting: Drilling</b>	Subsequent phases will be of the invasive type and entails the drilling of boreholes to confirm continuity of mineralisation and potential deposit size. It is not possible to give details of the drilling program (specific locations of drill holes) before the surveys and surface work phase 1 is completed. The location of the drill sites will be GPS located and pegged. These sites are inspected and photographed prior to any disturbance.
<b>Resource Use: water</b>	Supply from Pella water drift orange river pump station to Gamsberg then delivered via JoJo tanks, aqua dams and pipes or watercarts for up to 150 000 liters storage.
<b>Generation of hydrocarbon spills</b>	Strong control will be exercised over oil usage. Impervious sheeting (plastic lining) will be laid underneath the rig to catch any spills and the contaminated soil removed to an authorised disposal site. The excavation of a sump will not be required. A 3m <sup>3</sup> drill sludge containment and water recycling unit will be used. A diesel bowser will be used for rig refuelling. Spillage will be prevented as far as possible and cleaned up in the event that it occurs. Vehicle maintenance will occur off-site. Commercial oil spill kits will be kept at each site to be used in the event of any spillages.
<b>Generation of Dust</b>	The main source of air pollution in the area is dust generated on access roads.
<b>Disturbance: Noise</b>	Noise produced by current operations is limited to noise emanating from the mining activities and traffic noise. The effect of this industrial noise on any dwelling place in the region, is negligible.
<b>Rehabilitation</b>	Decommissioning will take place concurrently, as each drill site is closed. Concurrent rehabilitation will take place with direct transplantation of plant specimens to already impacted areas.
<b>Monitoring</b>	It is proposed that aerial photos (drone footage) at 5, 10 and 15 meters above the drill site be taken as fixed photo monitoring before, during and after rehabilitation. Three years of post-rehabilitation monitoring is required before final sign off can be considered.

### e) Policy and Legislative Context

The applicable policy and legislation context are indicated in the table below.

**Table 9: Policy and Legislative Context**

Policy & Legislative Context		
Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the legislation and policy context
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002, as amended) (MPRDA)	Application for amendment of section 102 mining right	Amendment application has been submitted to the DMR by the Applicant. The application was accepted by the DMR and draft BAR compiled for submission and approval.
National Environmental Management Act, 1998 (Act No. 107 of 1998)	The Basic Assessment Report and Environmental Management Programme for Environmental authorizations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) in respect of listed activities that have been triggered by applications in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002, as amended) (MPRDA)	An Application for Environmental Authorisation was submitted to the DMR. The application was accepted by the DMR and requested the submission of the Basic BAR and EMP within 90 days of the letter.  The Basic Assessment Report, Environmental Management Programme and the Stakeholder Consultation Process has been conducted with consideration of the EIA regulations.
National Water Act, 1998 (Act No. 36 of 1998)	No groundwater will be abstracted for prospecting activities.	Black Mountain Mine has an existing water use license. Licence number 14/D82C/ABCGIJ/2654 issued on 2016/04/14
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)	Presence of nationally protected trees and other flora	The EMP will regulate the applicant to apply for Tree Removal Permit from the DAFF and a Flora Permit from DENC prior to the potential removal of any sensitive and/or protected species.
National Environmental Management Act - Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations GNR1147, 2015	Financial provision, rehabilitation and closure	Financial provision and rehabilitation mitigation and monitoring requires is presented in line with the requirements of the regulations.
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	The activity may trigger the requirements under Section 38 of the NHRA. However, the requirements for permits are not known at this stage.	The South African Heritage Resources Agency (SAHRA) was contacted as part of the stakeholder engagement process.

**f) Need and desirability of the proposed activities**

*Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location*

The need for the project is primarily to secure an extension of the Black Mountain Complex life of mine, to ensure that all possible mineral resources in the area has been sourced and utilized for Gamsberg and the socio economic development and employment of local people.

**g) Motivation for the overall preferred site, activities and technology alternative**

The proposed prospecting area is targeted due to existing and historical mining activities that are known from within the Gamsberg inselberg and it is anticipated that similar conditions will prevail for this project.

The aim for the project is to ensure the long-term viability of the company. The economic desirability of whether or not this is the most suitable area for prospecting can only be confirmed after initial non-intrusive geological surveys. No alternative other than drilling is possible to determine the presence and quality of the specific minerals in the area.

**h) Full description of the process followed to reach the proposed preferred alternatives within the site**

*NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout*

The “no go” alternative were raised by interested and affected parties. Please refer to the detailed stakeholder engagement process appended to this submission. The evaluation of alternatives for the project was conducted on 25 April 2018 by BMM personnel and independent specialist as detailed below.

**Table 10: Alternative Assessment Team**

<b>Present</b>	<b>Company</b>	<b>Details</b>
Mark Botha	CSIT	mark@ecological.co.za
Dr Phil Desmet	EcosolGIS	drphil@ecosolgis.com
Chrizzette Neethling	EndemicVision	cdn@endemicvision.co.za
Alan Johnson	BMM	AJohnson@vedantaresources.co.za
Westley Price	BMM	WPrice@vedantaresources.co.za
Susan Oswald	BMM	SOswald@vedantaresources.co.za

**i. Details of the development footprint alternatives considered**

With reference to the site plan provided as Appendix C and the location of the individual activities on site, provide details of the alternatives considered with respect to:

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

**Table 11: Alternatives considered**

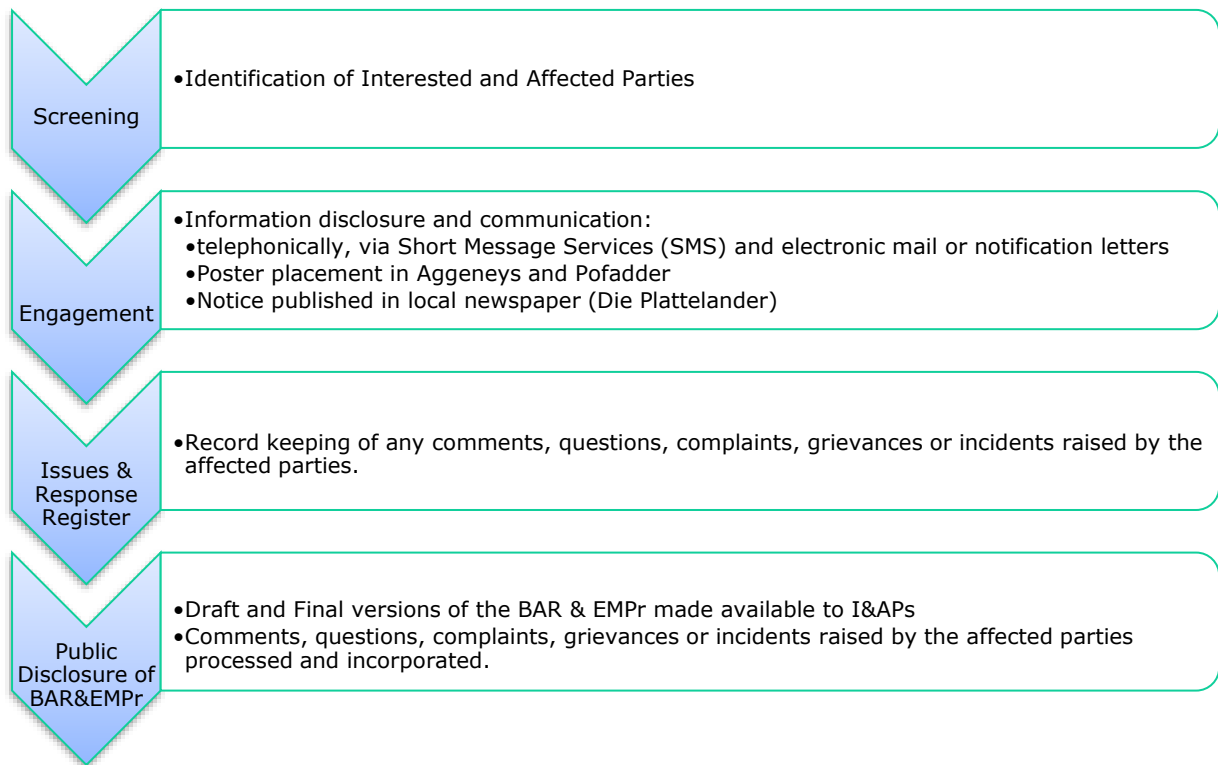
<b>Evaluation Criteria</b>	<b>sumps</b>	<b>drill pads</b>	<b>roads</b>	<b>laydown areas</b>	<b>water supply</b>
<b>Description of infrastructure</b>	Drill sludge containment and water recycling unit (1m <sup>3</sup> )	225m <sup>2</sup> level area	4 meter wide single track gravel road not bulldozed with T turning points where existing take-off roads are and in identified areas widening for vehicles to pass	550m <sup>2</sup> footprint for two laydown areas in non-critical habitats only	Supply from Pella water drift orange river pump station to Gamsberg then delivered via JoJo tanks, aqua dams and pipes or watercarts for up to 150 000 liters storage
<b>(a) the property on which, or location where, it is proposed to undertake the activity;</b>	n/a	Alternative locations considered: Old drill sites will be used wherever possible Old roads will be used as drill pads	Use of existing roads and creating new roads. 90% of all roads will be existing roads	Use of existing previously impacted areas and creating new laydown areas. 90% of all laydown areas will be existing impacted areas.	Use of existing roads instead of creating new roads.
<b>(b) the type of activity to be undertaken;</b>	n/a	n/a	Driving or flying. Flying is not financially feasible.	n/a	n/a
<b>(c) the design or layout of the activity;</b>	Excavated sumps vs above ground sumps. Above ground sumps will be used. Concurrent sludge drying and removal, wet sludge immediate removal or sludge left till rehab. Concurrent sludge removal will be used	Multiple boreholes per drill pad vs single borehole per drill pad. Multiple fan drills from one drill pad will be used.	Instead of building roads as the crow flies to the drill sites roads are constructed to avoid sensitive biodiversity areas Utilize CAS system to track, monitor, limit and report on vehicle movement including geo-fencing of no-go areas	Existing previously impacted area	Consider aquadam VS jo jo tanks VS water pipeline to drill sites

<p><b>(d) the technology to be used in the activity;</b></p>	<p>Hydrocarbon management. Environmental friendly solvents used. In-situ hydrocarbon bacteria inoculation</p>	<p>Tracked drill rigs instead of trackless drill rigs. New technology drill rigs (smaller) instead of standard drill rigs (larger). Utilization of advanced directional and wedge drilling techniques to drill several holes per site instead of moving the rig slightly of the previous hole. SQUID geophysics for more focused drilling. Use scaffolding for drilling using a mesh instead of solid cover. Metal frames for equipment storage.</p>	<p>Brush cutting and driving single track instead of bulldozing tracks.</p>	<p>Use scaffolding to store materials</p>	<p>Standard acceptable technology will be used.</p>
<p><b>(e) the operational aspects of the activity; and</b></p>	<p>Concurrent removal of sludge instead of removal post drilling. Consider pipeline removal of sludge</p>	<p>Drilling and concurrent rehab instead of drilling and post drilling rehab. Night and day drilling instead of just day drilling to minimise amount of equipment and people on site at any given time</p>	<p>Standard acceptable operating procedures will be applied.</p>	<p>Standard acceptable operating procedures will be applied.</p>	<p>Standard acceptable operating procedures will be applied.</p>
<p><b>(f) The option of not implementing the activity</b></p>	<p>The no-go options applicable is the no-go biodiversity and heritage areas for any new roads or drill sites. Any new drill sites are considered no go unless a biodiversity offset is secured according to the Biodiversity offset report.</p>				

**ii. Details of the Public Participation Process Followed**

.....  
*Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land)*  
 .....

The diagram below sets out the approach for the engagement process for the proposed project. The detailed stakeholder engagement report is attached as Appendix E of this report.



**Figure 9: Public Participation Approach**

### iii. Summary of issues raised by I&As

..... Complete the table summarising comments and issues raised, and reaction to those responses .....

Comments and issues received from Interested and Affected Parties are provided in the table below.

**Table 12: Issues Raised by Stakeholders**

Interested and Affected Parties	Date Comments Received	Date of response	Issue	Issues raised	Consultation Status	Response to issues as mandated by the applicant
Tania Anderson	2017/08/21	2017/08/22	Loss of species	Threatened plant species loss and biodiversity loss.	Continuous as project develops	Concerns addressed and process explained.
Tania Anderson	2017/08/21	2017/08/22	Loss of biodiversity	Should prospecting lead to mining, the loss of biodiversity in the region will impact on the socio-economic conditions of the next generation.	Continuous as project develops	Concerns addressed and process explained.
Tania Anderson	2017/08/21	2017/08/22	Biodiversity Offset	Information about the Biodiversity offset agreement for Gamsberg and whether it has been implemented yet.	Continuous as project develops	Concerns addressed and process explained.
BirdLife South Africa	2017/08/21	2017/08/22	Information	Request for Background Information and draft reports	Completed	Background Information Document and process sent
BirdLife South Africa	2017/08/21	2017/08/22	I&AP registration	Request to be registered as an interested or affected party	Completed	Background Information Document and process sent
Endangered Wildlife Trust	2017/10/09	2017/10/09	I&AP registration	Request to be registered as an interested or affected party	Completed	Background Information Document and process sent
Andrew Young	2017/10/27	2017/10/27	I&AP registration	Request to be registered as an interested or affected party	Completed	Background Information Document and process sent
SAHRA	2017/11/02	2018/05/16	Heritage	The SAHRA Archaeological, Palaeontological and Meteorites (APM) Unit cannot provide further comments without the HIA conducted for the development.	Continuous as project develops	HIA Submitted
SAHRA	2017/11/02	2018/05/16	Palaeontological	The submitted PIA does not assess the impact to palaeontological resources within the current proposed development area. An HIA and PIA relevant to the proposed development must be uploaded to the SAHRIS Case application for comment. Further comments will be issued upon receipt of the above.	Continuous as project develops	HIA Submitted

BirdLife South Africa	2018/11/02	2018/06/01	Biodiversity Offset	Page 47 and page 60 of the Basic Assessment report refer to the required mitigation measures to manage the impacts on the plants, habitats and vegetation and obligations for monitoring and conservation. They included the completion of the biodiversity offset calculations to offset the biodiversity loss and the implementation a biodiversity offset programme. These measures need to be finalised before this application for amendment of the approved EMP is granted. It was a condition of the EA granted for the existing mining right area that all mitigating measures are implemented, including the biodiversity offsets. A failure to implement these measures would constitute non-compliance	Continuous as project develops	Concerns addressed
BirdLife South Africa	2018/11/02	2018/06/01	Biodiversity Offset	Page 66 section n) of the BAR mentions that a gap in this study is that the final biodiversity offset study is not yet available. There is also no reference to the biodiversity offset and its implementation plan and timeframes in the EMP. The offset must be implemented to reduce residual impacts. This is a major gap that is unacceptable and an EA should not be granted without an agreed offset and its inclusion in the EMP	Continuous as project develops	Concerns addressed
BirdLife South Africa	2018/11/02	2018/06/01	Biodiversity Offset	We are aware of the draft Biodiversity Offset report of April 2013 and have knowledge of the Biodiversity Offset agreement between BMM and DENC signed in 2014. We are of the opinion that there is a lack of transparency in this process if the biodiversity offset agreement is not added as an appendix and referred to for implementation in the EMP	Continuous as project develops	Concerns addressed, documents sent
BirdLife South Africa	2018/11/02	2018/06/01	Biodiversity Offset	The BAR (page 66) says that the current mining footprint has been offset to compensate for loss of biodiversity. There needs to be evidence of this appended, such as an audit report, and reference to how it fulfils some of the requirements of the biodiversity offset agreement	Continuous as project develops	Concerns addressed, documents sent
BirdLife South Africa	2018/11/02	2018/06/01	CBA	We are aware that the Biodiversity Offset Agreement included that approx. 13000 ha of land (including Bushmanland Inselberg Shrubland and Aggeneys Gravel Vygieveld which are affected biodiversity no go zones) that must be secured by BMM and declared a Nature Reserve or Protected Environment under the Protected Areas Act, with ongoing management by a management authority. How far has this obligation proceeded? Securing and declaring these CBAs protected should be implemented before the EA for prospecting is granted	Continuous as project develops	Concerns addressed
BirdLife South Africa	2018/11/02	2018/06/01	habitat loss	The Aggeneys area is noted as one of the most important global core areas for the endemic and Vulnerable Red Lark <i>Calendulauda burra</i> . As a species only found in NC, SA, any impact (direct or indirect) on the core global habitat of this species should be avoided and/or carefully quantitated. As part of	Continuous as project develops	Concerns addressed



				a Red Lark study implemented by BirdLife South Africa, results reveal red dune habitat, i.e. the preferred habitat type of this species, occurring marginally within extensively throughout the adjacent proposed development area. Both direct, i.e. habitat loss, degradation and fragmentation, as well as indirect impacts, i.e. displacement through noise and dust pollution, need to be fully considered.		
BirdLife South Africa	2018/11/02	2018/06/01	Red Lark	Page 60 indicated a monitoring and conservation obligation to monitor Red Lark populations in the area. Has this obligation been implemented? If so do results corroborate the findings of our study suggesting that Red Lark habitat is marginally present within the proposed development area and extensively present surrounding the proposed development area? The obligated monitoring project should be providing quantified context as to the Red Lark population occurring in the surrounding area and potential impact thereon through proposed prospecting activities.	Continuous as project develops	Concerns addressed, documents sent
BirdLife South Africa	2018/11/02	2018/06/01	avifauna	Other threatened avian species recorded (BirdLife South Africa database) within or adjacent to the respective are include Endangered Martial Eagle, Vulnerable Verreaux's Eagle, Endangered Ludwig's Bustard and Near Threatened Maccao Duck. Non-threatened species that are endemic and/or listed as important Bird and Biodiversity Area's trigger species include Black-eared Sparrow-Lark, Burchell's Sandgrouse and Stark's Lark, amongst others. The Aggeneys are is known to host a range of threatened and non-threatened significantly range-restricted endemic avian species. Page 60 indicates that a gap in the regional faunal species data should be conducted. Was this obligatory requirement completed? If so, where are the avifaunal results and how have they influenced the proposed amendment of the approved EMP?	Continuous as project develops	Concerns addressed
BirdLife South Africa	2018/11/02	2018/06/01	Monitoring compliance	Until obligatory conservation and monitoring requirements as stated in be BAR page 60 are completed and available for perusal, environmental authorisation for further amendments should not be granted in light of this non-compliance to obligatory monitoring requirements	Continuous as project develops	Concerns addressed, documents sent
Department of Environmental Affairs	2017/11/10	2018/06/01	Functional Corridor	Maintain functional corridor width by ensuring that no other development occur within a 5km buffer around the mine impact area	Continuous as project develops	Concerns addressed
Department of Environmental Affairs	2017/11/10	2018/06/01	Biodiversity Offset	a Biodiversity specialist must be appointed to develop a diversity offset and a spatial design of biodiversity offsets.	Continuous as project develops	Concerns addressed
Department of Environmental Affairs	2017/11/10	2018/06/01	Rehabilitated	Vegetation removal must be minimized to smallest possible footprint and damage area should be rehabilitated with assistance of a qualified vegetation rehabilitation specialist.	Continuous as project develops	Concerns addressed

Department of Environmental Affairs		2018/06/01	Biodiversity Loss	All areas with habitat rich and high concentration of fauna and flora should be avoided	Continuous as project develops	Concerns addressed
Department of Environmental Affairs	2017/11/10	2018/06/01	Conservation	Pre-construction walk-through of the facility in order to locate species of conservation concern that can be trans located must be undertaken, provincial and DAFF permit conditions must also be complied with.	Continuous as project develops	Concerns addressed
Department of Environmental Affairs	2017/11/10	2018/06/01	Search and Rescue	Search and rescue operation of all listed species suitable for translocation within the development footprint that cannot be avoided should be conducted. Effected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitor purposes.	Continuous as project develops	Concerns addressed
Department of Environmental Affairs	2017/11/10	2018/06/01	Plant rescue and Protection plan	The plant rescue and protection plan must be compiled by the ecological specialist and implemented.	Continuous as project develops	Concerns addressed, documents sent
Department of Environmental Affairs	2017/11/10	2018/06/01	Fauna and flora	Recommendations stipulated within the fauna and flora impacts specialists' reports are supported and must be adhered during construction and operational phases.	Continuous as project develops	Concerns addressed
Department of Environmental Affairs	2017/11/10	2018/06/01	Loss of habitat	Recommendations outlined must be Implemented and included in the environmental authorisations.	Continuous as project develops	Concerns addressed
Department of Environmental Affairs	2017/11/10	2018/06/01	Alien plant services	Recommendations outlined must be Implemented and included in the environmental authorisations.	Continuous as project develops	Concerns addressed
Andrew Young	2017/11/16	2017/11/16	Information	Request for documents submitted by Vedanta for their Application for Amendment of the Approved Environmental Management Programme in Respect of the Portion 1 of Farm Gams 60, Namaqualand, Northern Cape	Completed	Information and documents sent
Andrew Young	2017/11/16	2017/11/16	Information	Also Request for The Basic Assessment Report and Environmental Management Plan for Gamsberg East & South Prospecting.	Completed	Information and documents sent
Andrew Young	2017/11/20	2018/06/01	Biodiversity Offset	There are no details provided for the calculations for the biodiversity offset proposed and subsequent implementation plans. These are critical elements and need to be put into place and objectively considered before any approval is given.	Continuous as project develops	Concerns addressed
Andrew Young	2017/11/20	2018/06/01	Biodiversity Mitigation	Has all the biodiversity mitigating measures been put in place for the existing mining area and how effective have these been? Have these been critically assessed (e.g., are annual independent reports available)? This MUST be reviewed and the measures shown to be effective before any further approvals are given.	Continuous as project develops	Concerns addressed, documents sent
Andrew Young	2017/11/20	2018/06/01	Quartz gravel patches	The quartz gravel patches in the area concerned by this Amendment are home to the dwarf succulent <i>Conophytum ratum</i> . This is an important consideration as this species is only found in	Continuous as project develops	Concerns addressed

				in substantial quantities on this part of the Gamsberg. Moreover, recent fieldwork has established that outlying populations are small and scattered and unlikely in themselves to be viable. Powell (2016) showed that the low-lying plants (on the quartz plains extending east to Achab-se berg) were in fact maintained by the plants on the Gamsberg plateau (via seed dispersal along drainage lines). This species can therefore be considered to be endemic to the eastern end of the Gamsberg plateau and therefore at considerable risk from the proposals. What specific measures are planned to protect this rare and endangered plant species?		
Andrew Young	2017/11/20	2018/06/01	Genetic diversity	A recent study (Powell, 2016) has shown that the genetic diversity of <i>C. ratum</i> was highest amongst plants located on the Gamsberg plateau than amongst those plants found around the base. The plants on the plateau are physically smaller than those below –in habitat and retain this feature in cultivation. What specific measures are to be undertaken to protect the genetic diversity of this species?	Continuous as project develops	Concerns addressed
Andrew Young	2017/11/20	2018/06/01	Dust	The current emphasis concerns the effect on human activities yet smothering of low-lying (windowed) plant species (e.g., <i>Lithops</i> and <i>Conophytum</i> ) by dust may be considerable. What are the likely consequences of the dust produced on the floral communities and what measures are to be taken to minimise these effects?	Continuous as project develops	Concerns addressed
Andrew Young	2017/11/20	2018/06/01	Rescue success rate	Rescue and transplantation measures are mentioned with respect to floral diversity (e.g., pages 23 & 47) but no evidence is given regarding the effectiveness of such measures for the species concerned. Dwarf succulents such as <i>Conophytum</i> and <i>Lithops</i> are notoriously challenging in this regard as they show high specificity for niche environments. This is a major concern. What are the survival rates for rescued plant species from the existing mining area, both under cultivated conditions and when subsequently transplanted to alternative field sites? The current approach and methodologies need to be shown to be effective before any further approvals are made.	Continuous as project develops	Concerns addressed, documents sent
Andrew Young	2017/11/20	2018/06/01	Search and Rescue	There are great concerns over the ability to rehabilitate much of the site following the proposed activity, especially for those plant species which are habitat specialists. Where are the sites identified for plant transplantation following rescue and what is the basis for their selection? A detailed plan is needed to cover all the niche environmental preferences of the different plant species involved.	Client response under development	Concerns addressed, documents sent

Andrew Young	2017/11/20	2018/06/01	Stockpiling of plants	What specific conditions are in place to permit 'stockpiling' of plants for use in rehabilitation (page 77)? How effective was this approach for the existing mining area?	Continuous as project develops	Concerns addressed, documents sent
Endangered wildlife trust	2018/11/23		Biodiversity Offset	Black Mountain Mining (Black Mountain Complex) agreed, through the signing of the Biodiversity Offset Agreement, to the protection of the biodiversity and ecological functioning of the no-go areas on the Gamsberg inselberg. It is disappointing to note that they now propose to prospect in these areas. These prospecting activities are expected to have a significant residual impact on the biodiversity of the area, particularly the activities in Gams North and Far East. We strongly recommend that an offset calculation and offset feasibility assessment be conducted prior to the issuing of an Environmental Authorisation (EA). Should the offset assessment find that the residual impact can be offset then we would recommend that the EA require the proponent to offset their residual biodiversity impact. However, should the assessment find that the residual biodiversity impact is not "offsetable" then we would urge that the authorisation for the proposed activity not be granted.	Continuous as project develops	Concerns addressed
Endangered wildlife trust	2018/11/23	2018/06/01	Management and Reporting	We believe that evidence of the proponent's ability to effectively manage and report on environmental and biodiversity issues at current and past prospecting sites is required. This will argue for or against their ability to effectively manage the risk at the future proposed prospecting sites. We recommend that the BAR be updated to include an assessment of the proponent's ability to effectively manage environmental and biodiversity on site as a risk for this proposed project.	Continuous as project develops	Concerns addressed, documents sent
Endangered wildlife trust	2018/11/23	2018/06/01	Mitigation measures.	Pgs. 51 – 64 of the BAR refer Section (i) Assessment of each identified potentially significant impact and risk; and (k) Environmental Impact Statement, Tables 17, 18, 20 and 21. All of the impacts that were predicted to be of high significance in Tables 17 and 18 were reduced in significance in Tables 20 and 21. We believe that this is a very optimistic assessment of the degree to which these impacts can be reduced in significance and would suggest that a more conservative approach be adopted. For example, it is unlikely that a high significance impact of the loss of habitats from the clearing of indigenous vegetation (Table 18) can be reduced to negligible (Table 21) through the implementation of the recommended mitigation measures	Continuous as project develops	Concerns addressed
Endangered wildlife trust	2018/11/23	2018/06/01	EAP Opinion	Pg. 67 of the BAR refers Section (o) Reasoned opinion as to whether the proposed activity should or should not be authorised i) Reasons why the activity should be authorized or not · The Environmental Assessment Practitioner (EAP) has not provided their opinion on whether the proposed activity should or should not be authorised. We request that the EAP provide their opinion	Continuous as project develops	Concerns addressed

				on this matter.		
Endangered wildlife trust	2018/11/23	2018/06/01	Biodiversity Offset	ii) Conditions that must be included in the authorisation · Due to the significance of the biodiversity that will be impacted on by the proposed prospecting activities, particularly those in Gams North and Far East, we strongly recommend that the proponent be required to offset their residual biodiversity impact from these proposed activities.	Continuous as project develops	Concerns addressed
Endangered wildlife trust	2018/11/23	2018/06/01	Biodiversity Mitigation	ii) Conditions that must be included in the authorisation: The level of significance of the anticipated biodiversity related impacts, as assessed by the EAP, decreased significantly with the implementation of the recommended mitigation measures. This was done on the understanding that the proponent would implement the recommended mitigation measures. Therefore, we recommend that all the biodiversity related mitigation measures (including those for the management of water quality and quantity, and rehabilitation) proposed by the EAP in the BAR be included in the environmental authorisation to ensure that the proponent mitigates these impacts such that their significance is reduced.	Continuous as project develops	Concerns addressed
German society for "other" succulents Jörg Ettelt	2018/02/01	2018/02/05	I&AP registration	Request for Background Information and draft reports	Completed	Background Information Document and process sent

## 1. Baseline Environment

### a) Type of environment affected by the proposed activity

.....  
*Its current geographical, physical, biological, socio-economic, and cultural character*  
 .....

#### Regional Context

##### ***Climatic Context***

The Gamsberg study area falls within the NW region of Bushmanland. This area is marginal to the winter and summer rainfall zones in the NW Cape Province. Namaqualand to the west is a winter rainfall area where Gordonia to the east is a summer rainfall area. Gamsberg gets more rain in the summer months but gets very little rainfall overall, resulting in desert condition. Extended droughts are common in the area. Some parts of Bushmanland did not have any rain for a period of 10 years. Rainfall data are collected in Pofadder, approximately 60 km East of Gamsberg, which receives more summer rain and thunderstorms. The average rainfall from 1933 to 1984 was 105 mm with 278 mm being the highest recorded for one year. Moisture from cold fronts in the winter is captured on the southern side of the inselberg.

The temperatures in the Gamsberg area range between -2°C and 45°C, with the mean maximum temperature being 31.4°C in the summer and 17.6°C in the winter and the mean minimum temperature being 20.2°C in the summer and 10.8°C in the winter.

In the summer months, the prevailing wind direction is southerly and in the winter the direction is northerly. A north-westerly wind direction, which precedes rain in the summer months, is least common in the area. Wind velocities of up to 110 km/hr have been recorded (Gamsberg Zinc Project EIA & EMP Amendment, 2008).

##### ***Topography and Geology***

Gamsberg is an oval shaped inselberg about 5km wide and 7km long. Its elevation is approximately 220m above ground level and 1150m above mean sea level. The basin in the interior is about 65 m below the rim and drains through a ravine on the eastern side.

Incompetent schists and amphibolites of the Nousses mafic gneiss formation occur on the floor of the basin which Pella Quartzites form the vertical cliffs, flat top and exterior sides of the inselberg. The mineralized layer which hosts sulphides of iron, zinc and lead with a diagnostic capping of gossan striking along a length of 5.3 km along the inner periphery of the basin are contained by the B member of the Gams formation.

##### ***Soils, Land Capability and Land Use***

The soils of the inselberg are mainly shallow and stony and of the Mispah soil form on the top and slopes of the Mispah, Augrabies and Plooyberg soil forms in the basin. The land capability is indicated as "wilderness" due to the shallow soil and rock in the area according to the Chamber of Mines guidelines. This area has not been used for agriculture and is rather left wild due to the hostile topography.

##### ***Vegetation Context***

The project falls within the Nama Karoo Biome which is a large, landlocked region within the central plateau of the western half of South Africa, extending into south-eastern Namibia.

The Nama Karoo Biome predominately consists of extensive plains dominated by dwarf shrubs mixed with grasses, succulents, geophytes and annual forbs. Due to unpredictable rainfall seasonality and frequency and low winter temperatures, leaf succulents are not able to dominate the area. Dominance of perennial grasses are prevented by very dry summer months and dominance of trees are prevented by shallow soils in the area.

The project area falls within SKr 18 Bushmanland Inselberg Shrubland, SKr 19 Aggeney's Gravel Vygieveld and washes (Appendix D3). The Bushmanland lies between the Orange River in the north, Namaqualand in the west, Loeriesfontein in

the south and Van Wyksvlei, Verneukpan and the Hartbees River in the east. It is dominated by a sea of sandy plains out of which rise steep, quartzite-capped hills. These ancient, rocky outcrops are known as inselbergs.

On the gravel plains and within the grasslands there are gravel patches with unique micro flora, including species such as *Lithops*, *Conophytum*, *Titanopsis*, *Lapidaria*, *Dinteranthus* and *Avonia*. But it is the flat-topped inselbergs that are covered by a particularly rich variety of succulents and geophytes. The isolation of populations has led to species diversification within the dwarf succulent shrub lands. The inselbergs are thus important refuge for plants and animals and act as stepping-stones for rock loving species migrating east - west across the sand covered plains of Bushmanland.

Succulents (*Aizoaceae*, *Asphodelaceae*, *Crassulaceae*, *Didiereaceae*, *Euphorbiaceae* and *Zygophyllaceae*), nonsucculents (mainly *Asteraceae*) and sparse grassy undergrowth (*Aristida*, *Eragrostis* and *Stipagrostis*) are found on the steep slopes of the inselbergs.

More detailed mapping was undertaken by Desmet (Appendix D3) of fine-grained quartz-patch habitat in result of the proposed exploration which appears to be linked to the presence of a geological anomaly within the quartzite bedrock rock indicating a possible contact zone manifested in a higher degree of fracturing in the parent material. This anomaly resulted in the high density of small quartz pebbles that defines the habitat.

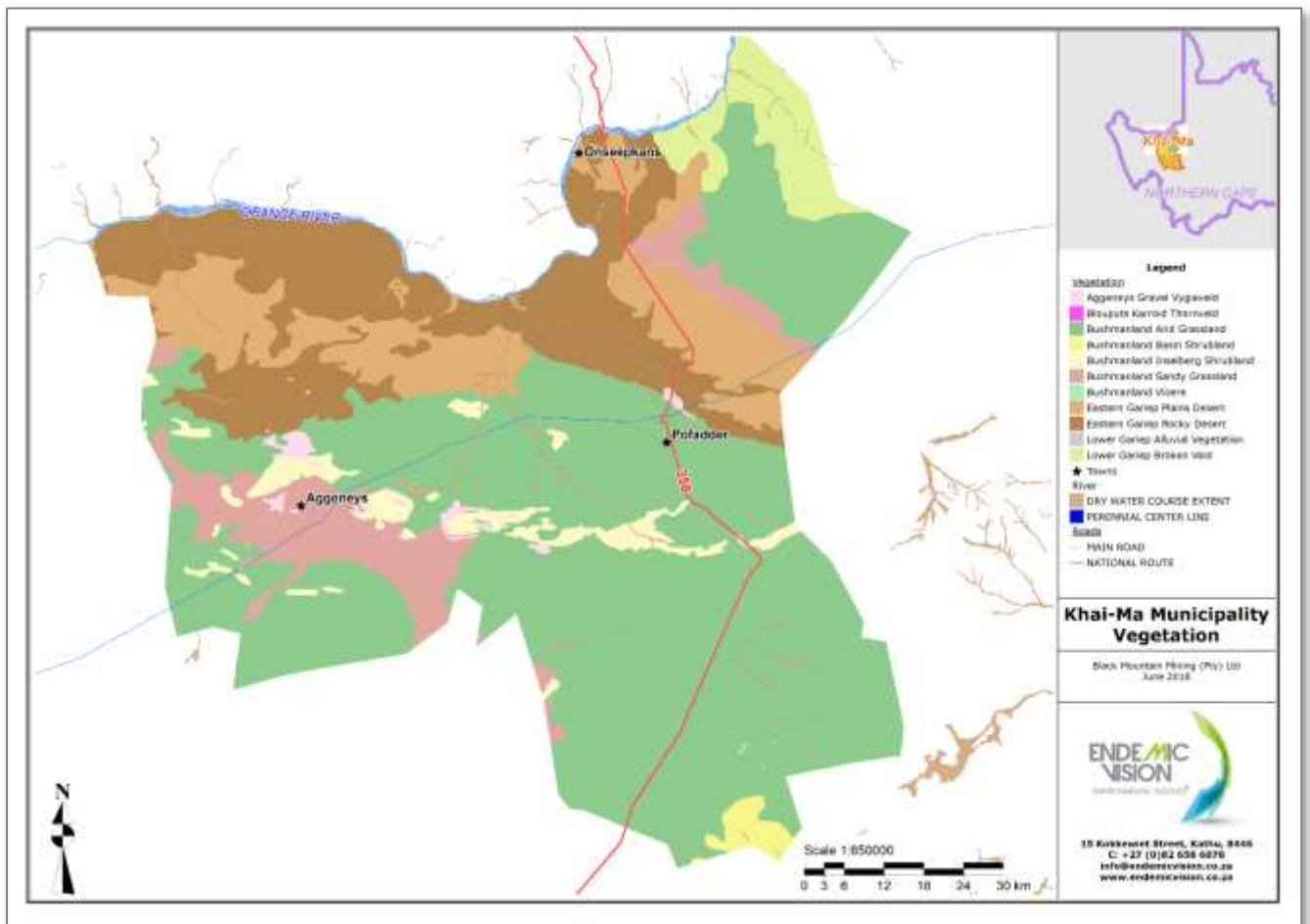


Figure 10: Vegetation: Topographical Map in municipal context

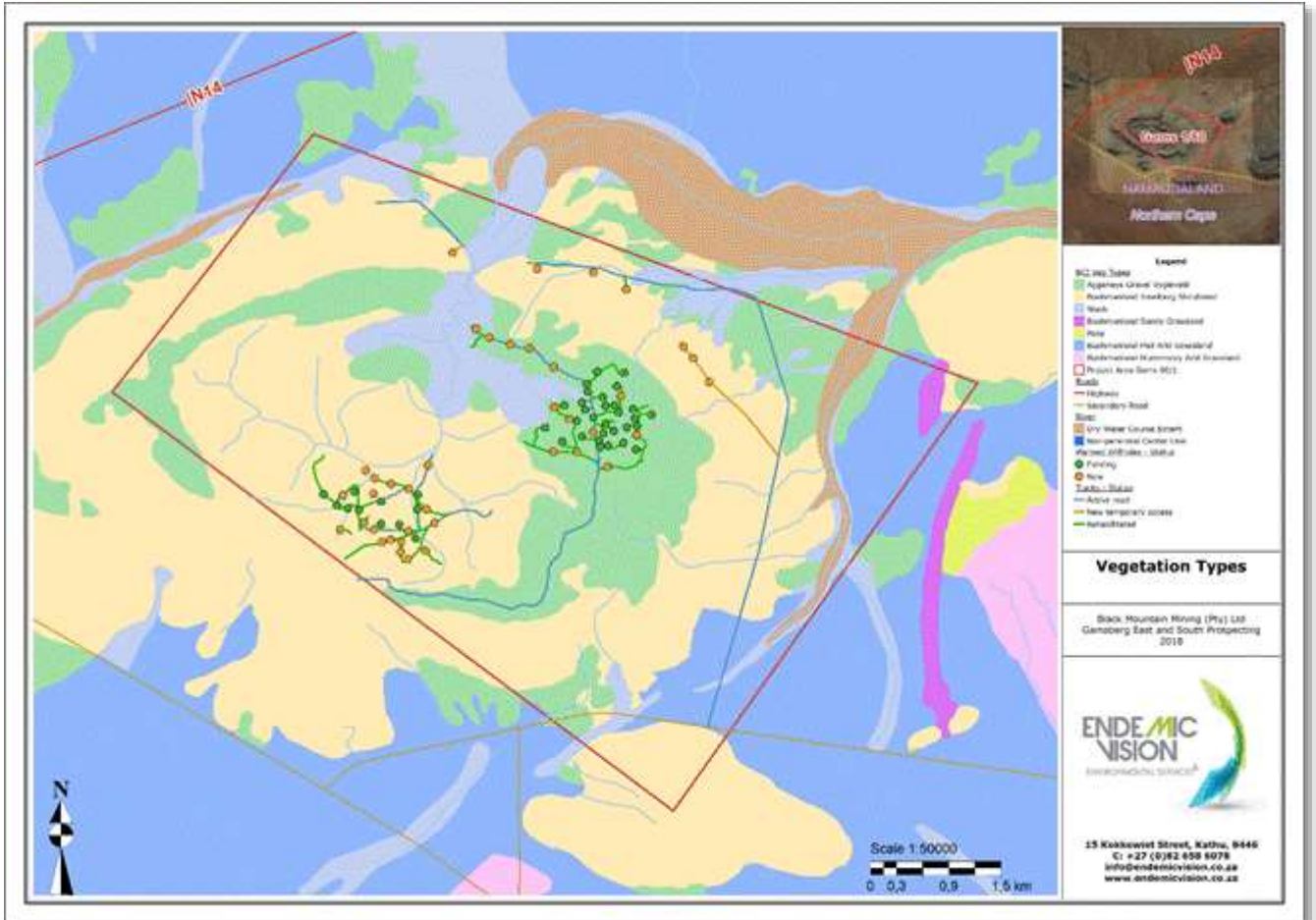
The study area is in a unique position as a considerable amount of botanical work has previously been done in the study area and regionally. The previous EIA and the Bushmanland Conservation Initiative (BCI) generated amongst other products that are available to this project (Referenced in Appendix D3):

- A regional context study quantifying the floristic relationships in the region (Desmet, 2000);



- Regions of Floristic Endemism in Southern Africa (van Wyk, A. and Smith, G. 2001);
- The succulents of Northern Bushmanland: their distribution and implications for conservation (Desmet 2000);
- A fine-scale vegetation map of the whole Bushmanland Inselberg Region(BIR) mapping habitat features found on the Gamsberg at a regional scale (Desmet *et al.*, 2005)
- Floral specialist study (Desmet, 2010).

**Site specific Context**



**Figure 11: Fine Scale Biodiversity Areas Map for Gamsberg (BCI)**



**Figure 12: Avonia papyracea found in the project area**





Figure 13: *Aloidendron dichotoma* stands in good condition - Gamsberg South project area



Figure 14: *Conophytum ratum* - specialist stone succulent (photo by P. Desmet)

#### **Fauna Context**

Gamsberg does not support a unique reptile or mammalian fauna. A unique ecosystem is however supported by the drainage through the ravine. The Rubber Frog (*Phrynomantis annectens*), Springbok Stream Frog (*Strongylpus springbokensis*) and Paradise Toad (*Bufo robinsoni*) requires spatial protection. Threatened raptor species may also nest on the mountain which will result in these sites to also be protected. Threatened raptor species include the Martial Eagle (*Polemaetus bellicosus*) and Lanner Falcon (*Falco biarmicus*)

#### **Hydrology**

The depths of groundwater range from 100m below surface on the inselberg to 60m below surface on the plains. This results in the flow being towards the plains since the inselberg has a higher water table than the surrounding plains. A number of springs are found at the base of the inselberg. The groundwater is a sodium chloride type with high levels of Fluoride F. The water from the springs are only used by the wildlife in the area.

The rainfall patterns, driving the hydrological cycles, indicate a relatively low rainfall of between 100mm and 200mm per year. The rainfall events are erratic and annual rainfall seldom results in river systems flowing. Extreme rain

events or a good rainfall year with sufficient follow-up rain could result in the Aggeneys berge catchment flowing out towards the lower lying plains.

Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA.

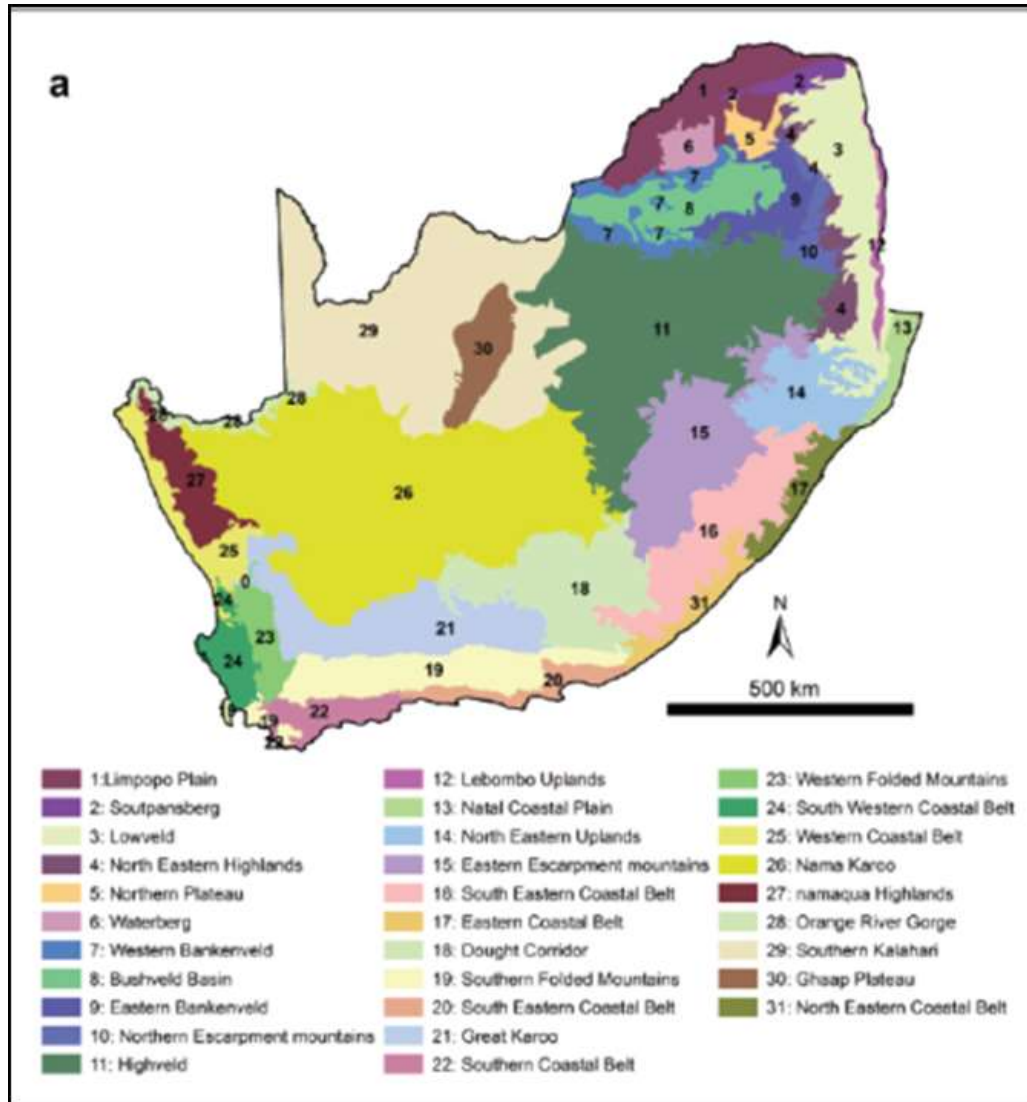


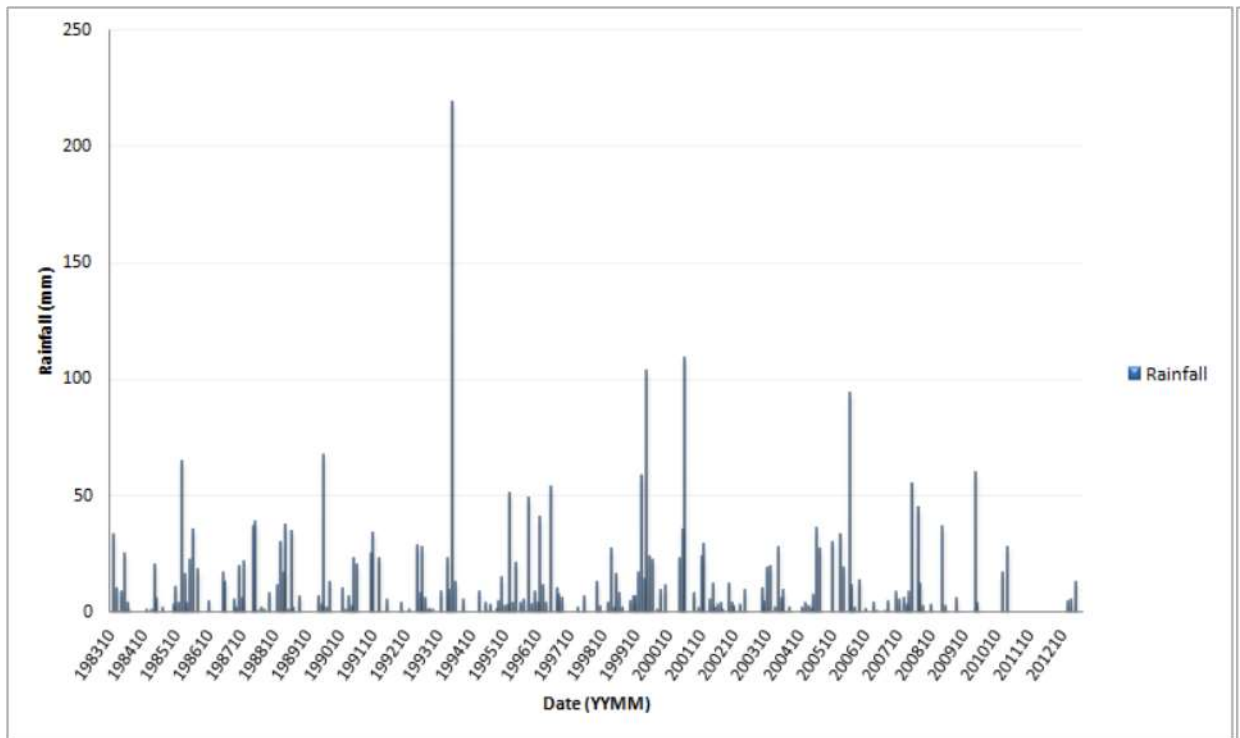
Figure 15: National Freshwater Priority Areas

In terms of surface hydrology categories by the Department of Water and Sanitation South Africa is divided into a number of drainage regions.

**Table 13: Water Balance for the Pella Meteorological Station**

Month	Precipitation (mm)	Evaporation (mm)	Difference (mm)
January	6.2	550.5	-544.3
February	18.1	452.4	-434.3
March	21.6	418.6	-397
April	18.6	300.0	-281.4
May	4.5	206.4	-201.9
June	2.9	148.0	-145.1
July	3.7	166.8	-163.1
August	2.8	224.7	-221.9
September	4.2	302.3	-298.1
October	5.7	408.9	-403.2
November	7.9	467.1	-459.2
December	10.1	534.0	-523.9
Mean annual	106.5	4271.0	-4164.5

The data showed in the table above clearly displays the evaporation exceeding the precipitation values for every month of the year.



**Figure 16: Time Series Rainfall**

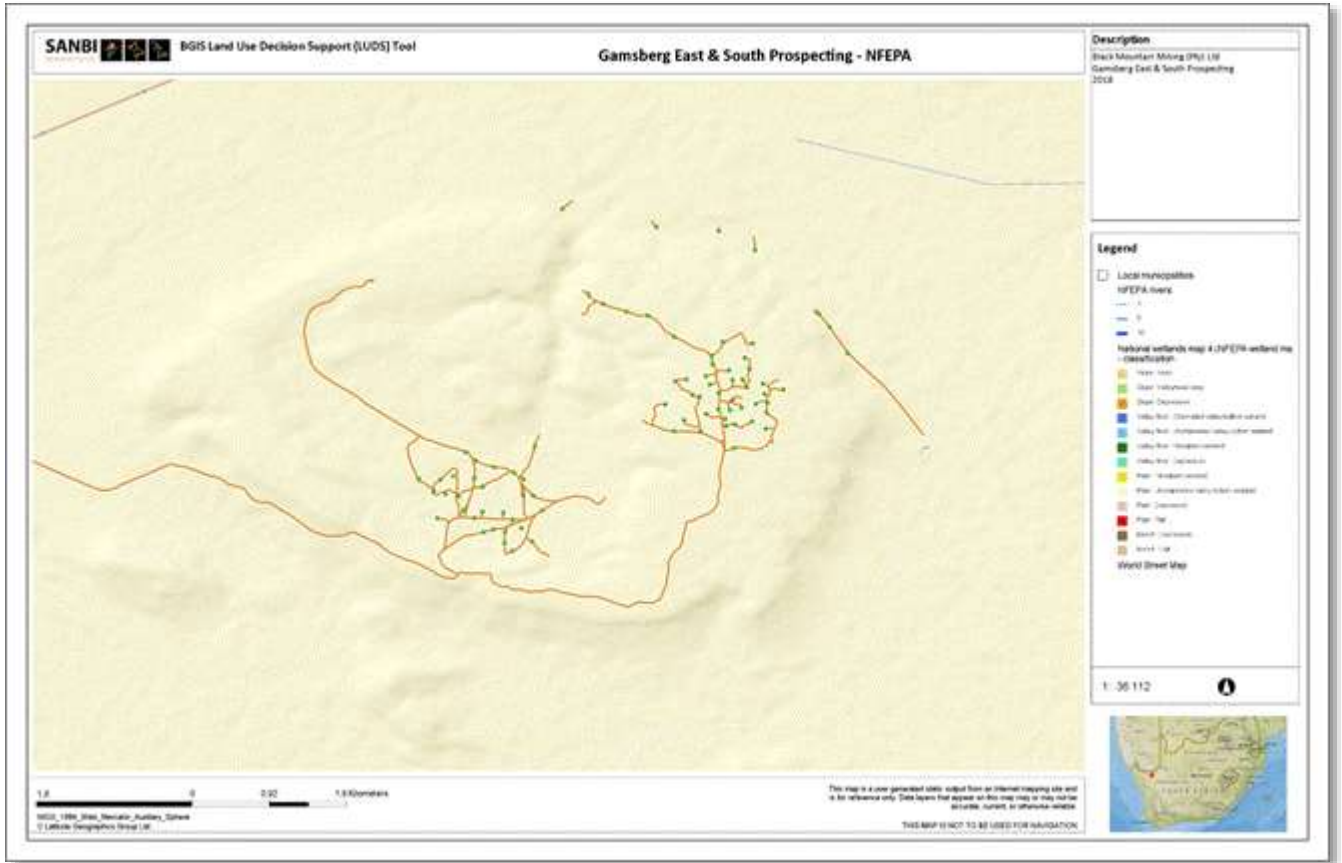


Figure 17: NFEPA map indicating freshwater sources in the Gamsberg area

There are some non-perennial rivers in the project area.



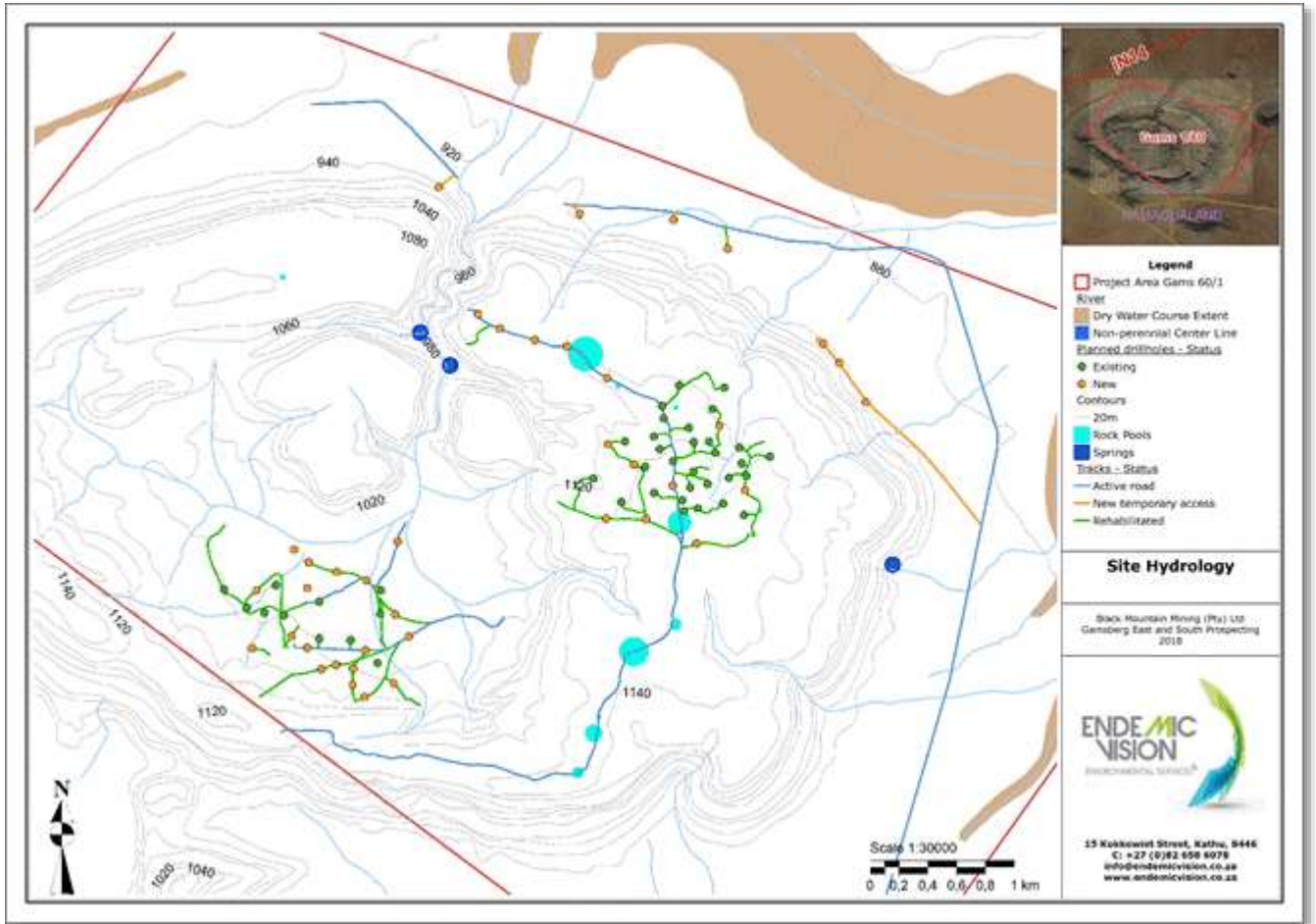


Figure 18: Map indicating surface water in the Gamsberg area

There are some springs and rock pools present on Gamsberg



Figure 19: Natural drainage lines in the project area

**Heritage Resources**

Minimal work had been undertaken in the region prior to the project. Cultural Resource Management reports from the surrounding region refer to the Later and Middle Stone Age sites occurring. A rock painting site is described near Black Mountain Mine, while reference was made to a rock engraving seen in the landscape in the 1870s which is yet to be relocated. Stone Age traces can be expected to cluster around particular kind of features in the landscape such as waterholes and springs and in the shelter of hills while widely dispersed isolated artefacts might occur. Colonial traces are also expected to be sparse and ephemeral. Farmers were known to practice transhumance or seasonal movement between this region and Namaqualand.

The Southern slope of Gamsberg is richer in sites and seen as more sensitive. Higher sensitivity stems from the possibility of this area being the site of an incident in which a group of San were cornered and shot, part of what historians now characterize as a genocide against the indigenous people of the region. Unfortunately, all previous studies as well as the study conducted in March 2018 for this project, has failed to identify the exact location of this site.

Tangible archaeological or heritage traces are scarce within the inselberg itself and within the basin. This is a generally highly eroded, extremely rocky area resulting in a hostile environment.

**Socio-economics**

Generation of Bushmanland communities have grown up in the area occasional seeking out work from mission stations and seasonal crop picking in the Upington/ Kakamas area. Education levels in the area were generally low and young children would often leave school to seek out work.

The population for Namakwa District Municipality according to a 2001 Census is approximately 108111 which is a 1.41 decrease from 1996. The population density is less than 1 person/square mile. In the Khai-Ma municipality the largest increase in population can be found which is an increase of 21.5%. There has also been a substantial shift in population totals from rural to urban areas. Afrikaans is the language of choice in the area with English and Xhosa spoken to a lesser extent. The population was limited to a few widely-spaced farms prior to the opening of the mine with Pella and Pofadder being the nearest population centers at the time.

The Khai Ma Municipality has a relatively young population with over 80% of the population younger than 50 years of age. The gender distribution is even with 4709 males and 4638 females. The majority of the population falls within the Colored ethnic group.

**Table 14: Summary of the population in the Khai-Ma Municipality**

	1996	2001
<b>Population</b>	9331	11344
<b>Urban</b>	1024	1832
<b>Rural</b>	1199	921
<b>Household</b>	2223	2754
<b>Male</b>	4709	
<b>Female</b>	4638	
<b>African</b>	283	
<b>Coloured</b>	9178	
<b>Indian</b>	3	
<b>White</b>	1263	
<b>Other</b>	42	

**b) Description of the current land uses**

The project area is zoned mining with no farming activities taking place and limited free roaming wildlife utilizing the area. The land use in the application is mining and surrounding area is grazing (sheep, cattle and goats). There is evidence of historic bulk sampling and prospecting activities.

The area demarcated for prospecting is currently part of the biodiversity offset for Gamsberg Mine and considered as conservation land use in terms of the BMM Biodiversity Management Plan.



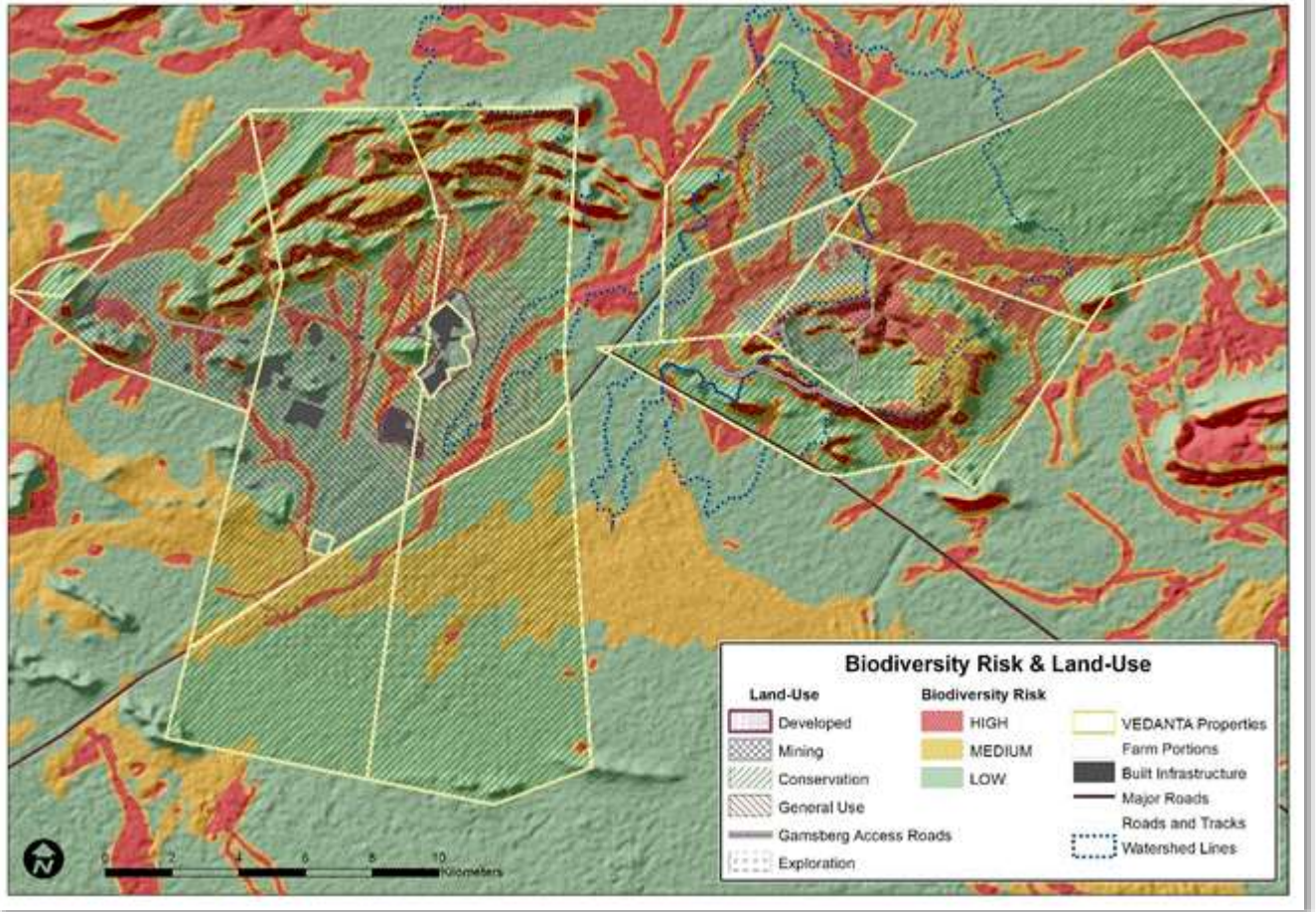


Figure 20: BMM Biodiversity Risk and Land use map

**c) Description of specific environmental features and infrastructure on the site**



Figure 21: Existing Management tracks on Gamsberg





**Figure 22: Existing single track take-off roads from historic drilling on South Gamsberg**



**Figure 23: Evidence of previously impacted areas as a result of prospecting (not rehabilitated)**





**Figure 24: Evidence of previously impacted areas as a result of prospecting (rehabilitated)**





**Figure 25: Gamsberg East Reference Vegetation (No previous impacts)**



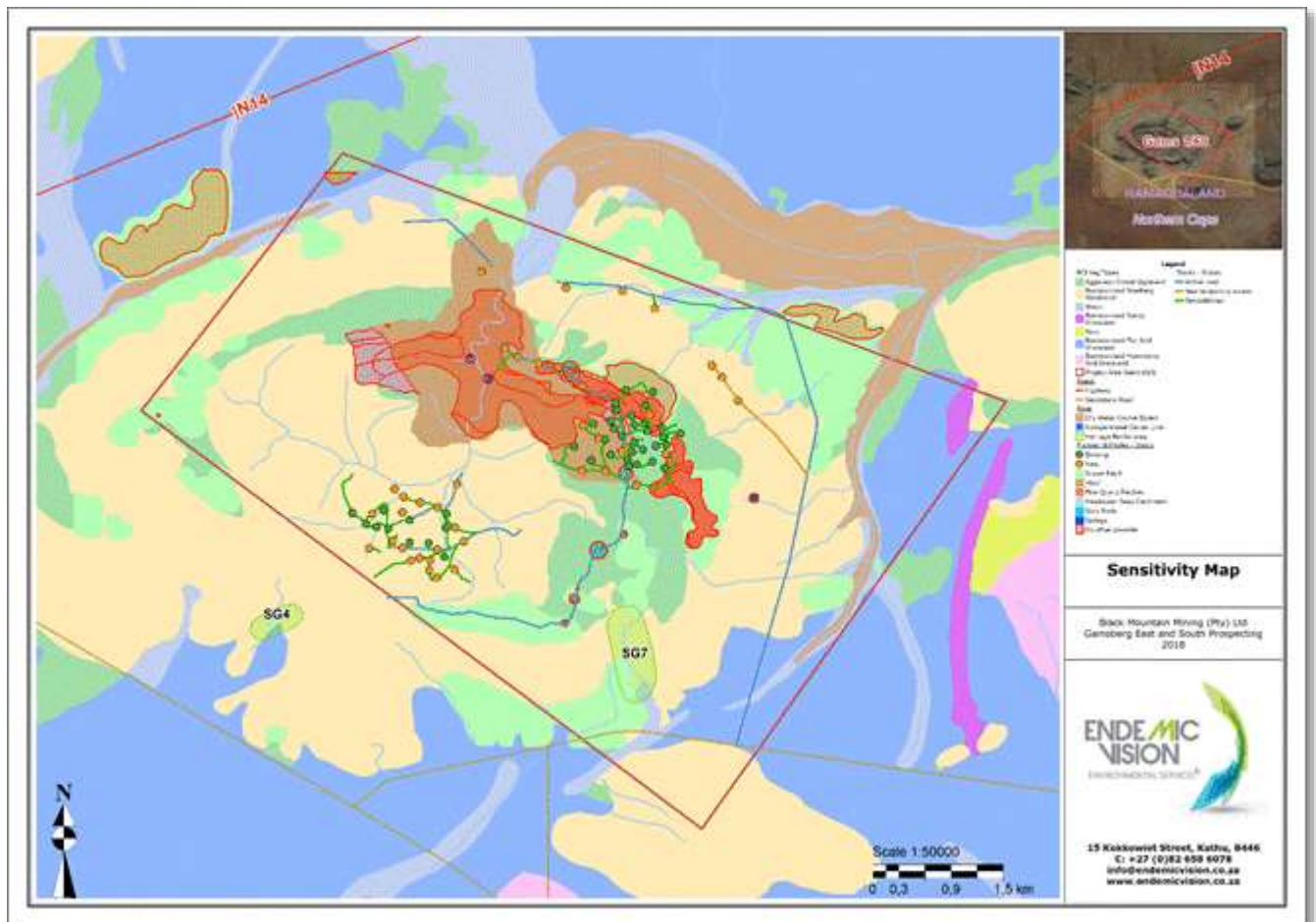
**Figure 26: Gamsberg South Reference vegetation (No previous impacts)**



**d) Environmental and current land use map**

*Show all environmental and current land use features*

Please refer to the sensitive habitats map for the site; the Vegetation Types map and the site map (Topo cadastral map) indicating services infrastructure indicating the environmental and land use features associated with the proposed prospecting area. Below is the ecological sensitivity map supporting the maps mentioned above.



**Figure 27: Ecological sensitivity map**

Some sites at Gams North and Gams Far East, are located in areas that were not previously impacted. Some areas were impacted historically but the extent of natural recovery still needs to be assessed prior to final site selection. In terms of impact assessment all other areas have been impacted and rehabilitated with different degrees of success. A separate assessment is presented for areas not previously impacted.

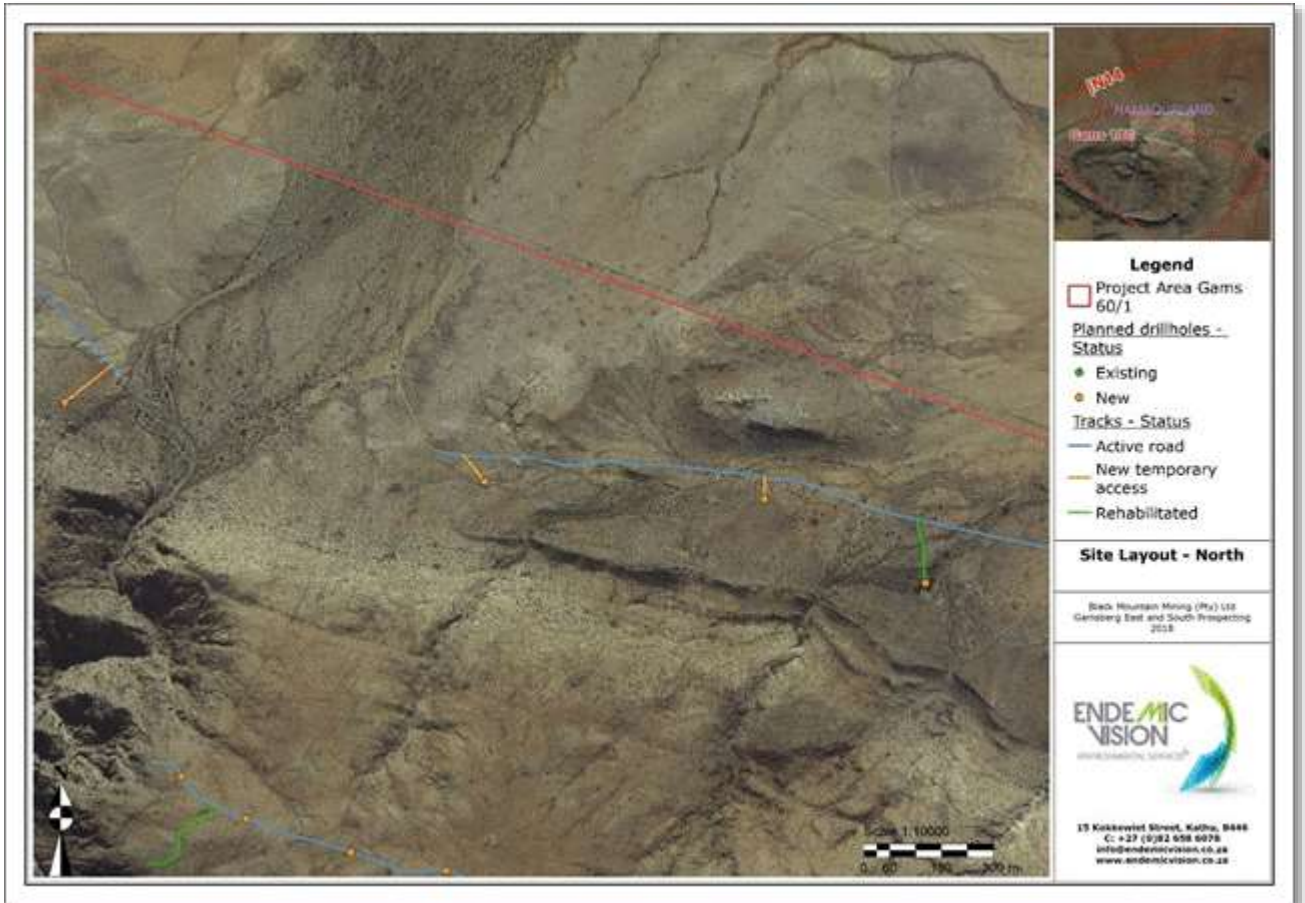


Figure 28: Gams North



Figure 29: Gams Far East

**v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed**

Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated

This section identifies and evaluates the actual and potential environmental consequences associated with the proposed prospecting activity. The potential for mitigation of negative impacts and enhancement of positive impacts (DEAT, 2003) to enable sustainable development principles are adhered to.

**Table 15: Summary of impacts according to aspect as applicable to the project lifecycle**

Summary of Impacts Applicable for Assessment	
<b>The following aspects were identified as potentially significant</b>	
<b>Resource Use</b>	<ul style="list-style-type: none"> <li>- Prospecting for the associated minerals;</li> <li>- Topsoil - Soil disturbance and compaction and topsoil stockpiling resulting in soil erosion;</li> <li>- Surface water (where affected as dirty water runoff); and</li> <li>- Potential destruction of heritage resources (if applicable).</li> </ul>
<b>Waste Management</b>	Potential water and soil pollution resulting from improper waste storage and management (drill sludge, hydrocarbon spillage).
<b>Biodiversity Disturbance</b>	<ul style="list-style-type: none"> <li>- Site clearance for new access roads to the drill sites, drill site clearance for drilling during the invasive prospecting phases of the programme;</li> <li>- Destruction and/or disturbance of on-site fauna, flora, sensitive species and sensitive areas; and</li> <li>- Activities within the watercourse could result in disturbance to the natural geomorphology and safety hazards during rainy periods.</li> </ul>
<b>Air Emission</b>	Dust emission resulting from site clearing, soil stripping and construction activities (including dust generated by vehicle movement).
<b>Water Pollution</b>	Hydrocarbon spillage as a main source of groundwater pollution. Surface water - storm water run-off from exposed areas and drill sludge.
<b>Noise / Vibration</b>	Noise as a result of construction, operation and vehicle movement resulting in disturbance of fauna / livestock / wildlife.

**vi) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks**

Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision

Standard evaluation methods are applied as defined below.

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. Assessment of impacts will be based on DEAT's (2014) Guideline Document: EIA Regulations. The various



environmental impacts and benefits of this project are discussed in terms of impact status, probability, duration, scale/extent and magnitude/severity.

The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the potential impacts will be determined through a synthesis of the criteria below:

### **Impact Status**

The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. A discussion on the nature of the impact will include a description of the cause of the effect, the aspect that will be affected and how it will be affected. The nature of the impact can be described as negative or positive.

**Table 16: Impact Nature Rating**

<b>RATING</b>	<b>DESCRIPTION</b>	<b>RATING</b>
Positive	A benefit to the receiving environment	(+ve)
Negative	A cost to the receiving environment	(-ve)

#### **Probability This describes the likelihood of the impact actually occurring.**

- Improbable:** The possibility of the impact occurring is very low, due to the circumstances, design or experience.
- Probable:** There is a probability that the impact will occur to the extent that provision must be made therefore.
- Highly Probable:** It is most likely that the impact will occur at some stage of the development.
- Definite:** The impact will take place regardless of any prevention plans, and there can only be relied on mediatory actions or contingency plans to contain the effect.

#### **Duration: The lifetime of the impact.**

- Short term:** The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
- Medium term:** The impact will last up to the end of the phases, where after it will be negated.
- Long term:** The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
- Permanent:** Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

#### **Scale: The physical and spatial size of the impact**

- Site:** The impacted area extends only as far as the activity, e.g. footprint
- Local:** The impact could affect the whole, or a measurable portion of the above-mentioned properties and adjacent properties.
- Regional:** The impact could affect the area including the neighbouring residential areas.

<b>Magnitude/ Severity:</b>	<b>Does the impact destroy the environment or alter its function.</b>
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**Low:** The impact alters the affected environment in such a way that natural processes are not affected.

**Medium:** The affected environment is altered, but functions and processes continue in a modified way.

**High:** Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

<b>Significance</b>	This is an indication of the <b>importance of the impact</b> in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.
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**Negligible:** The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.

**Low:** The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.

**Moderate:** The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.

**High:** The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The ratings of the identified impacts were undertaken in a quantitative manner as provided from section (vi) above. A risk matrix will be used to determine the significance of the impacts. The magnitude of the impact, the extent of the impact, the reversibility of the impact, the duration of the impact and the probability of the impact occurring were taken into consideration. The assessment has been conducted without implementing any mitigation or management measures and then with the implementation of management and mitigation measures. During the process, a score was determined to divide the significance of the impacts into negligible, low, moderate and high.








The following scale is used to determine the significance score of the impact.

**Table 17: Impact Significance Rating**

Aspect	Description	Weight	Significance Rating	Weight	Score Colour
<b>Duration</b>	Short term	1	Negligible	<20	Grey
	Medium term	3			
	Long term	4			
	Permanent	5			
<b>Scale/Extent</b>	Site	1	Low	<40	Green
	Local	2			
	Regional	3			
<b>Magnitude/Severity</b>	Low	2	Moderate	<60	Orange
	Medium	6			
	High	8			
<b>Probability</b>	Improbable	1	High	>60	Red
	Probable	2			
	Highly probable	4			
	Definite	5			






For the baseline vegetation impact assessment, specialist conducted a high-level desktop assessment to determine the botanical setting in which the Gamsberg East and South project is located. The various resources used to determine the significance and sensitivity of the environmental considerations include:

-  The Gamsberg Database;
-  Geographic Information System maps;
-  SANBI's PRECIS herbarium record database;
-  SANBI's NFEPA maps;
-  Biodiversity Offset specialist report for prospecting;
-  Specialist reports of the 2014 Gamsberg EIA;
-  Heritage and Paleontological specialist report for prospecting.

Existing botanical knowledge of the site, the detailed botanical assessment of 2014, the biodiversity offset report based on botanical assessment and botanical independent audit report was used to guide the risk assessment. The site visit was undertaken in August and September 2017, March and April 2018 to fill data gaps.

For Heritage and Paleontological impact assessments, a high-level desktop study was conducted to determine the environmental setting in which the Gamsberg East and South project is located. Extensive research into the SAHRIS database was conducted and historic maps were reviewed. A field assessment was also conducted on the 28<sup>th</sup> of March 2018 and specialist report generated for this assessment.

For the faunal impact assessment, specialist conducted a desktop assessment to establish the species previously recorded within the study area and to determine the species expected to occur in the region. The various resources used included:

-  The International Union for Conservation of Nature (IUCN) Red List; and
-  The Convention on International Trade in Endangered Species (CITES)
-  Specialist fauna report (Ground Truth 2012).

A site visit was conducted in May 2009 and invertebrate surveys was conducted in 2009 and 2012 for the specialist report.

#### **vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected**

*Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties*

##### **Potential impact on palaeontological resources**

A Palaeontological Impact Assessment of the prospecting area has been conducted to identify any palaeontological or fossil resources in the subsurface which may be impacted on. No particular sensitive areas were identified. It is considered unlikely that significant fossil occurrences will be found due to the sparse and patchy distribution of fossils in the subsurface and the impact intensity is thus considered low. The impact of finding fossils or the loss thereof will be permanent and will result in long term cumulative impact which can be both partly negative and partly positive.

##### **Potential impact on heritage resources**












A Heritage Impact Assessment of the prospecting area has been conducted to identify any cultural, heritage and/or archaeological features which may be impacted on. No indications of any heritage related structures or

artefacts were identified within the study areas. It is not anticipated that any heritage sites will be impacted upon and sub-surface finds are also unlikely

The construction phase and operational activities would result in a low negative impact of medium term on archaeological resources pre-mitigation. The residual impact will be reduced in significance after mitigation.

### **Impacts on plants, habitat or vegetation**








Major impacts include habitat loss and sensitive species loss. Impacts are predicted to be significant even with extensive mitigation. The following possible impacts can result from the prospecting:

-  Habitat loss is a direct negative impact resulting from the construction and operational phase. The likelihood of restoring the original ecosystems is low;
-  Reduced ecological function and habitat degradation due to run-off from stream or surface flow diversion and dust generation;
-  The impact of dust deposition on habitat and species can be significant;
-  Loss of biodiversity due to surface water runoff quality and dust fallout;
-  Prospecting operations will increase the amount of people and may have an impact on vegetation due to collection of flora, litter, and creation of off-road tracks;
-  Spread of alien and invasive species;
-  Impacts on landscape-level ecological processes by disruption of ecosystem processes and habitat fragmentation, disruption of meta-population processes, reduction of ecological corridor function, and reduction of ecological refuge function; and
-  Loss of sensitive populations (e.g., Lithops and Conophytum), which show high specificity for niche environments.
-  Loss of species variations of unique genetic forms found on Gamsberg.
-  Loss of sensitive habitats (vernal rock pools, ephemeral pans).
-  Loss of vegetation richness, composition and diversity by means of site clearance and fragmentation.

The residual impacts include the cumulative reduction of the conservation area and conservation land capability of Gamsberg and other important habitat patches fragmented by drill sites and roads. This could lead to total species richness and diversity decline which cannot be fully mitigated in-situ due to the island effect of inselbergs. Species associated with the fine-grain quartz patches could also be significantly impacted beyond viable population limits.

### **Disturbance of on-site fauna**

The following key impacts are noted:

-  Direct loss of fauna and faunal habitat through site clearance and road construction;
-  Direct loss of fauna due to increased road kills, hunting, trapping, poaching of animals, etc.;
-  Increased habitat fragmentation;
-  Disturbance of habitat through unnatural factors such as fires, off-road driving, increased movement of people, etc.;
-  Indirect loss of aquatic features and fauna due to groundwater/surface water impacts.;
-  Impact from water contamination and air pollution.; and
-  Impacts from increased noise and use of artificial lighting.

### **Impacts on communities, individuals or land uses in close proximity**

The following impacts are regarded as community impacts:

- Potential water and soil pollution resulting from deep drilling, hydrocarbon spills and soil erosion;
- Noise due to prospecting activities;



#### **Water quality and availability**

Limited quantities of hazardous goods (fuel, oil and lubricants) will be stored on site. A diesel bowser will be used for storage of diesel on site for re-fueling. The transportation, handling and storage of such materials may result in spills and further water quality impacts in the event of spills when carried by storm water to the water courses.

100 000 l of water may be used per day for the prospecting activities and use must not exceed the general authorization volume for the area. Water will only be extracted from boreholes for monitoring purposes. Water management should be implemented to prevent unnecessary spillage and waste of water. Water will be supplied by Sedibeng Water Board from the Pella drift orange river pump station to Gamsberg. Water is then piped and delivered via JoJo tank, aqua dams and pipes or watercarts for up to 150 000 litres storage. No groundwater will be extracted for prospecting activities.

Possible pollution sources include stockpiled soil and all areas cleared of vegetation. The eroded soil particles may be carried by storm water to watercourses which will result in an increase in the Total Suspended Solids (TSS) and Total Dissolved Solids (TDS) of the watercourses. The storage of hazardous goods, temporary ablation facilities and discharge of drill fluids may also lead to surface- and groundwater pollution if not managed properly.



#### **Visual impact**

The prospecting activities is not expected to result in localized visual impacts due to the adjacent open pit mine and locality.



#### **Positive impacts**

- While no significant short term positive impacts are expected with the prospecting activities, in the event that viable mineral reserve is confirmed, and pending the outcome of detailed social and environmental impact assessment processes, a positive socio-economic benefit must be investigated and optimized. Based on existing and historical mining activities which are known from within the larger region it is anticipated that similar conditions will prevail for this prospecting project.
- The finding and recovery of fossils could have a positive impact on palaeontological resources ranging from regional to international in extent depending the nature of the finds, regarding that mitigation measures are taken to look out for any resources.
- Rehabilitation of impacted areas that have been impacted and not properly rehabilitated in the past is seen as a positive impact.
- Prospecting will mostly be undertaken by contractors, personnel of Black Mountain Mining and specialists but some temporary employment opportunities for local and/regional communities will be available.

#### **viii) +The possible mitigation measures that could be applied and the level of risk**

.....  
*With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered*  
 .....



#### **Measures to manage the potential impact on palaeontological resources**

A palaeontological Impact Assessment has been conducted on the area where drilling activities are planned.

No particular sensitive areas were identified. It is considered unlikely that significant fossil occurrences will be found due to the sparse and patchy distribution of fossils in the subsurface and the impact intensity is thus considered low. On-site personnel will monitor excavations under the supervision of the Environmental Site Officer (ESO). Inspections of drilling activities will be included in Gamsberg Environmental team activities. In the event of a significant fossil find, a palaeontologist will supervise the excavation of the fossils and record the contexts.



#### **Measures to manage the potential impact on heritage resources**

A Heritage Impact Assessment has been conducted on the area where drilling activities are planned.

- Once the exact location of the proposed diamond boreholes is available these should be investigated individually by a qualified archaeologist.
- It is recommended that the development designs take into account the positive and negative characteristics of the existing cultural landscape type.
- If mining activities are considered, the areas should be submitted to a full Heritage Impact Assessment.
- Obscured, subterranean sites must be managed, if they are encountered.
- During the construction phase all operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and what procedure to follow.
- Should any sub-surface remain of heritage sites be identified, all construction in the immediate vicinity (50m radius) should cease and the heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the South African Police Services should be notified.
- Mitigation measures, such as refilling, should not be attempted.
- The area of the find and a 50m radius thereof should be marked off with hazard tape, placed under guard and public access should be limited.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyse the finds.
- An archaeological and palaeontological inventory plan must be developed and approved by SAHRA prior to site-specific developments.





#### **Measures to manage the potential impact on plants, habitat and vegetation.**

- Reduce dust emission;
- Manage surface water run-off;
- Protect all known regional populations of species at risk via biodiversity offset to buffer species against possible loss of or changes in source populations;
- All workers must be trained and educated on environmental sensitivities of the site and appropriate behaviour especially with regard species introductions by the ECO and Biodiversity Officer and as a part of induction;
- No-go areas should be clearly demarcated on the ground and on mine plans, site plans and contractor packs;
- The detailed biodiversity management plan developed to ensure that the proposed avoidance and mitigation measures associated with construction are effectively implemented by the Black Mountain Mine Environmental Management team;
- A concurrent rehabilitation plan for sites, roads and laydown areas should be in place before drilling commence, implemented concurrently during drilling and monitored for compliance.
- Search and rescue plan should be compiled for all flora specimens of special concern and a representative sample of other protected flora required to fulfil the rehabilitation obligations.
- Alien Plant and Animal Monitoring and Control is managed by Black Mountain mine's environmental management team;
- Complete the implementation of the original offset agreement, to the satisfaction of an external auditor, before proceeding with new impacts on biodiversity in the areas originally set aside for offsetting the mine impacts;
- The study on the additional offset requirements from prospecting on Gamsberg assumes that the quantification of residual negative impacts of the prospecting is reliable. Should monitoring highlight significant changes in



















impact predictions, it would be necessary to revisit the offset requirements accordingly, and it is worth including any recalculation as a specific term of reference for any audit process for the offset or environmental mitigation for Gamsberg and BMM;

- ✦ Monitoring and Evaluation of the impact of dust, mitigation measures and the spatial footprint of the prospecting and road construction, must be done according to table 1 and 3 of the Gamsberg Biodiversity Offset Report (Appendix G);
  - ✦ The original offset implementation agreement (including the required offset quantum, specifics and most suitable target sites) must only be formally augmented once there is greater clarity on the full scope of anticipated biodiversity impact from all prospecting activities and planned new infrastructure, acknowledging that there are some biodiversity features which are not offset-able and which should not be further compromised by BMM, but which can be compensated for through the measures suggested in this report;
  - ✦ The current biodiversity offset agreement should be honoured between all parties and required written notification and consent granted for prospecting to continue in biodiversity offset areas.
  - ✦ Conservation protection must be done according to requirements set out in the biodiversity management plan and biodiversity offset;
  - ✦ Vegetation removal must be minimized to smallest possible footprint and damage area should be rehabilitated with assistance of a qualified vegetation rehabilitation specialist;
  - ✦ All areas with habitat rich and high concentration of fauna and flora should be avoided;
  - ✦ Pre-construction walk-through (pre-clearance report) of the facility in order to locate species of conservation concern that can be translocated must be undertaken before final site layout or road layout is approved.
  - ✦ Search and rescue operation of all listed species suitable for translocation within the development footprint that cannot be avoided should be conducted.
  - ✦ Affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitor purposes.
  - ✦ The required flora and protected tree permits will be obtained by provincial and national departments as legally required.
- ✦ **Measures to manage the potential disturbance of on-site fauna**
- ✦ The footprint should be reduced as far as possible;
  - ✦ Sensitive areas, i.e. aquatic systems and habitats supporting key faunal species should be avoided;
  - ✦ All disturbed areas must be rehabilitated during all phases of the project to reinstate natural habitat. If applicable, a rehabilitation plan should be designed by an appropriate specialist which includes erosion control structures and revegetation measures with indigenous species only;
  - ✦ Personnel and contractors must be prohibited from having domestic dogs and cats on the premises. A feral dog and cat control programme must be implemented where monitoring indicate any presence of domestic animals on site;
  - ✦ The movement of people and vehicles must be restricted and controlled and areas should be clearly demarcated;
  - ✦ Speed limits must be implemented and enforced;
  - ✦ Maintain roads and implement dust control measures as far as practical on management roads;
  - ✦ Prospecting take-off single tracks should be used sparingly with no bulldozing or chemical dust suppression treatment. Dust suppression will be by speed limit only.
  - ✦ Light pollution must be kept to a minimum so as to not interfere with insect life cycles and nocturnal vertebrates as far as safety does not decrease. Low pressure sodium vapour lights/ LED lights with wavelengths of limited attractiveness to insects, facing inwards to the mine, are recommended;
  - ✦ Drill holes must be temporarily plugged directly after drilling to fulfil access and safety requirements.
  - ✦ Once drilling is completed permanent capping must be installed that will fulfil the departmental requirements for access, surface water ingress, safety, stability and monitoring (where applicable);
  - ✦ The loss of the sensitive faunal habitats must be avoided (e.g. breeding areas, raptor nests); and
  - ✦ A concurrent rehabilitation plan for sites, roads and laydown areas should be in place before drilling commence, implemented concurrently during drilling and monitored for compliance.



### **Measures to manage the potential impacts on communities, individuals or land uses in close proximity**

-  Potential water resource or quality impacts resulting from prospecting activities must be monitored annually and remediated in response to monitoring results;
-  Background noise level is not expected to increase with more than 85dB.



### **Measures to manage the potential impact on water quality and availability**

-  Potential water and soil pollution resulting from hydrocarbon spills and soil erosion must be managed upfront during site establishment by ensuring proper design and isolation of material storage;
-  Water management in terms of the prevention of spillage from leaking pipelines of water should be implemented on site;
-  Water supply lines should be laid with least impact on sensitive vegetation;
-  Water supply materials (pipes, wires, valves, fittings) must be removed when not use;
-  Current roads and take-off tracks must be used as far as is practical to minimize the potential for soil erosion.
-  Should new roads be required to drill sites, clearing will be undertaken with a view to maintain vegetation cover, limit soil erosion potential.
-  Construction will allow for reduced water flow or water diversion along roads or sites to prevent erosion.
-  The area impacted by the drill site must be kept to a minimum and vegetation removal minimized to limit soil erosion;
-  Prevent wind erosion by rock packing, early re-vegetation, sowing and brush packing with damaged vegetation;
-  When establishing the drill pad, topsoil that will be removed will be stockpiled on PVC lining up-slope of the pad. The stockpile will be shaped to divert storm water around the drill pad. The stockpile will be re-used for the rehabilitation of the sites.;
-  To reduce potential for water pollution during the drilling activities, a raised recycling sump will be used with sufficient capacity to receive drill fluids and allow for evaporation;
-  A waste management system will be implemented and sufficient waste bins provided on site. A system to prohibit littering and poor housekeeping practices on site will be implemented;
-  Oils and lubricant will be stored within secondary containment structures / liners;
-  Vehicle maintenance will be undertaken off-site except for breakdowns.
-  Waste separation will be undertaken on-site and separate containers will be provided (i.e. general waste, hazardous waste, recyclable waste);
-  Disposal of waste will be at an appropriately licensed landfill/facility and recyclables will be taken to a licensed recycling facility;
-  Waste containers will be closed to eliminate the possible access of rain water or animals;
-  Commercial oil spill kits will be kept at each site to be used in the event of any spillages.

### **Measures to manage the potential visual impact**

-  All temporary infrastructures such as portable ablution facilities, water tanks etc. should be acquired with consideration for colour. Natural colour options which blend in with the surrounding area must be favoured;
-  A waste management system will be implemented and sufficient waste bins provided on site. A system to prohibit littering and poor housekeeping practices on site will be implemented; and

### **Measures to manage rehabilitation (positive impact)**

-  Rehabilitation in itself can result in additional impacts and should be carefully planned concurrently with the drilling plan;
-  Rehabilitation should be done according to similar vegetation diversity, vegetation cover constituency as described by the baseline;

- ✦ Rehabilitation should be monitored using the BMM rehabilitation monitoring protocol to ensure the rehabilitation efforts can be quantified as successful;
- ✦ Rehabilitation maintenance is required until the rehabilitation is self-sufficient; and
- ✦ It is required that only indigenous flora is re-established on impacted areas where rehabilitation takes place.

✦ **In addition to the above, the following obligations for monitoring and conservation are carried out by the BMM and is incorporated in as part of this assessment:**

- ✦ Implement a biodiversity offset programme to properly identify and set aside areas for conservation;
- ✦ Implement biodiversity management plan to protect and enhance biodiversity on site;
- ✦ Develop and implement an environmental awareness programme for workers and contractors which emphasises biodiversity issues. Signed contracts must include policy to ensure compliance is achieved; and
- ✦ Implement existing management plans to deal with waste, storm water, hydrocarbons, dust, hazardous waste, ground water monitoring, dust monitoring.

### ix) Motivation where no alternative sites were considered

Alternatives have been considered in the assessment of alternatives as tabled above.

**Table 18: Original drill plan**

Access tracks totals			
Infrastructure type	Width	Length (m)	Area (m <sup>2</sup> )
Existing Access Tracks	4	15000	60000
New Access Tracks	4	5000	20000
	<b>Total</b>	<b>20000</b>	<b>80000</b>

Drill pad totals (includes contingency)			
Infrastructure type	Area (m <sup>2</sup> ) per site	Planned number of drill sites (including contingency)	Total Area (m <sup>2</sup> )
Drill Pad	225	180	18000

Total Footprint	
Infrastructure type	Total Area (m <sup>2</sup> )
Access Tracks	80000
Drill Pads	18000
<b>Total</b>	<b>98000</b>



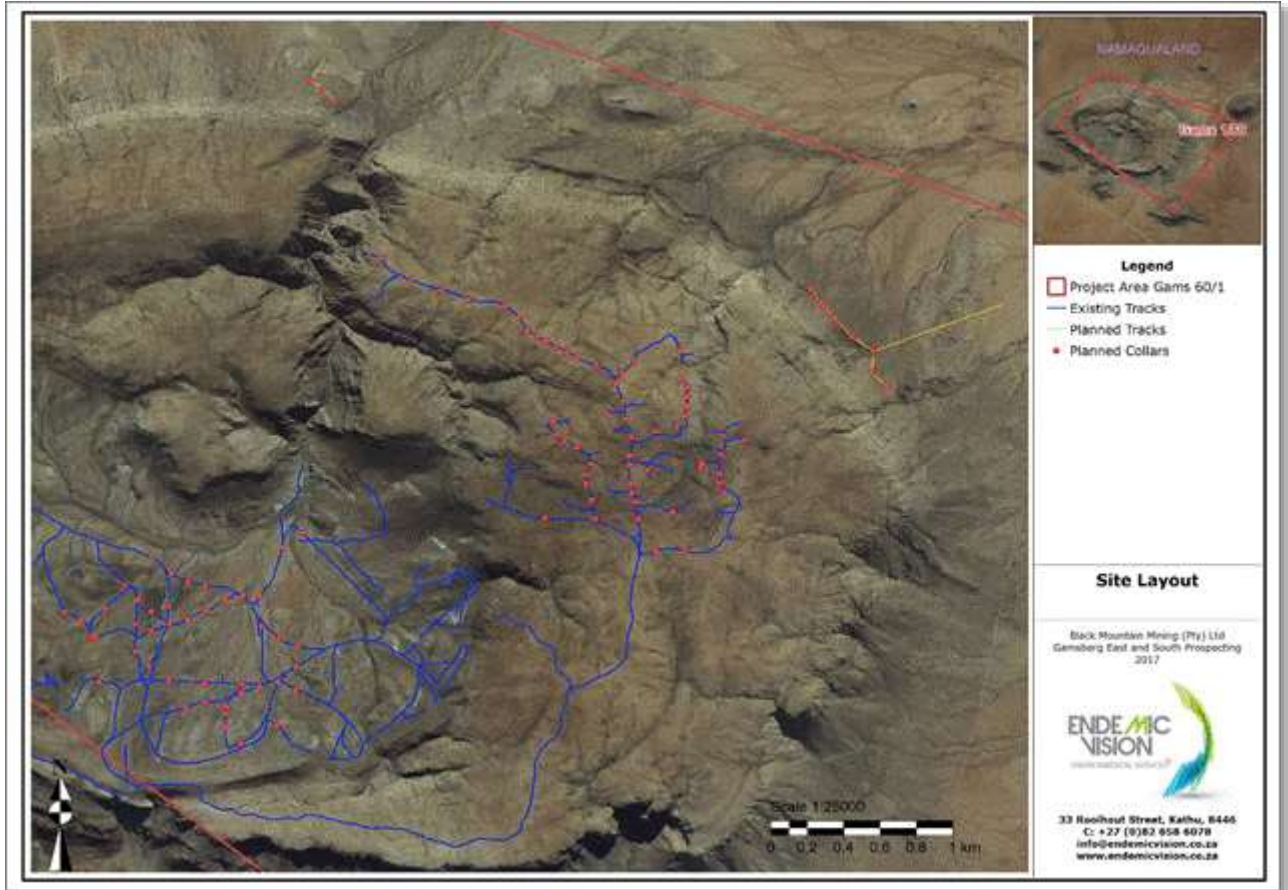


Figure 30: Original site layout

Table 19: Final drill plan

Access tracks totals*				
Infrastructure type	Width	Length (m)	Total Area (m <sup>2</sup> )	Road area excluding drill pads (m <sup>2</sup> )*
Active Main Roads	4	18375	73500	72767
Rehabilitated Tracks	4	13089	53026	50369
New Access Tracks	4	2055	8222	7934
	<b>Total</b>	<b>33519</b>	<b>134749</b>	<b>131070</b>

\*Drill pads in roads are subtracted from road footprint

Drill pad totals (includes contingency)			
Infrastructure type	Drill pad Area (m <sup>2</sup> ) per site	Planned number of drill sites	Total drill pad area (m <sup>2</sup> )
Existing Drill Pad	225	41	9225
New Drill Pad	225	39	8775
	<b>Total</b>	<b>80</b>	<b>18000</b>

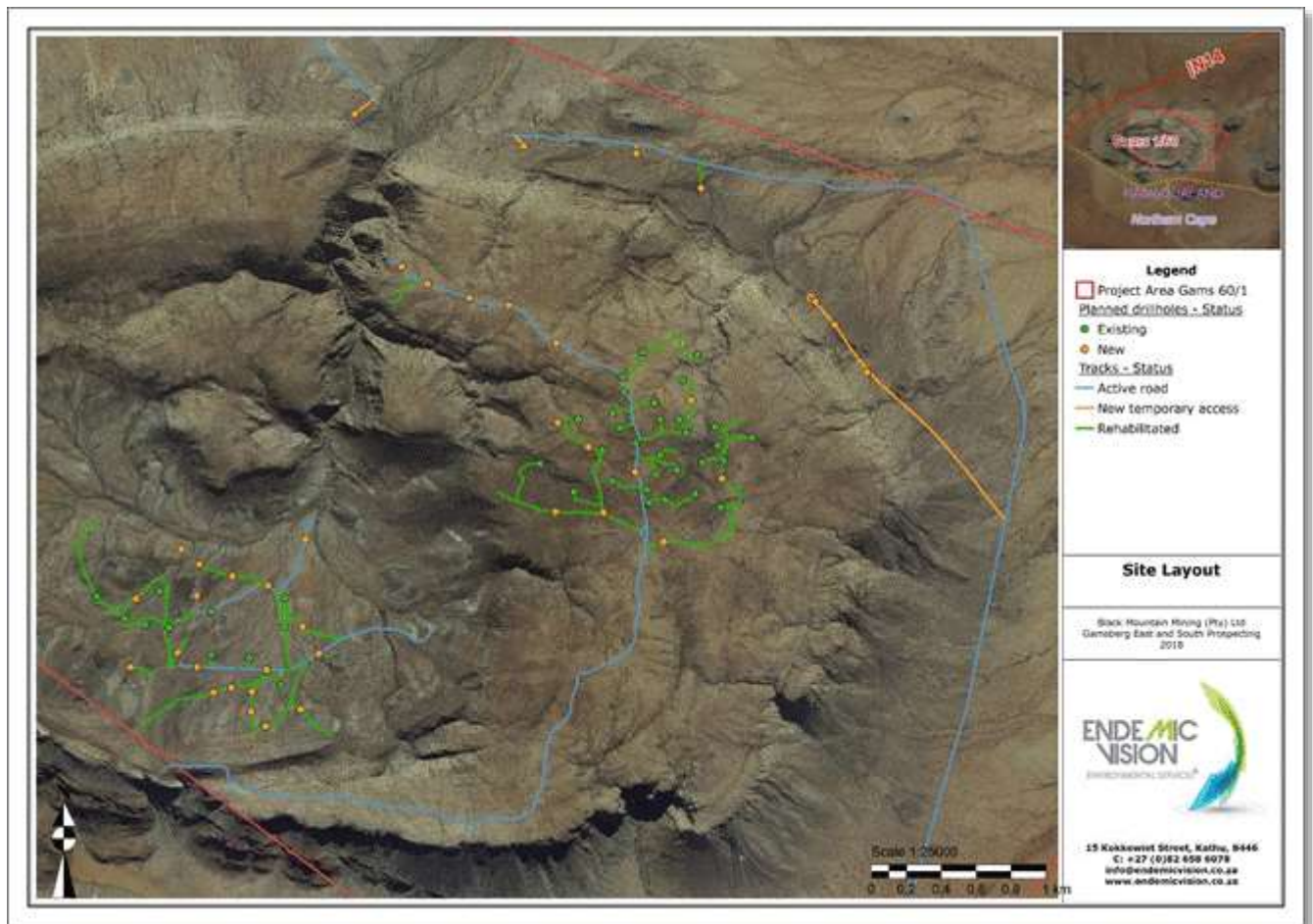
Declared footprint	
Infrastructure type	Area (m <sup>2</sup> )
Road area excluding drill pads (m2)*	131070
Active Main Roads	72767
Total drill pad area (m2)	18000
<b>Impact footprint</b>	<b>76303</b>

Drilling totals (actually planned)		
Target Area	Actual Meters planned	Actual No. Planned BH's
Gamsberg East	152000	264
Gamsberg South	55000	102
Other (prospecting)	19000	18
	<b>226000</b>	<b>384</b>

**x) Statement motivating the alternative development location within the overall site**

*Provide a statement motivating the final site layout that is proposed*

The final layout is presented below.



**Figure 31: Site layout indicating new drill collars on existing footprint and on new roads to be constructed**

**Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity**

.....  
 ...  
*Including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures*  
 .....

Methodology of all specialist studies are described in full in section (vi) above.

The ratings of the identified impacts were undertaken in a quantitative manner as provided from section (vi) above. A risk matrix will be used to determine the significance of the impacts. The magnitude of the impact, the extent of the impact, the reversibility of the impact, the duration of the impact and the probability of the impact occurring were taken into consideration. The assessment has been conducted without implementing any mitigation or management measures and then with the implementation of management and mitigation measures. During the process, a score was determined to divide the significance of the impacts into negligible, low, moderate and high.

The identification of management measures and impact management objectives were developed to ensure that adverse socio-economic impacts and minimised and socio-economic benefits are maximised. Measures were further defined to avoid, prevent, limit or manage any impacts. Closure objectives were further measured against Section 28 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and Regulation 52(2)(f) of the MPRDA regulations.

## i) Assessment of each identified potentially significant impact and risk

*This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties*

This section identifies and evaluates the actual and potential environmental consequences associated with the proposed drilling activity. The potential for mitigation of negative impacts and enhancement of positive impacts (DEAT, 2003) to enable sustainable development principles are adhered to.

**Table 20: Impact Assessment of activities BEFORE mitigation**

### Legal Risks

High risks are encountered where additional authorizations are required before drilling. Specifically, in terms of protected flora, heritage, regulation 704 and NEMA performance and rehabilitation monitoring obligations. With mitigation measures in place, these risks are reduced to negligible.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Legislative	Plan & Design	Clearing Indigenous Vegetation	Unlawfull activity: Impacting protected species without permission	Direct Negative High	Long term	Site	Medium	Highly Probable	44
Legislative	Plan & Design	Clearing Soils	Unlawfull activity: Impacting heritage without notification to regulator or permission	Direct Negative High	Long term	Site	High	Definite	65
Legislative	Plan & Design	Construction of Roads	Unlawfull activity: Affecting a water resource without permission	Direct Negative High	Long term	Site	High	Definite	65
Legislative	Plan & Design	Invasive Prospecting: Drilling	Unlawfull activity: transgressing regulation 704 specifications	Direct Negative High	Long term	Site	High	Definite	65
Legislative	Plan & Design	Monitoring	Compliance: transgressions resulting in penalties and fines	Direct Negative High	Long term	Site	High	Definite	65

### Dust Related Risks

Dust is a major concern in terms of mining on Gamsberg sensitive habitats. Dust risks are however a low risk item in terms of prospecting. There is a minor cumulative impact of prospecting dust adding to the mining dust impacts.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Dust	Operational	Generation of Dust	Changes in air quality - dust	Direct Negative Low	Short term	Site	Low	Definite	20
Dust	Operational	Generation of Dust	Loss of habitats	Direct Negative High	Long term	Regional	Medium	Improbable	13
Dust	Operational	Generation of Dust	Social: Health and Safety of individuals on site	Indirect Negative Low	Short term	Site	Medium	Highly Probable	32
Dust	Site Clearance	Generation of Dust	Changes in air quality - dust	Direct Negative Low	Short term	Site	Low	Definite	20
Dust	Site Clearance	Generation of Dust	Ecological system impacts: Ecological process & function deterioration/ breakdown	Indirect Negative High	Long term	Site	Medium	Improbable	11
Dust	Site Clearance	Generation of Dust	Loss of habitats	Direct Negative Moderate	Short term	Local	Medium	Improbable	9
Dust	Site Clearance	Generation of Dust	Loss of species	Direct Negative High	Permanent	Regional	High	Probable	32

## Ecological Risks

Ecological risks relate to habitat fragmentation; changes in ecological processes and restoration potential of the sites and changes in soil functionality on which ecological processes is founded. Compaction on these habitats cannot be remedied by means of ripping. Compaction will definitely take place and only limited reduction in risk can be achieved through mitigation by limiting future compaction to impacted areas. This will however result in increased loss of soil functionality on these sites. Because of the limited possibility to rectify compaction, the risk remains moderate. It is proposed that holo-tine trials be conducted to see if this is a feasible restoration option.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Ecology	Site Clearance	Invasive Prospecting: Drilling	Ecological system impacts: habitat fragmentation	Direct Negative High	Short term	Local	High	Definite	55
Ecology	Site Clearance	Clearing Indigenous Vegetation	Ecological system impacts: Ecological process & function deterioration/ breakdown	Direct Negative Moderate	Long term	Site	Medium	Definite	55
Ecology	Site Clearance	Clearing Soils	Ecological system impacts: Ecological process & function restoration	Direct Negative High	Long term	Site	High	Definite	65
Ecology	Site	Construction of Roads	Ecological system impacts: habitat	Direct	Long term	Site	High	Definite	65



	Clearance		fragmentation	Negative High					
Ecology	Site Clearance	Invasive Prospecting: Drilling	Changes in soil functionality: compaction	Direct Negative High	Long term	Site	High	Definite	<b>65</b>
Ecology	Site Clearance	Disturbance: Traffic	Changes in soil functionality: compaction	Direct Negative High	Long term	Site	High	Definite	<b>65</b>
Ecology	Site Clearance	Clearing Indigenous Vegetation	Changes in surface water quality runoff	Direct Negative Low	Medium term	Site	Medium	Probable	<b>20</b>
Ecology	Site Clearance	Clearing Indigenous Vegetation	Loss of sensitive habitats	Direct Negative High	Permanent	Site	High	Definite	<b>70</b>

## Faunal Risks

Faunal disturbances are mainly due to noise, light and traffic. Loss of faunal habitats and possible persecution of protected specimens due to traffic is the greatest risks. All faunal risks can be reduced through mitigation measures to low or insignificant levels.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Fauna	Site Clearance	Disturbance: Noise	Disturbance of fauna engagement patterns	Direct Negative Low	Short term	Site	Medium	Probable	<b>16</b>
Fauna	Site Clearance	Clearing Indigenous Vegetation	Loss of habitats	Indirect Negative Moderate	Medium term	Site	Medium	Definite	<b>50</b>
Fauna	Operational	Disturbance: Light	Disturbance of fauna engagement patterns	Direct Negative Moderate	Long term	Local	Medium	Probable	<b>24</b>
Fauna	Operational	Disturbance: Noise	Disturbance of fauna engagement patterns	Direct Negative Moderate	Long term	Local	Medium	Probable	<b>24</b>
Fauna	Operational	Disturbance: Traffic	Persecution of fauna - road kills	Indirect Negative Moderate	Medium term	Site	Medium	Definite	<b>50</b>

## Flora Risks

Flora risks are encountered at protected specimen level, population level, species level and genetic level due to unique genetic characteristics of specimens found on Gamsberg. Functionally, vegetation cover and species composition are altered and must be restored as far as possible. The special species list below has a risk of affecting populations and variations of the species represented on site.

<b>FAMILY</b>	<b>SPECIES</b>
Crassulaceae	Adromischus nanus
Aloeaceae	Aloe cf. glauca
Aloeaceae	Aloe dabenorisana
Aloeaceae	Aloe microstigma
Portulacaceae	Anacampseros bayeriana
Portulacaceae	Avonia quinnaria subsp. alstonii
Salvadoraceae	Azima tetraacantha
Asphodelaceae	Bulbine striata
Mesembryanthemaceae	Cheiridopsis umdausensis
Mesembryanthemaceae	Conophytum achabense
Mesembryanthemaceae	Conophytum angelicae subsp. angelicae (Plateau form)
Mesembryanthemaceae	Conophytum burgeri
Mesembryanthemaceae	Conophytum limpidum (diploid form)
Mesembryanthemaceae	Conophytum marginatum var. karamoepense
Mesembryanthemaceae	Conophytum mirabile
Mesembryanthemaceae	Conophytum ratum
Crassulaceae	Crassula mesembryanthemopsis
Crassulaceae	Crassula tabularis
Crassulaceae	Crassula umbella
Mesembryanthemaceae	Dinteranthus vanzylii var. lineata
Mesembryanthemaceae	Dinteranthus vanzylii var. vanzylii

Eriospermaceae	Eriospermum bakerianum subsp. bakerianum
Euphorbiaceae	Euphorbia avasmontana
Euphorbiaceae	Euphorbia friedrichiae
Euphorbiaceae	Euphorbia virosa
Hyacinthaceae	Lachenalia giessii
Mesembryanthemaceae	Lapidaria margaretae
Mesembryanthemaceae	Lithops dinteri subsp. multifrederici
Mesembryanthemaceae	Lithops olivacea var. nebrownii
Mesembryanthemaceae	Mesembryanthemum inachabense
Asteraceae	Othonna sp. nov. (PGD 2342)
Asteraceae	Othonna sp. nov. (PGD 3728)
Mesembryanthemaceae	Phyllobolus latipetalus
Mesembryanthemaceae	Sceletium tortuosum
Mesembryanthemaceae	Titanopsis hugo-schlechteri var. hugo-schlechteri
Asphodelaceae	Trachyandra sp. nov.
Crassulaceae	Tylecodon sulphureus var. sulphureus



Flora impacts are all high risk impacts due to the high diversity, unique composition and specialized flora communities on Gamsberg, some of the impacts can be reduced with intensive rehabilitation efforts. Specialist stone succulent species, such as *Conophytum ratum*, that only occur in this form on Gamsberg is highly vulnerable to disturbance and the impact is far reaching as these populations represent the regional, and in some cases, global extent of this species variation.

Vegetation cover can be returned, but for specialist species avoidance is the only true mitigation measure.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Flora	Site Clearance	Clearing Indigenous Vegetation	Change in species composition	Direct Negative Moderate	Permanent	Local	High	Definite	75
Flora	Site Clearance	Clearing Indigenous Vegetation	Loss of vegetation cover	Direct Negative High	Long term	Site	High	Definite	65
Flora	Site Clearance	Clearing Indigenous Vegetation	Loss of species	Direct Negative High	Long term	Site	High	Definite	65
Flora	Site Clearance	Clearing Indigenous Vegetation	Loss of populations	Direct Negative High	Long term	Regional	High	Definite	75
Flora	Operational	Invasive Prospecting: Drilling	Changes in vegetation composition: Alien species encroachment	Indirect Negative Moderate	Short term	Local	Medium	Probable	18

## Heritage Risks

Tangible archaeological or heritage traces are scarce within the inselberg itself and within the basin. Pre-cautionary measures are however still applicable. Risk to heritage resources are low to insignificant.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Heritage	Site Clearance	Invasive Prospecting: Drilling	Loss of heritage artefacts or archaeological resources	Direct Negative High	Permanent	Local	High	Probable	30
Heritage	Site Establishment	Invasive Prospecting: Drilling	Loss of paleontological resources	Direct Negative Low	Permanent	Local	Low	Improbable	9

## Land-use Risks

Current land use for the area to be prospected is conservation in terms of the BMM Biodiversity Management Plan and the Biodiversity offset agreement. There is a risk that the area affected will not have conservation land capability after rehabilitation and this should be monitored post drilling.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Land use	Closure	Rehabilitation	Change in land use potential	Indirect Negative Low	Permanent	Site	High	Definite	<b>70</b>

## Noise Risks

Noise is seen as a low risk activity in terms of prospecting.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Noise	Site Clearance	Disturbance: Noise	Disturbance: noise	Direct Negative Low	Short term	Site	Low	Definite	<b>20</b>
Noise	Operational	Disturbance: Noise	Disturbance: noise	Direct Negative Low	Short term	Site	Low	Definite	<b>20</b>

## Rehabilitation Risks

The risk to rehabilitation is increased costs because of delayed, poor or unplanned rehabilitation as well as the risk that the end land-use committed to as part of the authorization process is not achieved.

It should be noted that in the case of rehabilitation, the final residual score is a positive rating as rehabilitation completed correctly will result in positive environmental impacts.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Rehabilitation	Site Clearance	Clearing Indigenous Vegetation	Costs: increase in rehabilitation costs	Indirect Negative Moderate	Long term	Site	High	Highly Probable	<b>52</b>
Rehabilitation	Rehabilitation	Lack of Monitoring	Costs: Increased management costs	Indirect Negative Low	Long term	Site	High	Highly Probable	<b>52</b>
Rehabilitation	Rehabilitation	Maintenance	Costs: shift in rehabilitation costs	Indirect Positive Moderate	Long term	Site	High	Highly Probable	<b>52</b>
Rehabilitation	Monitoring	Maintenance	Changes to landscape: transformation	Direct Positive Low	Short term	Site	Medium	Highly Probable	<b>32</b>

Rehabilitation	Closure	Monitoring	Change in land use potential	Indirect Positive Low	Long term	Site	Medium	Highly Probable	<b>44</b>
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## Soil Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Soil	Site Clearance	Clearing Soils	Changes in soil functionality: depletion	Direct Negative Low	Medium term	Site	Medium	Definite	<b>50</b>
Soil	Operational	Generation of hydrocarbon spills	Contamination of Soil - loss of soil function	Direct Negative Moderate	Short term	Site	Medium	Definite	<b>40</b>

## Ground Water Quality Risks

The risk of ground water quality is negative when drilling takes place, but positive when monitoring and maintenance of ground water is done directly after drilling until ground water quality is restored.

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Water - Groundwater	Operational	Invasive Prospecting: Drilling	Changes in ground water quality	Indirect Negative High	Permanent	Regional	Medium	Definite	<b>70</b>
Water - Groundwater	Monitoring	Maintenance	Changes in ground water quality	Indirect Negative Low	Permanent	Regional	Medium	Probable	<b>28</b>

## Surface Water Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Duration	Scale	Severity	Initial Probability	Initial Score Before mitigation
Water - Hydrology	Site Clearance	Construction of Roads	Changes in surface hydrological patterns and processes	Indirect Negative High	Permanent	Site	Medium	Definite	<b>60</b>
Water - Hydrology	Operational	Generation of hydrocarbon spills	Changes in surface water quality runoff	Indirect Negative Low	Long term	Site	Medium	Definite	<b>55</b>

## j) Summary of specialist reports

*This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form:*

The specialist studies and recommendations incorporated in the report are indicated in the table below.

**Table 21: Summary of Specialist Reports**

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Palaeontological impact assessment	<p><b>1. Mitigation measures to limit loss of palaeontological resources</b></p> <ul style="list-style-type: none"> <li>✎ All staff must be informed of the need to watch for potential fossil occurrences.</li> <li>✎ Inform staff of procedures to be followed in the event of fossil occurrences.</li> <li>✎ Excavations must be monitored by on-site personnel under the supervision of the Environmental Site Officer (ESO).</li> <li>✎ Liaise on nature of potential finds and appropriate responses.</li> <li>✎ A professional palaeontologist must be appointed to respond to queries about any possible or definite fossils found. In the event of a significant fossil find, a palaeontologist will supervise the excavation of the fossils and record the contexts. This palaeontologist must undertake the recording of the stratigraphy and sedimentary geometry of the exposures, must attempt sampling of the ambient small fossil content and must undertake the compilation of the detailed report.</li> <li>✎ A permit will have obtained from SAHRA for any finds.</li> </ul>	x	<p>Baseline Environment: Type of environment affected by the proposed activity.</p> <p>Description of specific environmental features and infrastructure on the site.</p> <p>The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.</p> <p>The possible mitigation measures that could be applied and the level of risk.</p> <p>Assessment of each identified potentially significant impact and</p>

			risk  Summary of the key findings of the environmental impact assessment;
Heritage Impact Assessment	<p><b>1. Mitigation measures to limit loss of heritage and cultural resources</b></p> <ul style="list-style-type: none"> <li>✎ Once the exact location of the proposed boreholes is available these should be investigated individually by a qualified archaeologist.</li> <li>✎ It is recommended that the development designs take into account the positive and negative characteristics of the existing cultural landscape type.</li> <li>✎ If mining activities are considered, the areas should be submitted to a full Heritage Impact Assessment.</li> <li>✎ Obscured, subterranean sites must be managed, if they are encountered. <ul style="list-style-type: none"> <li>◇ All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and what procedure to follow.</li> <li>◇ Should any sub-surface remains of heritage sites be identified, all prospecting activities in the immediate vicinity (50m radius) should cease and the heritage practitioner should be informed as soon as possible.</li> <li>◇ In the event of obvious human remains the South African Police Services should be notified.</li> <li>◇ Mitigation measures, such as refilling, should not be attempted.</li> <li>◇ The area of the find and a 50m radius thereof should be marked off with hazard tape, placed under guard and public access should be limited.</li> <li>◇ No media statements should be released until such time as the heritage practitioner has had sufficient time to analyse the finds.</li> </ul> </li> </ul>	X	<p>Baseline Environment: Type of environment affected by the proposed activity</p> <p>Description of specific environmental features and infrastructure on the site</p> <p>The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected</p> <p>The possible mitigation measures that could be applied and the level of risk</p> <p>Assessment of each identified potentially significant impact and risk</p> <p>Summary of the key findings of the environmental impact assessment;</p>
Flora Impact Assessment	<p><b>1. Mitigation measures to limit loss of biodiversity</b></p> <ul style="list-style-type: none"> <li>✎ Reduce dust emission</li> <li>✎ Manage surface water quality run-off in the basin</li> </ul>	x	<p>Baseline Environment: Type of environment affected by the</p>

	<ul style="list-style-type: none"> <li>➤ Protect all known regional populations of species at risk via Biodiversity Offset to buffer species against possible loss of or changes in source populations.</li> </ul> <p><b>2. Mitigation measures to limit the spread of alien and invasive species</b></p> <ul style="list-style-type: none"> <li>➤ All workers must be trained and educated on environmental sensitivities of the site and appropriate behaviour especially with regard species introductions.</li> </ul> <p>The following obligations for monitoring and conservation carried by the mine are noted and incorporated by Black Mountain Mine’s environmental management team.</p> <ul style="list-style-type: none"> <li>➤ An Alien Plant and Animal Monitoring and Control program is incorporated in Black Mountain Mine’s management.</li> </ul> <p>No-go areas should be clearly demarcated on the ground and on mine plans. Development of a detailed biodiversity management plan to ensure that the proposed avoidance and mitigation measures associated with construction are effectively implemented (incorporated by the Black Mountain Mine Environmental Management team)</p>		<p>proposed activity</p> <p>Description of specific environmental features and infrastructure on the site</p> <p>The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected</p> <p>The possible mitigation measures that could be applied and the level of risk</p> <p>Assessment of each identified potentially significant impact and risk</p> <p>Summary of the key findings of the environmental impact assessment;</p>
Fauna Specialist Report	<p><b>1. Measures to manage the potential disturbance of on-site fauna.</b></p> <ul style="list-style-type: none"> <li>➤ The footprint should be reduced as far as possible;</li> <li>➤ Sensitive areas, i.e. aquatic systems and habitats supporting key faunal species should be avoided;</li> <li>➤ All disturbed areas must be rehabilitated during all phases of the project to reinstate natural habitat. If applicable, a rehabilitation plan should be designed by an appropriate specialist which includes erosion control structures and revegetation measures with indigenous species only;</li> <li>➤ Personnel and contractors must be prohibited from having domestic dogs and cats on the premises. A feral dog and cat control programme</li> </ul>	x	<p>Baseline Environment: Type of environment affected by the proposed activity</p> <p>Description of specific environmental features and infrastructure on the site</p> <p>The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the</p>

	<p>must be implemented where monitoring indicate any presence of domestic animals on site;</p> <ul style="list-style-type: none"> <li>✦ The movement of people and vehicles must be restricted and controlled and areas should be clearly demarcated;</li> <li>✦ Speed limits must be implemented and enforced;</li> <li>✦ Maintain roads and implement dust control measures as far as practical on management roads;</li> <li>✦ Prospecting take-off single tracks should be used sparingly with no bulldozing or chemical dust suppression treatment. Dust suppression will be by speed limit only.</li> <li>✦ Light pollution must be kept to a minimum so as to not interfere with insect life cycles and nocturnal vertebrates as far as safety does not decrease. Low pressure sodium vapour lights/ LED lights with wavelengths of limited attractiveness to insects, facing inwards to the mine, are recommended;</li> <li>✦ Drill holes must be temporarily plugged directly after drilling to fulfil access and safety requirements.</li> <li>✦ Once drilling is completed permanent capping must be installed that will fulfil the departmental requirements for access, surface water ingress, safety, stability and monitoring (where applicable);</li> <li>✦ The loss of the sensitive faunal habitats must be avoided (e.g. breeding areas, raptor nests); and</li> <li>✦ A concurrent rehabilitation plan for sites, roads and laydown areas should be in place before drilling commence, implemented concurrently during drilling and monitored for compliance.</li> </ul>		<p>environment and the community that may be affected</p> <p>The possible mitigation measures that could be applied and the level of risk</p> <p>Assessment of each identified potentially significant impact and risk</p> <p>Summary of the key findings of the environmental impact assessment;</p>
<p>Gamsberg Biodiversity Offset</p>	<ul style="list-style-type: none"> <li>✦ Complete the implementation of the original offset agreement, to the satisfaction of an external auditor, before proceeding with new impacts on biodiversity in the areas originally set aside for offsetting the mine impacts.</li> <li>✦ The study on the additional offset requirements from prospecting on Gamsberg assumes that the quantification of residual negative impacts of the prospecting is reliable. Should monitoring highlight significant changes in impact predictions, it would be necessary to revisit the offset</li> </ul>	<p>x</p>	<p>Conditions for inclusion in the EMP</p>



	<p>requirements accordingly, and it is worth including any recalculation as a specific term of reference for any audit process for the offset or environmental mitigation for Gamsberg and BMM</p> <ul style="list-style-type: none"> <li>✎ Monitoring and Evaluation of the impact of dust, mitigation measures and the spatial footprint of the prospecting and road construction, must be done according to table 1 and 3 of the Gamsberg Biodiversity Offset (Appendix G).</li> <li>✎ The original offset implementation agreement (including the required offset quantum, specifics and most suitable target sites) must only be formally augmented once there is greater clarity on the full scope of anticipated biodiversity impact from all prospecting activities and planned new infrastructure, acknowledging that there are some biodiversity features which are not offsetable and which should not be further compromised by BMM, but which can be compensated for through the measures suggested in this report.</li> </ul>		
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Attach copies of Specialist Reports as appendices, marked **Appendix D1** (Palaeontological Impact Assessment Report), **Appendix D2** (Heritage Impact Assessment Report), **Appendix D3** (Flora Impact Assessment), **Appendix D4** (Fauna Impact Assessment) **Appendix D5** (Heritage Impact Assessment 2018) and **Appendix G** (Biodiversity offset report).

### k) Environmental impact statement

#### (i) Summary of the key findings of the environmental impact assessment;

Table 22: Summary of Impact Assessment WITH mitigation

### Legal Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Legislative	Plan & Design	Clearing Indigenous Vegetation	Unlawfull activity: Impacting protected species without permission	Direct Negative High	Improbable	11
Legislative	Plan & Design	Clearing Soils	Unlawfull activity: Impacting heritage without notification to	Direct	Improbable	13

			regulator or permission	Negative High		
Legislative	Plan & Design	Construction of Roads	Unlawfull activity: Affecting a water resource without permission	Direct Negative High	Improbable	<b>13</b>
Legislative	Plan & Design	Invasive Prospecting: Drilling	Unlawfull activity: transgressing regulation 704 specifications	Direct Negative High	Improbable	<b>13</b>
Legislative	Plan & Design	Monitoring	Compliance: transgressions resulting in penalties and fines	Direct Negative High	Improbable	<b>13</b>

## Dust Related Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Dust	Operational	Generation of Dust	Changes in air quality - dust	Direct Negative Low	Improbable	<b>4</b>
Dust	Operational	Generation of Dust	Loss of habitats	Direct Negative High	Improbable	<b>13</b>
Dust	Operational	Generation of Dust	Social: Health and Safety of individuals on site	Indirect Negative Low	Improbable	<b>8</b>
Dust	Site Clearance	Generation of Dust	Changes in air quality - dust	Direct Negative Low	Probable	<b>8</b>
Dust	Site Clearance	Generation of Dust	Ecological system impacts: Ecological process & function deterioration/ breakdown	Indirect Negative High	Improbable	<b>11</b>
Dust	Site Clearance	Generation of Dust	Loss of habitats	Direct Negative Moderate	Improbable	<b>9</b>
Dust	Site Clearance	Generation of Dust	Loss of species	Direct Negative High	Improbable	<b>16</b>

## Ecological Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
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Ecology	Site Clearance	Invasive Prospecting: Drilling	Ecological system impacts: habitat fragmentation	Direct Negative High	Probable	22
Ecology	Site Clearance	Clearing Indigenous Vegetation	Ecological system impacts: Ecological process & function deterioration/ breakdown	Direct Negative Moderate	Highly Probable	44
Ecology	Site Clearance	Clearing Soils	Ecological system impacts: Ecological process & function restoration	Direct Negative High	Highly Probable	52
Ecology	Site Clearance	Construction of Roads	Ecological system impacts: habitat fragmentation	Direct Negative High	Probable	26
Ecology	Site Clearance	Invasive Prospecting: Drilling	Changes in soil functionality: compaction	Direct Negative High	Highly Probable	52
Ecology	Site Clearance	Disturbance: Traffic	Changes in soil functionality: compaction	Direct Negative High	Highly Probable	52
Ecology	Site Clearance	Clearing Indigenous Vegetation	Changes in surface water quality runoff	Direct Negative Low	Improbable	10
Ecology	Site Clearance	Clearing Indigenous Vegetation	Loss of sensitive habitats	Direct Negative High	Highly Probable	56

## Faunal Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Fauna	Site Clearance	Disturbance: Noise	Disturbance of fauna engagement patterns	Direct Negative Low	Probable	16
Fauna	Site Clearance	Clearing Indigenous Vegetation	Loss of habitats	Indirect Negative Moderate	Probable	20
Fauna	Operational	Disturbance: Light	Disturbance of fauna engagement patterns	Direct Negative Moderate	Improbable	12
Fauna	Operational	Disturbance: Noise	Disturbance of fauna engagement patterns	Direct Negative Moderate	Probable	24
Fauna	Operational	Disturbance: Traffic	Persecution of fauna - road kills	Indirect Negative Moderate	Probable	20

## Flora Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Flora	Site Clearance	Clearing Indigenous Vegetation	Change in species composition	Direct Negative Moderate	Highly Probable	60
Flora	Site Clearance	Clearing Indigenous Vegetation	Loss of vegetation cover	Direct Negative High	Probable	26
Flora	Site Clearance	Clearing Indigenous Vegetation	Loss of species	Direct Negative High	Highly Probable	52
Flora	Site Clearance	Clearing Indigenous Vegetation	Loss of populations	Direct Negative High	Highly Probable	60
Flora	Operational	Invasive Prospecting: Drilling	Changes in vegetation composition: Alien species encroachment	Indirect Negative Moderate	Improbable	9

## Heritage Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Heritage	Site Clearance	Invasive Prospecting: Drilling	Loss of heritage artefacts or archaeological resources	Direct Negative High	Improbable	15
Heritage	Site Establishment	Invasive Prospecting: Drilling	Loss of paleontological resources	Direct Negative Low	Improbable	9

## Land-use Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Land use	Closure	Rehabilitation	Change in land use potential	Indirect Negative Low	Probable	28

## Noise Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Noise	Site Clearance	Disturbance: Noise	Disturbance: noise	Direct Negative Low	Definite	20
Noise	Operational	Disturbance: Noise	Disturbance: noise	Direct Negative Low	Definite	20

## Rehabilitation Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Rehabilitation	Site Clearance	Clearing Indigenous Vegetation	Costs: increase in rehabilitation costs	Indirect Negative Moderate	Definite	65
Rehabilitation	Rehabilitation	Lack of Monitoring	Costs: Increased management costs	Indirect Negative Low	Definite	65
Rehabilitation	Rehabilitation	Maintenance	Costs: shift in rehabilitation costs	Indirect Positive Moderate	Definite	65
Rehabilitation	Monitoring	Maintenance	Changes to landscape: transformation	Direct Positive Low	Definite	40
Rehabilitation	Closure	Monitoring	Change in land use potential	Indirect Positive Low	Definite	55

## Soil Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Soil	Site Clearance	Clearing Soils	Changes in soil functionality: depletion	Direct Negative Low	Probable	20
Soil	Operational	Generation of hydrocarbon spills	Contamination of Soil - loss of soil function	Direct Negative Moderate	Improbable	8

## Ground Water Quality Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Water - Groundwater	Operational	Invasive Prospecting: Drilling	Changes in ground water quality	Indirect Negative High	Probable	28
Water - Groundwater	Monitoring	Maintenance	Changes in ground water quality	Indirect Negative Low	Definite	70

## Surface Water Risks

Element	Project Phase	Activity	Impact Description	Impact Type Degree of loss	Final Probability	Final Score Residual
Water - Hydrology	Site Clearance	Construction of Roads	Changes in surface hydrological patterns and processes	Indirect Negative High	Improbable	12
Water - Hydrology	Operational	Generation of hydrocarbon spills	Changes in surface water quality runoff	Indirect Negative Low	Improbable	11

**(ii) Final Site Map**

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

**(iii) Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;**





No new impacts, risks or alternatives are applicable to the detailed list and tables of the alternatives, impacts (positive and negative), risks and mitigation measures described above.

**l) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr**








*Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorization*

Impact management objectives will be developed to ensure that adverse socio-economic impacts are minimised and socio-economic benefits are maximised. Measures will further be defined to avoid, prevent, limit or manage any impacts.

The objectives of the EMPr will be to:

-  Provide sufficient information and guidance to plan prospecting activities in a manner that would reduce both social and environmental impacts as far as possible;
-  Provide sufficient information to strategically plan the prospecting activities to avoid unnecessary social and environmental impacts;
-  Provide a management plan that is effective and practical for implementation; and
-  Ensure an approach that will provide the necessary confidence in terms of environmental compliance.


Through the implementation of the mitigation and management measures it is expected that:

-  Limited biodiversity and flora species loss will take place;
-  Noise impacts can be managed through consultation and restriction of operating hours;
-  Risks associated with crime can be mitigated through the avoidance of recruitment activities on site and also monitoring and reporting;
-  The water and soil resource pollution can be effectively managed through containment;
-  Water resource availability can be managed through groundwater monitoring strategies;
-  Ecological impact can be managed through the implementation of pollution prevention measures, land clearance minimisation, faunal disturbance by restricting working hours and rehabilitation; and
-  Visual impact can be minimised through the consideration of the material used for temporary infrastructure and drill site infrastructure used.

**m) Aspects for inclusion as conditions of Authorisation**

*Any aspects which must be made conditions of the Environmental Authorisation*

The following conditions should be considered for inclusion in the Authorisation:

-  If any prospecting takes place within the buffer areas of any river or pan an application for general authorization in terms of section 21 c and i or exemption in terms of regulation 704 must be applied for.



- ✿ If any protected, specially protected flora or nationally protected trees are affected, the required authorisation should be applied for before specimens are affected in any way.
- ✿ Any activities occurring within habitats that is not sufficiently secured in the BMM offset properties can only be drilled once sufficient offset properties have been secured to allow for drilling in these habitats.
- ✿ Any activities occurring within areas that is not offset-able should not be authorised unless the biodiversity offset specialist report requirements can be fulfilled, amendment of the current offset agreement or establishment of a new offset agreement is in place where required.
- ✿ Current biodiversity offset obligation must be met and consent granted from all offset agreement parties in terms of the current biodiversity offset agreement prior to prospecting in biodiversity offset areas.

## n) Description of any assumptions, uncertainties and gaps in knowledge

*Which relate to the assessment and mitigation measures proposed*

The following assumptions, uncertainties and gaps are applicable to this project:

- ✿ Final comment from SAHRA is not yet available.
- ✿ The following assumptions have been made for the quantification of the Gamsberg mine offset:
  - The offset study must assume that all possible and required mitigation has been undertaken by the mine, and these requirements have been assessed and/or approved by the relevant regulatory authorities. In particular, that the habitats set aside and conserved on BMM owned land will be protected and managed for biodiversity for at least the duration of the impacts of the mine.
  - Offset design must cater for worst case scenarios, applying a risk-averse and cautious approach in accordance with the requirements of NEMA's environmental management principles.
  - With the exception of the sandy plain habitats no impacted area has the potential to be restored to or near their original condition within the life of the mine and its closure phase as the required ecological timeframes are far greater than the span of the closure plans. The physical and biophysical environmental qualities (including the specific size, soil structure and organism dynamics such as lichens, fungi and organic crust) that determine these habitats cannot be recreated.
  - The effectiveness of proposed mitigation actions around drill rigs is unclear. The rehabilitation assessment (EndemicVision 2018b) noted that residual impacts still affect rehabilitation potential, including drill sludge residue, soil structure impacts from erosion, inverted soil profiles, and irreversible compaction (not possible to mechanically address in the quartz habitats). Rock packing can be replicated after drilling, but quartz layering cannot be recreated.
  - The micro scale processes and ecological drivers on Gamsberg make it unique. Normally ecological drivers (like grazing) can be used to assist rehabilitation, but this is not possible on Gamsberg.
  - Impacts of fragmentation by roads is unclear.
  - Best mitigation remains footprint reduction and avoidance. This study must assume that footprint impacts will not be any larger than catered for in these calculations.

## o) Reasoned opinion as to whether the proposed activity should or should not be authorised

### i) Reasons why the activity should be authorized or not

The option of not authorizing the activities will result in a significant loss to valuable information regarding the presence and quality of the minerals present on the property.

A major driver for approval of this assessment is the expansion of the life of mine for Gamsberg Mining Project and associated socio-economic benefits to the local community, province and national.

The major driver in conflict with this is that prospecting is now required in areas declared as biodiversity sensitive (CBA01 and CBA02); is part of the existing biodiversity offset secured to authorise the Gamsberg mining project and declared as a conservation area in terms of the BMM Biodiversity Management plan.

## ii) Conditions that must be included in the authorisation

The following conditions should be considered for inclusion in the Authorisation:

- ✿ If any prospecting takes place within the buffer areas of any river or pan an application for general authorization in terms of section 21 c and i or exemption in terms of regulation 704 must be applied for.
- ✿ If any protected, specially protected flora or nationally protected trees are affected, the required authorisation should be applied for before specimens are affected in any way.
- ✿ Any activities occurring within habitats that is not sufficiently secured in the BMM offset properties can only be drilled once sufficient offset properties have been secured to allow for drilling in these habitats.
- ✿ Any activities occurring within areas that is not offset-able should not be authorised unless the biodiversity offset specialist report requirements can be fulfilled, amendment of the current offset agreement or establishment of a new offset agreement is in place where required.
- ✿ Current biodiversity offset obligation must be met and consent granted from all offset agreement parties in terms of the current biodiversity offset agreement prior to prospecting in biodiversity offset areas.

## p) Period for which the Environmental Authorisation is required

The life of project is anticipated to be 3 years.

## q) Undertaking

.....  
*Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMP and is applicable to both the Basic assessment report and the Environmental Management Programme report.*  
 .....

An undertaking by the EAP is provided for in Section 2 of the EMP (Part B) and is applicable to both the Basic Assessment Report and the Environmental Management Programme report.

**r) Financial Provision**

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.

**Table 23: Summary of Project Context for calculation**

Project Context						
<b>Land holding</b>						
Project Name	DMR Ref	Year Approved	LoM	Property Name	Erf No.	Ownership
Gamsberg South & East	NC5 39/5/1/2/2/ (518) MR	2019	2024	Gamsberg	Gams 60, Portion 01	Black Mountain Mining Pty (Ltd)
<b>Drilling Status</b>						
Project Name	Access Roads	Total Approved # Drill Sites	Sites Drilled	Sites Planned for Drilling	Drill Sites rehabilitated	Rehabilitation Signed off
Gamsberg South & East	numerous	80	0	80	0	0
<b>Rehabilitation Status: Roads, Laydown areas and Drill Sites</b>						
Project Name	Total landholding (ha)	Approved footprint (ha)	Disturbed (ha)	Planned Disturbance (ha)	Rehabilitated (ha)	Balance (Disturbed-Rehab)
Gamsberg South & East	2,089.22	7.63	-	7.63	-	-

**Table 24: Summary of Project Financial Quantum**

Financial Quantum Summary						
Financial quantum per closure and rehabilitation works						
Project	Safety and Security	Pollution Control	Rehabilitation	Maintenance	Monitoring	Total
Gamsberg South & East	434,534.40	1,410,050.10	184,523.54	23,768.38	375,307.08	<b>2,428,183.51</b>

**i) Explain how the aforesaid amount was derived.**

The following section details the methodologies adopted to calculate the quantities, associated rehabilitation (clean closure) rates and eventually the final (clean) closure cost estimate

Please refer to the BMM Gamsberg East and South Financial Provision Cost Report appended to this submission that details methodologies and approach.

The financial provision provided in terms of section 41 and regulation 53 of the Act must be periodically reviewed and adjusted to conform to the relevant prospecting activities.

Concurrent rehabilitation costs occur annually as drilling progressed. Rehabilitation costs are incorporated both into the drilling program and the drilling operator contract.

The detail tables of the assessment are available in the financial provision report attached to this application.

**ii) Confirm that this amount can be provided for from operating expenditure.**

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

The rehabilitation costs are incorporated as part of the prospecting tender and secured in the budget to appoint drilling contractor before commencement and a financial guarantee is secured before commencement.

**s) Specific Information required by the competent Authority**

- i) Compliance with the provisions of sections 24(4) (a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). The EIA report must include the: -**

**(1) Impact on the socio-economic conditions of any directly affected person.**

.....  
*Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an Appendix*  
 .....

No specific report was generated for the purposes of the socio-economic conditions. The directly affected persons in terms of this application is the proponent itself. BMM is both the landowner and developer of the property.

**(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.**

.....  
*Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on 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, attach the investigation report as **Appendix D2** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12. herein.*  
 .....

A Heritage Impact Assessment of the prospecting area has been conducted to identify any cultural, heritage and/or archaeological features which may be impacted on.

**t) Other matters required in terms of sections 24(4) (a) and (b) of the Act**

.....  
*The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as Appendix Z*  
 .....

Not applicable.

## PART B: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

### 1. Draft environmental management programme

#### a) Details of the EAP,

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

The requirement for the provision of the details and expertise of the EAP are included in Part A, Section (1) (a).

#### b) Description of the Aspects of the Activity

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

The requirement to describe the aspects of the activity that are covered by the draft environmental management programme is included in Part A, Section (1) (h).

#### c) Composite Map

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





Please refer to **Appendix F** for the composite map.

#### d) Description of Impact management objectives including management statements

##### i. Determination of closure objectives

.....  
*Ensure that the closure objectives are informed by the type of environment described.*  
 .....

Black Mountain Complex currently commits to the following closure objectives:

1. To secure the effective and sustainable transfer of the municipal services of the town, Aggeneys, and the Pella-drift Water Board to the Khai-Ma municipality.
2. To ensure that the biodiversity and environment on the site is protected.
3. To make sure that the following commitments will be achieved as a minimum:
  -  The site will be made safe for both humans and animals,
  -  The site will be rehabilitated to be physically, chemically and biologically stable
  -  The residual impacts will be managed to acceptable levels and will not deteriorate over time, and
  -  Closure will be achieved with minimal socio-economic upheaval.
4. To provide sufficient funds at the end of life of mine, to properly implement the closure plan, and also to make provision for possible premature closure, and post closure monitoring requirements.

Concurrent rehabilitation is required from the contracted company. Each drill site has to be cleaned from all evidence of pollution and made safe as part of decommissioning. All drill holes are capped and marked for safety of persons and animals on site.

Post drilling rehabilitation status evaluation will be evaluated and provide specific remedial measures for implementation until satisfactory rehabilitation has been completed.

## **ii. Volumes and rate of water use required for the operation.**

During the operational phase water will be supplied from Pella water drift orange river pump station to Gamsberg. Supply from Pella water drift orange river pump station to Gamsberg then delivered via JoJo tanks, aqua dams and pipes or watercarts for up to 150 000 liters storage. Where water use will exceed the general authorisation volume for the area, BMM WUL will be checked for application of compliance or new authorisation sought whichever is applicable. The site has a water use license and is authorised to use water beyond the generally authorised amounts. No groundwater will be extracted for prospecting.

## **iii. Has a water use licence been applied for?**

Black Mountain Mine has an existing water use license. Licence number 14/D82C/ABCGIJ/2654 issued on 2016/04/14. In terms of legal application, in summary water can legally be used without a WUL for domestic use for the prospecting project and water can be stored up to 50 000 cubic meters for domestic and prospecting use.

No water use license is required where water use is limited to the above volumes, drilling takes place outside 100 meters of a water course and regulation 704 buffer areas of 500 meters is applied to pans. Drilling can be conducted legally without a WUL or regulation 704 exemption application as long as BMM avoids drilling within 100 meters of a water course or 500 meters from a pan. Where drilling will exceed these buffers, application for authorisation can be made to the Department of Water and Sanitation (DWS).



**iv. Impacts to be mitigated in their respective phases***Measures to rehabilitate the environment affected by the undertaking of any listed activity***Table 25: Concurrent Rehabilitation Schedule**

Rehabilitation plan								
ITEM	2019	2020	2021	2022	2023	2024	2025	
<b>REHABILITATION PLANNING AND BASELINE VERIFICATION</b>								
Demarcation of areas: drill pads and roads	50	20	10					
Demarcation of areas: rehabilitation	20	50	10					
Site verification and staff training	all	all	all					
Schedule transplantation, nursery specimens, seed collecting.	20	50	10	Seed collecting to continue if need be				
Site Evaluation - Baseline	80	80	80					
<b>CONCURRENT REHABILITATION</b>								
Pre-clearance risk assessment, search and rescue	50	20	10					
Site clearance and topsoil stockpiling	50	20	10					
Direct transplantation	50	20	10	20				
<b>DRILLING AND POLLUTION CONTROL</b>								
Drilling	50	20	10					
Pollution control and clean-up	50	20	10					
Closure of drill sumps	50	20	10					
De-compaction	50	20	10					
Safeguarding the drill site	50	20	10					
<b>REHABILITATION - POST DRILLING</b>								
Rehabilitation status inspection	20	80	80	20				
Site Evaluation - post impact monitoring	20	80	80	20				
Soil amelioration	20	20	20	20				
Re-vegetation - transplantation	20	80	80	20				
Re-vegetation - sowing	20	80	80	20				
Site Evaluation - post rehabilitation phase 01	20	50	10	20		20		
<b>REHABILITATION MONITORING AND MAINTENANCE</b>								
Annual Monitoring	0	20	50	60	80	80	80	
Annual Maintenance	0	20	50	60	80	80	80	

### e) Impact Management Outcomes

A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph (i);

**Table 26: Impact Management Outcomes**

ASPECTS								OUTCOMES	
Resource Use	Waste Management	Air Emission	Water Pollution	Noise / Vibration	Land Contamination	Biodiversity Disturbance	Socio Economic Changes	Element	Environmental Management Objective
						1		Biodiversity	To minimise biodiversity impact in the proposed development area.
		1						Dust	Limit dust impacts from site clearance and traffic
						1		Ecology	Limit habitat destruction and fragmentation during site clearance and construction
						1		Ecology	Manage interaction with the environment during construction
						1		Ecology	To minimise ecological sensitive area impacted the proposed development area.
							1	Economic	Maintenance and monitoring management
						1		Fauna	Limit faunal impacts because of traffic
						1		Fauna	Limit faunal habitat destruction and fragmentation during site clearance and construction
						1		Fauna	Manage interaction with fauna during construction

						I		Flora	<b>Ensure vegetation protection through the project life cycle</b>
						I		Flora	<b>Protect sensitive species variations and populations.</b>
						I		Flora	<b>Manage alien invasive species</b>
							I	Health and Safety	<b>Limit injuries to individuals on site</b>
								Heritage	<b>Minimise the impact on archaeological and palaeontological resources</b>
								Heritage	<b>Limit loss of heritage artefacts or archaeological resources during site clearance, road construction and earth works</b>
						I		Land use	<b>Restore land use value to sustainable land use or natural pre-determined state</b>
I			I					Legislative	<b>Ensure compliance to the National Water Act and applicable regulations</b>
I			I					Legislative	<b>Manage Section 21 c and i water use risks</b>
I			I					Legislative	<b>Ensure surface water management in terms of Regulation 704</b>
I								Legislative	<b>Ensure authorisation for clearance is obtained from SAHRA</b>
						I		Legislative	<b>Ensure legal compliance through monitoring</b>
				I				Noise	<b>Reduce noise impacts</b>
						I		Rehabilitation	<b>Manage rehabilitation sustainability through proper planning</b>
					I			Soil	<b>Prevent and manage soil contamination</b>
I			I					Water - Hydrology	<b>Reduce impact on surface hydrology and consequential secondary impacts</b>

-			-					Water - Surface	<b>Manage and limit the impact of mineral waste generation and accumulation on surface water</b>
-			-					Water - Groundwater	<b>Manage and limit impact on groundwater levels and quality</b>

## f) Impact Management Actions

*A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved*

**Table 27: Impact Management Actions**

## Legal Mitigation Measures

OUTCOMES	ACTIONS			
Environmental Management Objective	Avoidance Measures	Reduction Measures	Remedial Measures	Monitoring Measures
<b>Ensure compliance to the National Water Act and applicable regulations</b>	Various roads and boreholes are located within the 100m buffer zone of non-perineal rivers and required application for general authorization in terms of section 21 c and i must be applied for where required.		Implement mitigation and rehabilitation measures as recommended by a suitable professionally registered person and as per Section 21 c and i risk assessment and management plan if and where applicable	Implement a monitoring program as recommended by a suitable professionally registered person and Section 21 c and i General Authorization Conditions if and where applicable
<b>Manage Section 21 c and i water use risks</b>		Water use in the instream and/or riparian habitats as applicable must not result in potential, measurable, cumulative detrimental decline in diversity of communities and composition of the natural, endemic vegetation	In terms of rehabilitating impacts (water use) (a) a systematic rehabilitation program must be undertaken to restore the watercourse to its condition prior to the commencement of the water use; (b) all disturbed areas must be revegetated with indigenous vegetation suitable to the area and (c) active alien invasive plant control measures must be implemented to prevent invasion by exotic and alien vegetation within the disturbed area.	In terms of monitoring, annual environmental audits for three years are required to ensure that the rehabilitation is stable; failing with remedial action must be taken to rectify any impacts.

<b>Ensure surface water management in terms of Regulation 704</b>		Proponent must ensure concurrent rehabilitation to reduce surface areas where dirty water can accumulate. Storm water berms must be vegetated immediately to protect against wind and water erosion and possible failure. Concurrent rehabilitation must address water pollution control concerns.	Concurrent rehabilitation requirements must be addressed according to the BMM Integrated Closure Plan 2018	Implementation of concurrent rehabilitation and rehabilitation monitoring of riverine habitat is required.
<b>Ensure authorization for clearance is obtained from SAHRA</b>	Final comment from SAHRA must be in hand before drilling.	Instructions from SAHRA final comment must be implemented as part of the EMP.		
<b>Ensure legal compliance through monitoring</b>	Sufficient resources and funds must be available to maintain the required monitoring, data analysis and management of elements monitored throughout the project.	Monitoring must be outsourced where skills and expertise are not found in-house.	Where monitoring is adhered to according to authorizations, notification and rectification plan should be submitted to the relevant authority. Where data deviate from required norms and standards, immediate actions plans to rectify root cause for change in element quality must be put in place, executed and monitored for success.	Monitoring records should be kept for life of the project and at least five years after project closure.

## Dust Impact Mitigation Measures

<b>Environmental Management Objective</b>	<b>Avoidance Measures</b>	<b>Reduction Measures</b>	<b>Remedial Measures</b>	<b>Monitoring Measures</b>
<b>Limit dust impacts from site clearance and traffic</b>		Maintain slow speed limits to reduce dust on site and in area.	Dust impacts cannot be remediated.	Dust monitoring is applicable where this is a significant risk or impact on third parties must be monitored. Ensure compliance according to NEMAQA and dust regulations where applicable.

## Ecological Mitigation Measures

<b>Environmental Management Objective</b>	<b>Avoidance Measures</b>	<b>Reduction Measures</b>	<b>Remedial Measures</b>	<b>Monitoring Measures</b>



<p><b>Limit habitat destruction and fragmentation during site clearance and construction</b></p>	<p>Construction of new roads are avoided as far as possible. No dry watercourse, wetland, flood line or riparian vegetation should be fragmented by new road construction. Where this is inevitable, on-site environmental risk assessment by suitably competent person should be conducted to reduce impacts before construction.</p>	<p>Roads are reduced to a single track, using existing take-off roads for turning points.</p>	<p>Road verges should be restored to natural state as soon as possible after road construction. This would include storm water diversions and landscaping, replacement of topsoil, brush packing, seeding and/or planting.</p>	<p>All take-off roads for the purposes of drilling only must be rehabilitated with continuous rehabilitation monitoring.</p>
<p><b>Manage interaction with the environment during construction</b></p>	<p>Disturbance footprint should be limited to the minimum required footprint and be assessed before site clearance. No dogs should be allowed on site. No fires (heating or cooking) is allowed on site. No fuel wood collection is allowed on-site.</p>	<p>Sites should be demarcated and prevent fauna / area interactions with drilling water or open boreholes. It should be endeavored that the construction site and loose material will not be exposed to rain resulting in excessive erosion, siltation and general disturbance down slope.</p>	<p>Drilling should be completed in shortest possible time period to limit impact on ecological processes.</p>	<p>Monitor community members accessing the site, maintain complaints register and respond to concerns as appropriate.</p>
<p><b>To minimize ecological sensitive area impacted the proposed development area.</b></p>	<p>Avoidance should be applied to highly sensitive ecological areas (pans and CBA 01 / CBA 02 areas) as mapped on the sensitivity mapping. Where avoidance cannot be achieved, offset targets should be met according to the Biodiversity Offset Report before impacts take place.</p>	<p>In order to minimize the disturbed area and disturbance impact the project should be completed as soon as possible and return to a state of recovery before the next rain season.</p>	<p>Rehabilitation of all disturbed areas should be conducted concurrently with locally collected specimens replaced to their specific habitats.</p>	<p>Species relocation and rehabilitation efforts should be monitored in terms of habitat complexity to gauge the return of ecological processes.</p>

## Faunal Mitigation Measures

<p><b>Environmental Management Objective</b></p>	<p><b>Avoidance Measures</b></p>	<p><b>Reduction Measures</b></p>	<p><b>Remedial Measures</b></p>	<p><b>Monitoring Measures</b></p>
<p><b>Limit faunal impacts because of traffic</b></p>	<p>Ensure that construction activities are staggered and vehicular activities are kept to a minimum.</p>	<p>Vehicle speed should be limited to 30km per hour in areas with indigenous vegetation to reduce probability of road kills.</p>	<p>If more than one roadkill is encountered, the area should be investigated for fauna breeding or migration and an alternative route considered.</p>	<p>Road kills should be recorded for the project to give indication of fauna activity in the area. Recording should include species, date, area.</p>

<p><b>Limit faunal habitat destruction and fragmentation during site clearance and construction</b></p>	<p>Avoid construction of new roads as far as possible. Re-use drill sites as far as possible.</p>	<p>Reduce the number and width of roads required by proper planning and agreement to a single traffic management plan.</p>	<p>Road verges should be restored to natural state as soon as possible after road construction. This would include storm water diversions and landscaping, replacement of topsoil, brush packing, seeding and/or planting.</p>	
<p><b>Manage interaction with fauna during construction</b></p>	<p>Site access should be controlled and no unauthorized persons should be allowed onto the site. All vehicles and machinery should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.</p>	<p>The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site. If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.</p>	<p>Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person. Faunal sweeps within habitats such as bush clumps should take place before clearing and any fauna located should form part of a search and rescue and relocated to safety.</p>	<p>Faunal encounters should be noted and reported as part of the rehabilitation monitoring to indicate return of these species after rehabilitation.</p>

## Flora Mitigation Measures

<p><b>Environmental Management Objective</b></p>	<p><b>Avoidance Measures</b></p>	<p><b>Reduction Measures</b></p>	<p><b>Remedial Measures</b></p>	<p><b>Monitoring Measures</b></p>
<p><b>Ensure vegetation protection through the project life cycle</b></p>	<p>All vehicles and machinery should adhere to clearly defined and demarcated roads. No off-road driving to be allowed. Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. Multiple boreholes should be drilled from one drill site. Re-use of existing boreholes and roads. No unauthorized site clearing or disturbance at the site without an ECO present.</p>	<p>Pre-clearance inspections should be completed before road or site establishment. Search and rescue of all listed species and species with high probability of survival for community reconstruction should be photo catalogued, geo-referenced and rescued for transplantation and concurrent rehabilitation purposes.</p>	<p>Temporary roads and storage areas should be investigated and rehabilitated after use, even if vegetation clearance were minimal. Concurrent rehabilitation should be implemented before the next rain season with specific site specimens replaced and buffered (watering, planting method and amelioration) to ensure vegetation cover and composition is returned as best possible.</p>	<p>Vegetation cover and composition should make out part of the baseline and rehabilitation monitoring program.</p>

<p><b>Protect sensitive species variations and populations.</b></p>	<p>Site clearance for new boreholes should be minimized to prevent impact on sensitive species. Sensitive habitats (pans and CBA 01 and CBA 02) should be avoided unless a biodiversity offset is secured before impact takes place.</p> <p>Any nationally protected trees within close proximity of the development footprint to be identified and avoided or special permits obtained to remove the trees, meeting the obligations of such permits issued.</p>	<p>Search and rescue operations in sensitive areas should rescue all possible plants and the growth medium with the plants where drilling will take place. This will ensure species not visible during the time of rescue is also secured and hopefully the seedbank in the topsoil as well. The growth medium should be carefully managed to activate in-situ seedbank and bulbs.</p>	<p>Rescued specimens should be used for concurrent rehabilitation. Only areas designated for long term protection and no further drilling should be rehabilitated. Ex-situ propagation and seed production and banking of special species should be part of the concurrent rehabilitation program at the BMM nursery and at least one other nursery.</p>	<p>Specialist species monitoring and rehabilitation monitoring should take place on reference and drill sites before and after drilling.</p>
<p><b>Manage alien invasive species</b></p>	<p>Prevent and limit alien invasive species establishing on site by conducting concurrent rehabilitation and vegetating bare areas as soon as possible.</p>	<p>Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.</p>	<p>Reintroduce local indigenous seed and species during rehabilitation. Vegetate area with specimens rescued from site where possible. This should be done where areas were cleared and where alien species were removed.</p>	<p>Alien vegetation monitoring and maintenance plans should be in place for the site during operation and for the rehabilitated areas after operation has ceased</p>

## Heritage Mitigation Measures

<p><b>Environmental Management Objective</b></p>	<p><b>Avoidance Measures</b></p>	<p><b>Reduction Measures</b></p>	<p><b>Remedial Measures</b></p>	<p><b>Monitoring Measures</b></p>
<p><b>Minimize the impact on archaeological and paleontological resources</b></p>	<p>Once the exact location of the proposed diamond boreholes on new areas is available these should be investigated individually by a qualified archaeologist.</p>	<p>If any concentration of heritage material (including graves, burials or human remains) are uncovered during the project, it should be reported to the South African Heritage Resources Agency immediately so that systematic and professional investigation/excavations can be undertaken. Sufficient time should be allowed to remove/collect such material.</p>		

<p><b>Limit loss of heritage artefacts or archaeological resources during site clearance, road construction and earth works</b></p>	<p>No heritage artefacts or archaeological resources should be damaged or destroyed by site clearance, road construction or earth works.</p>	<p>Reduce the number and width of roads required by proper planning and agreement to a single traffic management plan.</p> <p>Where this is inevitable, on-site environmental risk assessment by suitably competent person should be conducted to reduce impacts before construction.</p>	<p>Road verges should be restored to natural state as soon as possible after road construction. This would include storm water diversions and landscaping, replacement of topsoil, brush packing, seeding and/or planting.</p>	<p>An archaeological and paleontological inventory plan must be developed and approved by SAHRA prior to site-specific developments.</p>
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## Land use Mitigation Measures

Environmental Management Objective	Avoidance Measures	Reduction Measures	Remedial Measures	Monitoring Measures
<p><b>Restore land use value to sustainable land use or natural pre-determined state</b></p>	<p>No area should be left unsafe, or as waste land after the project. All areas (small or great) must be rehabilitated to reduce cumulative effect of land use reduction as a result of the project.</p>	<p>Land use should be acceptable to the community and sustainable on the long term. Current land-use is conservation in terms of the BMM Biodiversity management plan and biodiversity offset agreement.</p>	<p>Where areas cannot be restored to sustainable land use or natural pre-determined state and alternative land use can be selected through specialist and community consultation process.</p>	<p>Monitor final land use quality before project closure and or handover.</p>

## Noise Mitigation Measures

Environmental Management Objective	Avoidance Measures	Reduction Measures	Remedial Measures	Monitoring Measures
<p><b>Reduce noise impacts</b></p>		<p>Adjacent landowners to the proposed activity will be notified of commencement of construction and expected timing for construction activities that would result in significant noise generation.</p>	<p>PPE must be worn by all employees and site visitors while drilling takes place.</p>	<p>The responsible engineer should check legislation and ensure that SANS standards relating to noise generation are observed.</p>

## Rehabilitation Mitigation Measures

Environmental Management Objective	Avoidance Measures	Reduction Measures	Remedial Measures	Monitoring Measures
<b>Manage rehabilitation sustainability through proper planning</b>	Ensure a rehabilitation plan is in place that incorporate physical and biophysical (biotic and abiotic remediation) designs specific to the site conditions.	Reduce rehabilitation costs by implementing rehabilitation according to the rehabilitation plan and review plan and monitoring results annually to adjust for continual improvement.	Fire, flood, wind and trampling impacts on rehabilitation works should be mapped and prioritized for follow-up as frequently as these impacts on rehabilitation occur.	Monitor the rehabilitation plan and rehabilitation success annually.

## Soil Mitigation Measures

Environmental Management Objective	Avoidance Measures	Reduction Measures	Remedial Measures	Monitoring Measures
<b>Prevent and manage soil contamination</b>	<p>Breakdowns must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil.</p> <p>Drill sludge should be contained in recycle units and not be allowed to run overland.</p> <p>The contractor must have a drill rig maintenance plan addressing each rig type with prestart checklists and no operation standards if prestart indicate faults.</p> <p>The appointed TMM engineer should inspect the rigs regularly to ensure drill rig standards, condition and maintenance is sufficient to prevent unnecessary breakdowns and polluting operations.</p> <p>Major services must not be done infield and must be done at the Gamsberg Mine workshop or other designated area</p>	<p>It must be ensured that all hazardous storage containers in transport or storage comply with the relevant SABS standards to prevent leakage and pollution on site.</p> <p>The BMM ISO14001 Hydrocarbon management procedure should be applied to all prospecting activities.</p> <p>Cumulative drill sludge should be disposed of at the nearest demarcated waste rock dump or tailings facility.</p>	<p>Any parking areas, refueling areas or storage areas where soil is contaminated needs to be cleaned up and soil dispatched to registered hazardous waste site or bio-remedial plant. Evidence of final correct disposal must be kept on site.</p>	<p>The implementation, monitoring and management of hydrocarbons on site are critical to prevent soil contamination.</p> <p>Monitor equipment for pollution potential: All vehicles must be regularly inspected for leaks.</p>

## Ground Water Mitigation Measures

Environmental Management Objective	Avoidance Measures	Reduction Measures	Remedial Measures	Monitoring Measures
<b>Manage and limit impact on groundwater levels and quality</b>	Avoid ingress of surface- and/or affected-water to ground water by having a raised, closed borehole cap immediately after drilling.	Hydrocarbon impacts on ground water can only be reduced in terms of which chemicals are used. Environmentally friendly chemicals should be used as far as possible.	All boreholes should be treated for hydrocarbon impacts directly after drilling.	Ground water levels and visual assessments should be conducted annually with treatment and chemical analysis of all affected boreholes.





## Surface Water Mitigation Measures

Environmental Management Objective	Avoidance Measures	Reduction Measures	Remedial Measures	Monitoring Measures
<b>Reduce impact on surface hydrology and consequential secondary impacts</b>	Avoid road and site establishment in steep gradients as far as possible. Where this is unavoidable, storm water isolation berms should be constructed to isolate affected areas from natural areas. Diversion of potential rainwater around affected sites should be planned for all drill sites where rainwater is expected to affect adjacent areas.	Reduce long term impacts and maintenance by road rehabilitation immediately after drilling	Restoration of the hydrological regime as well as storm water control during operations will be required to ensure minimal silt and loose soils wash downwards towards the Aggeneys Gravel Vygie veld which is most susceptible to such disturbance.	Monitoring of secondary impacts and storm water infrastructure to maintain integrity of mitigation measures.
<b>Manage and limit the impact of mineral waste generation and accumulation on surface water</b>	Avoid contamination of soils by waste, hydrocarbons or drill sludge that could lead to dirty water areas that could wash / drain into clean water areas.	Remediate all impacted sites immediately during drilling. Sludge and hydrocarbon spills should not be left until rehabilitation phase.	Soil remediation by the use of spillsorb and or other amelioration to restore functionality (like microorganism inoculation) may need to be considered where soils do not recover from sludge / hydrocarbon impacts.	Rehabilitation monitoring should incorporate pollution and soil impact (subsoil, compaction, erosion) visual assessments and rehabilitation success.



**i. Financial Provision****1) Determination of the amount of Financial Provision****a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.**

Black Mountain Mine currently commits to the following closure objectives:

5. To secure the effective and sustainable transfer of the municipal services of the town, Aggeneys, and the Pella-drift Water Board to the Khai-Ma municipality.
6. To ensure that the biodiversity and environment on the site is protected.
7. To make sure that the following commitments will be achieved as a minimum:
  -  The site will be made safe for both humans and animals,
  -  The site will be rehabilitated to be physically, chemically and biologically stable
  -  The residual impacts will be managed to acceptable levels and will not deteriorate over time, and
  -  Closure will be achieved with minimal socio-economic upheaval.
8. To provide sufficient funds at the end of life of mine, to properly implement the closure plan, and also to make provision for possible premature closure, and post closure monitoring requirements.

The main alignment to the baseline environment is aiming for the protection of the biodiversity through all the phases of the project. This will be achieved by implementing the rehabilitation plan.

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

The landowner is also the proponent. The nearest neighboring farm is approximately 1.29 km from the drill sites. The Basic Assessment Report and Environmental Management Plan are now made available to each registered stakeholder for review and comment. All comments will be recorded in the issues and response section and will be included into the final report.

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

The proposed rehabilitation approach is to conduct rehabilitation concurrently while drilling takes place according to the different prospecting areas and phases.

The drilling plan inserted above is also the concurrent rehabilitation plan as set out in the rehabilitation schedule above.

Timeline for exploration is a projection and completely dependent on zinc prices and budget availability for exploration activities. Please refer to the financial provision report appended to this submission for more detail.

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

The rehabilitation plan has been developed on the basis that the rehabilitated areas are safe, stable, non-polluting and are able to support an ecosystem similar to the surrounding natural environment. Due to the nature of the activities, the impacts will be limited and of short duration. The management plan is provided in such a manner as to ensure concurrent rehabilitation. To ensure the alignment of the rehabilitation plan with the closure objective, a high-level risk assessment of the prospecting activities has been conducted to establish the potential risks associated with it.

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

Table 28: Summary of Project Context for calculation

Project Context						
Land holding						
Project Name	DMR Ref	Year Approved	LoM	Property Name	Erf No.	Ownership
Gamsberg South & East	WCS 30/5/1/2/2/ (518) MR	2019	2024	Gamsberg	Gams 60, Portion 01	Black Mountain Mining Pty (Ltd)
Drilling Status						
Project Name	Access Roads	Total Approved # Drill Sites	Sites Drilled	Sites Planned for Drilling	Drill Sites rehabilitated	Rehabilitation Signed off
Gamsberg South & East	numerous	80	0	80	0	0
Rehabilitation Status: Roads, Laydown areas and Drill Sites						
Project Name	Total landholding (ha)	Approved footprint (ha)	Disturbed (ha)	Planned Disturbance (ha)	Rehabilitated (ha)	Balance (Disturbed-Rehabi)
Gamsberg South & East	2,089.22	7.63	-	7.63	-	-

Table 29: Summary of Project Financial Quantum

Financial Quantum Summary						
Financial quantum per closure and rehabilitation works						
Project	Safety and Security	Pollution Control	Rehabilitation	Maintenance	Monitoring	Total
Gamsberg South & East	434,534.40	1,410,050.10	184,523.54	23,768.38	375,307.08	<b>2,428,183.51</b>

**f) Confirm that the financial provision will be provided as determined.**

Black Mountain Mining (Pty) Ltd, a member of Vedanta plc, is considered financially competent and undertakes concurrent rehabilitation in the company resolution as provided in the Prospecting Work Programme.

Black Mountain Mining (Pty) Ltd will provided bank guarantee if prospecting project is approved.

- j) Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including**
- a) Monitoring of Impact Management Actions**
  - b) Monitoring and reporting frequency**
  - c) Responsible persons**
  - d) Time period for implementing impact management actions**
  - e) Mechanism for monitoring compliance**

It is the primary responsibility of Black Mountain Mining (Pty) Ltd to ensure that the execution of the monitoring and management programme is done in accordance with this environmental management programme (EMP).

In instances where contractors will be appointed, it remains the responsibility of the BMM Manager to communicate the requirements of this EMP to the said contractors. An environmental officer or other appointed representative will at least conduct EMP audits monthly during prospecting to ensure compliance with the EMP.

All existing ISO14001 procedures and standards will be applied to this site as for the rest of the BMM operation. Where new requirements are detailed in this report that is not in the existing standards, the standards will be reviewed and updated. Roles and responsibilities need to be defined clearly in such a procedure. The Manager must ensure that all reporting to specific government department is done as per this EMP.

The table below provides details of how environmental impacts must be managed and monitored and also provides the monitoring frequency as well as the reporting frequency.

Table 30: Mechanisms for Monitoring Compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Site access/roads Drill sites Exploration drilling	Land disturbed by prospecting	Measure concurrent rehabilitation as per BMM rehabilitation monitoring protocol	Prospecting Manager	Monitoring: Annually Reporting: Annually
		Cap and mark all boreholes	Prospecting Manager	Monitoring: Every drill site, as drill site close (temporary or permanently) Reporting: Monthly
		Take photographs prior and after drilling as records	Prospecting Manager	Monitoring: Every drill site Reporting: Annually
Exploration drilling Re-Fuelling and maintenance Ablution facilities Waste management	Soil loss and quality deterioration	Topsoil placement at sump areas	Prospecting Manager	Monitoring: Every drill site Reporting: Monthly
		Implementation of BMM ISO14001 standard operating procedures	Prospecting Manager	Monitoring: Every drill site, Reporting: Monthly ECO inspections
		If spill occur, stop drilling and clean spill, remove contaminated soil off site to a designated disposal facility.	Prospecting Manager	Monitoring: Every drill site, daily Reporting: Immediate incident reporting

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Site access/roads Drill sites Exploration drilling	Fauna and flora affected by prospecting activities	Fence off drill site to ensure demarcation and access control	Prospecting Manager	Monitoring: Every drill site Reporting: Monthly
		Avoid damaging endangered or protected plants, Search, rescue and translocate plants.	Prospecting Manager; Environmental Specialist, Biodiversity Manager/ Officer	Monitoring: Pre-clearance report, search and rescue records prior to prospecting Reporting: Annually with performance assessment, flora permit compliance reporting and rehabilitation monitoring reporting
Water management Exploration drilling	Groundwater quality affected by prospecting activities	Clean hydro carbons spills	Prospecting Manager	Monitoring: Every drill site, daily Reporting: Immediate incident reporting
		Water Quality Monitoring after drilling	Contracting Company	Monitoring & Reporting: during rehabilitation of drill sites. Annually thereafter depending on results
Ablution facilities Waste management	Waste generated	Keep records for ton of hazardous waste removed from site.	Prospecting Manager	Monitoring: Monthly Reporting: Monthly

### l) Indicate the frequency of the submission of the performance assessment/ environmental audit report

Internal and external inspections will be conducted on a regular basis to confirm the compliance to this EMP.

EMP performance results and quantum update from these inspections will be reported to the relevant regulator according to the prescribed manner annually.

### m) Environmental Awareness Plan

#### (1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

All employees and subcontractor staff involved with the project will undergo Safety-Health-Environmental Induction that is updated on a regular basis to adhere to changes in compliance requirements.

A Safety-Health-Environmental (SHE) representative is appointed for the working teams to assist in highlighting operational SHE issues while drilling takes place.

The reporting hierarchy for operational performance is also used to ensure environmental communication and awareness. Competent contractors are appointed with supervisors that can translate SHE risks to foremen and operating staff. This takes place through morning meetings before drilling commence (toolbox meetings) and SHE meetings held specifically for this purpose.

## **(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment**

Black Mountain Mining Pty (Ltd) will aim to apply a risk management system where risks are identified and rated. Site inspections in terms of EMP compliance take place and will serve as a training opportunity.

Emergency procedures of risks are practiced at least annually and improvements made to ensure emergency preparedness and response is adequate to address environmental incidents.

Recommendations and Incident reporting of events takes place during site inspections and are addressed to ensure continual improvement of the environmental management on site.

Vedanta plc applies international IFC best practice standards on site and BMM is an ISO14001 certified operation.

### **n) Specific information required by the Competent Authority**

.....  
*Among others, confirm that the financial provision will be reviewed annually*  
.....

Specific recommendations from the Department of Environmental Affairs to be included in the environmental authorisation:

- ✿ a Biodiversity specialist must be appointed to develop a diversity offset and a spatial design of biodiversity offsets.
- ✿ Vegetation removal must be minimized to smallest possible footprint and damage area should be rehabilitated with assistance of a qualified vegetation rehabilitation specialist.
- ✿ All areas with habitat rich and high concentration of fauna and flora should be avoided
- ✿ Pre-construction walk-through of the facility in order to locate species of conservation concern that can be translocated must be undertaken, provincial and DAFF permit conditions must also be complied with.
- ✿ Search and rescue operation of all listed species suitable for translocation within the development footprint that cannot be avoided should be conducted. Effected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitor purposes.
- ✿ The plant rescue and protection plan must be compiled by the ecological specialist and implemented.
- ✿ Recommendations stipulated within the fauna and flora impacts specialists' reports are supported and must be adhered during construction and operational phases.
- ✿ Recommendations outlined must be Implemented and included in the environmental authorisations.

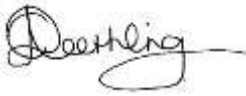


## 2. UNDERTAKING

The EAP herewith confirms

- (a) the correctness of the information provided in the reports
- (b) the inclusion of comments and inputs from stakeholders and I&APs;
- (c) the inclusion of inputs and recommendations from the specialist reports where relevant; and
- (d) that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein

**Signature of the environmental assessment practitioner:**



**Name of company:**

EndemicVision Environmental Services

**Date:**

22 June 2018

## Appendix A

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### EAP CURRICULUM VITAE

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix B

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### LOCALITY MAP

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix C

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### SITE MAP

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix D1

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### PALAEONTOLOGICAL IMPACT ASSESSMENT

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix D2

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### HERITAGE IMPACT ASSESSMENT

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**



## Appendix D3

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### FLORA IMPACT ASSESSMENT

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix D4

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### FAUNA IMPACT ASSESSMENT

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix D5

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### HERITAGE IMPACT ASSESSMENT 2018

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix E

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### STAKEHOLDER ENGAGEMENT

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix F

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### CLOSURE QUANTUM

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**

## Appendix G

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### BIODIVERSITY OFFSET

**For the Gamsberg East and South Prospecting Basic Assessment Report  
June 2018**