

DRAFT: SCOPING REPORT

INTEGRATED ENVIRONMENTAL IMPACT ASSESSMENT

FOR

**ESTABLISHMENT OF AN OPEN CAST
MINE AT ASSMANG BLACK ROCK
MINE OPERATIONS, HOTAZEL,
NORTHERN CAPE PROVINCE**

**ASSMANG (PTY) LTD BLACK ROCK
MINE OPERATIONS, SANTOY,**

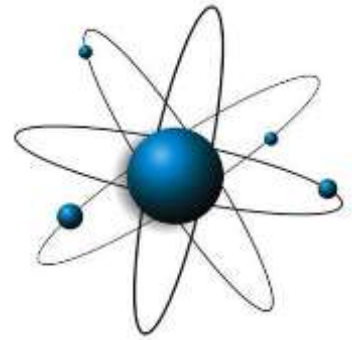


BLACK ROCK MINE OPERATIONS

NORTHERN CAPE:

DEPARTMENT OF MINERAL RESOURCES AND ENERGY REFERENCE NO:
Pending

MAY 2023



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PROJECT INFORMATION SHEET

PROJECT:

ESTABLISHMENT OF AN OPEN CAST MINE AT ASSMANG BLACK ROCK MINE OPERATIONS, HOTAZEL, NORTHERN CAPE PROVINCE

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DMRE REFERENCE NUMBER: Pending

REPORT STATUS:

Scoping Report for interested and affected parties' review and comment.

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ABBREVIATIONS

Assmang	Assmang (Pty) Ltd
BRMO	Black Rock Mine Operations
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EO	Environmental Officer
Ma	Mega-annum: a period of 1 million years
Mn	Manganese
MPRDA	Minerals and Petroleum Resources Development Act
Mtpa	Million tonnes per annum (or mega tonnes per annum)
NCDENC	Northern Cape Department of Environment and Nature Conservation
NCNCA	Northern Cape Nature Conservation Act (Act 109 of 2009)
NEMA	National Environmental Management Act, No. 107 of 1998 NEMA EIA
NEMBA	National Environmental Management: Biodiversity Act (Act10 of 2004)
NEMAQA	National Environment Management: Air Quality Act, No. 39 of 2004
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PM	Particulate Matter
PM ₁₀	Particulate matter with a mean aerodynamic diameter of less than 10 µm
PM _{2.5}	Particulate matter with a mean aerodynamic diameter of less than 2.5 µm
RDL	Red Data Listed
ROM	Run of Mine
SDF	Spatial development framework

1 INTRODUCTION

Assmang (Pty) Ltd mines manganese ore in the Black Rock area of the Kalahari, in the Northern Cape Province. The ore is mined from the Kalahari Manganese field. The Black Rock Mine Operations (BRMO) are approximately 60 km north-west of the town of Kuruman, in close proximity to the town of Hotazel.

In 1940, Assmang acquired a manganese ore outcrop on a small hillock known as Black Rock. Several large properties underlain by ore were subsequently found and acquired. Manganese ore mining operations were extended and currently include 3 underground mining complexes:

- Gloria (commissioned in 1975) and producing medium grade carbonated ore
- Nchwaning II and Nchwaning III (commissioned in 1981 and 2004 respectively) and producing high grade ore.

BRMO proposes to establish an open cast mine for manganese bearing minerals and related minerals to the north of the existing Gloria mine. This mine will be referred to as the proposed Gloria opencast mine.

The proposed development includes activities listed in terms of the National Environmental Management Act (Act 107 of 1998), as well as the National Environmental Management: Waste Act, 2008 (Act 59 of 2008), and thus BRMO has applied for an Integrated Environmental Authorisation in terms of the National Environmental Management Act. A scoping and environmental impact assessment (EIA) process must be undertaken, in accordance with the environmental impact assessment regulations GN. R 982 of 2014 as amended, to authorise the proposed activities. The proposed development also requires other environmental management permits which include a water use licence, heritage resources management permits or exemptions, protected tree removal permits, and protected plant removal and transport permits.

1.1 REGIONAL LOCATION

BRMO is situated at Santoy in the Northern Cape Province approximately 80 km north-west of the town of Kuruman and 12 kilometres north-west of the town of Hotazel.

The proposed site for the open cast mine is located predominantly on the northern extent of Portion 1 of the farm Gloria No. 266 belonging to BRMO. Therefore, the site itself is approximately 6km north-west of Hotazel, and 6 km south-east of Santoy.

BRMO falls within the jurisdiction of the John Taolo Gaetsewe District Municipality, and the Joe Morolong Local Municipality.

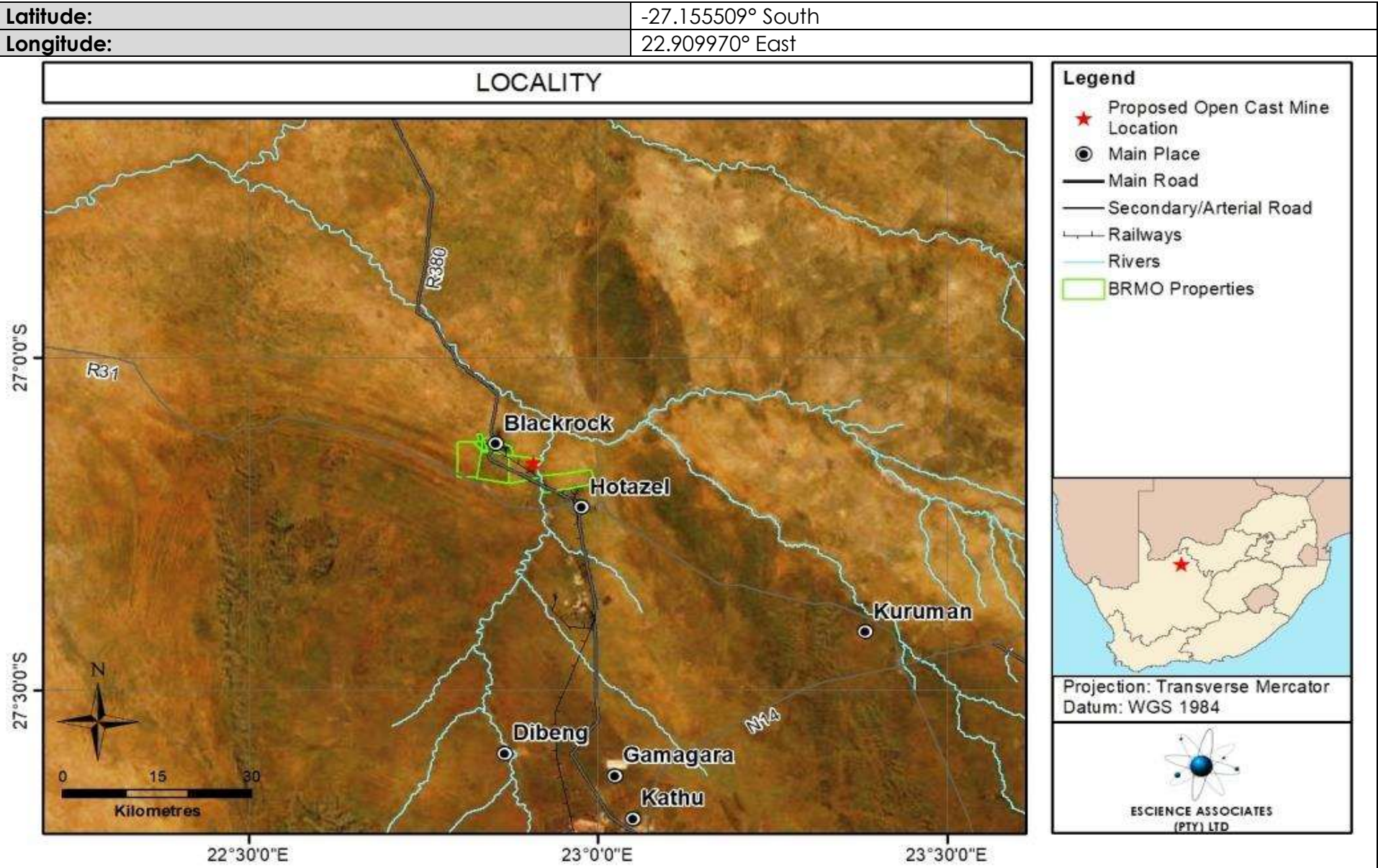
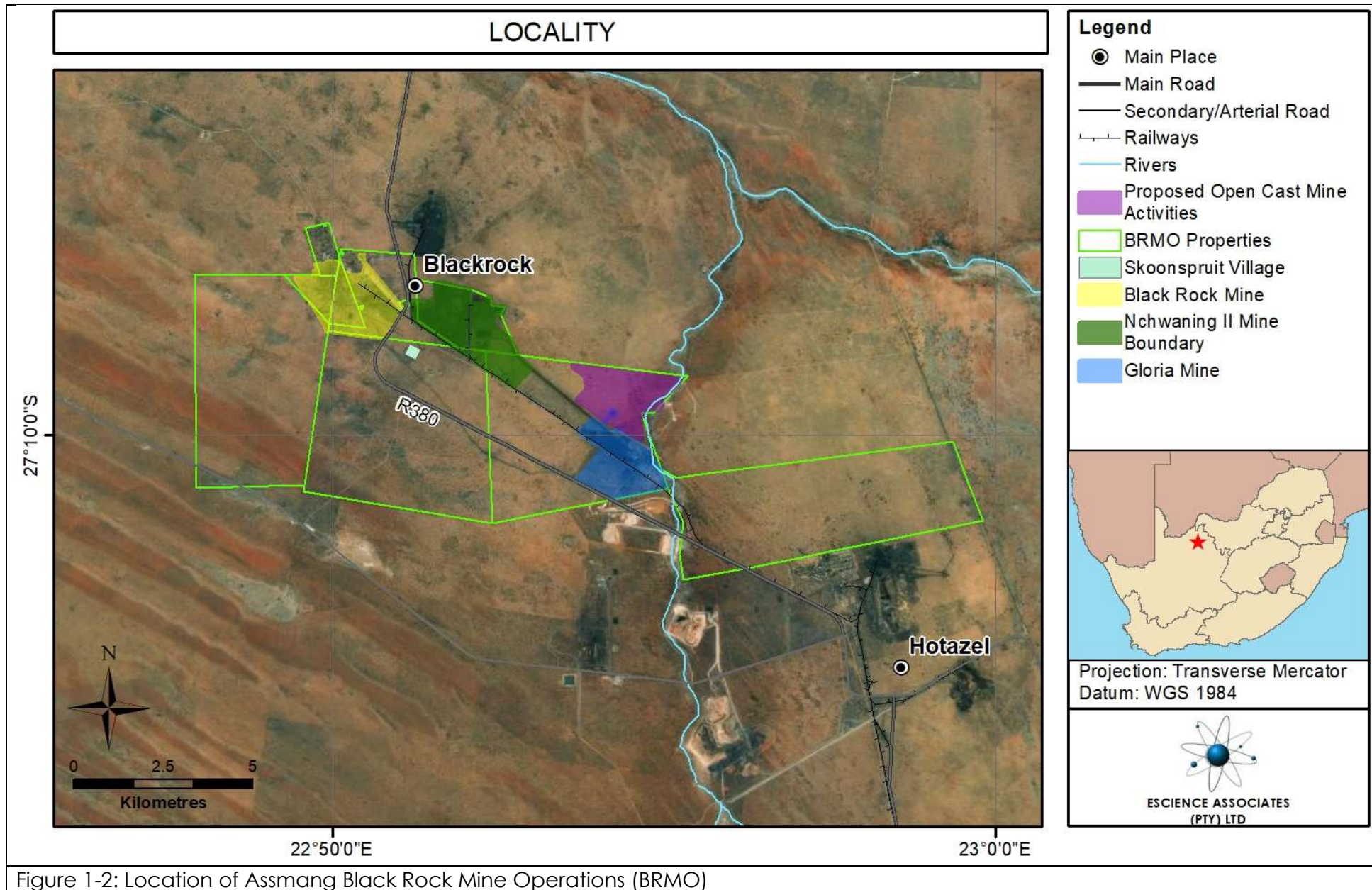


Figure 1-1: Location of Assmang Black Rock Mine Operations (BRMO)



1.2 ADMINISTRATIVE INFORMATION

The following section and associated set of tables, provides pertinent administrative information pertaining to BRMO, the associated mine lease area, as well as the environmental assessment practitioner who developed the scoping report (Table 1-1 to Table 1-5).

Table 1-1: Name and Address of Mine	
Owner and Name of Mine	Assmang (Pty) Limited, Black Rock Mine Operations
Company Registration	1935/007343/06
Physical Address	Black Rock Mine Operations, Santoy, Northern Cape
Postal Address	PO Box 187, Santoy, Northern Cape, 8491
Telephone	053 751 5260
Fax	053 751 5555
Senior General Manager	Felix Manyanga

Table 1-2: Details of Environmental Specialist	
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Table 1-3: Details of EAP	
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Contact Person	Abdul Ebrahim
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Physical Address	9 Victoria Street, Oaklands, Johannesburg, 2192
Telephone	011 718 6380
Fax	072 268 1119
Email	abdul@escience.co.za
Qualifications	Certified EAP, BEng Honours Environmental Engineering
Curriculum Vitae	Refer to Appendix 1

Table 1-4: Mining Rights, Surface Rights and Title Deed Description Relevant to BRMO				
Mine	Farm Name	Title Deed	Surface Rights	Mining Rights
FOR THIS APPLICATION				
Gloria	Ptn. 1 Gloria 266	No. 506 of 1966	Assmang (Pty) Ltd	Assmang (Pty) Ltd
OTHER SECTIONS OF BRMO RIGHTS				
Black Rock	Ptn. 1 Belgravia 264	No. 541 of 1940	Assmang (Pty) Ltd	Assmang (Pty) Ltd
	Ptn. 1 Santoy 230	No. 1491 of 1970	Assmang (Pty) Ltd	Assmang (Pty) Ltd
Nchwaning II	Ptn. 1 Nchwaning II67	No. 541 of 1940	Assmang (Pty) Ltd	Assmang (Pty) Ltd
	Ptn. 3 Nchwaning II67	No. 1491 of 1970	Assmang (Pty) Ltd	Assmang (Pty) Ltd

Table 1-4: Mining Rights, Surface Rights and Title Deed Description Relevant to BRMO				
Mine	Farm Name	Title Deed	Surface Rights	Mining Rights
Nchwaning III	Ptn. 1 Nchwaning II67	No. 541 of 1940	Assmang (Pty) Ltd	Assmang (Pty) Ltd
	Ptn. 3 Nchwaning II67	No. 1491 of 1970	Assmang (Pty) Ltd	Assmang (Pty) Ltd

Table 1-5: Project Applicable Servitudes Relevant to this application.		
Mine	Servitude Type	Servitude No.
Gloria	Rail	K38/83S
Gloria	Water pipeline (Sedibeng Water Vaal-Gamagara Supply)	K36/1978S

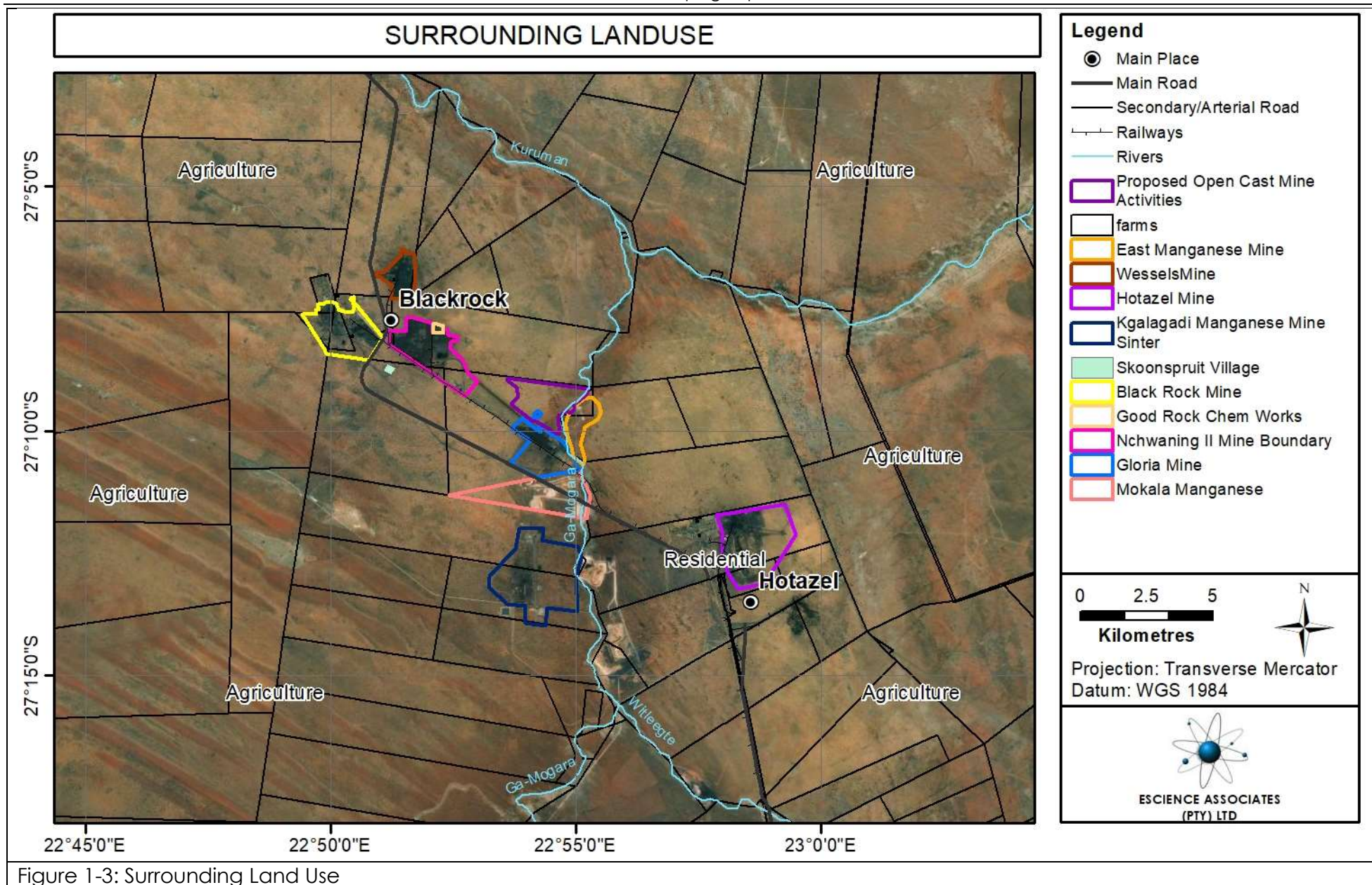
1.3 LAND TENURE AND ADJACENT LAND USE

Assmang (Pty) Ltd holds both the surface and mining rights over the properties encompassing the greater BRMO and its constituent mining operations (i.e., Black Rock, Nchwaning and Gloria Mines). The region surrounding BRMO is dominated by mining, industrial and agricultural (generally livestock production) land uses. Land in the immediate vicinity of BRMO that is not used for mining/industrial purposes, is utilised for livestock farming (i.e. sheep, goats, and cattle) and game farming (Refer to Figure 1-3).

A basic summary of nearby activities and built-up areas is presented in Table 1-6 and Table 1-7.

Table 1-6: Neighbouring Mining/Industrial Activity/ies	
Mine/Industry	Distance/Direction from BRMO
Good Rock (Pty) Ltd	Eastern boundary of Nchwaning II Mine
East Manganese Mine	North western boundary of Gloria mine.
South 32 Wessels Manganese Mine	Approximately 1.3 km north of Nchwaning II Mine
Kalagadi Manganese Mine	Approximately 2.5 km south of Gloria Mine
South 32 Hotazel Manganese Mine	Approximately 7 km south east of Gloria Mine

Table 1-7: Neighbouring Towns	
Town	Distance/Direction from BRMO
Santoy (Black Rock Mine Village)	Adjacent to BRMO
Hotazel	Approximately 17 km south east of BRMO
Kuruman	Approximately 80 km south east of BRMO
Upington	Approximately 267 km south west of BRMO
Kimberley	Approximately 320 km south east of BRMO



2 DESCRIPTION OF CURRENT AND PROPOSED ACTIVITIES

2.1 BACKGROUND

The general descriptions herein are intended to convey a broad understanding of the facilities and activities associated with the BRMO and the proposed development. These descriptions are not exhaustive. It should be noted that infrastructure typical of such mining activities is encountered on the site which may not be covered in specific detail herein. These facilities and infrastructure are subject to repairs, general maintenance and upgrading in accordance with standard practices, and thus will be altered from time to time. Current infrastructure is within the footprint of existing, historical, and/or authorised activities. Proposed infrastructure will require clearing of undisturbed land where it does not overlap with existing disturbed areas.

2.1.1 EXISTING ACTIVITIES

Manganese mining has been undertaken at BRMO since 1938, although mining activities at the original Black Rock Mine have ceased. Operations at Gloria were commissioned in 1975, and Nchwaning II was first commissioned in 1981. A shaft was established at Nchwaning III in 2006. Nchwaning III is located within the boundary of the Black Rock Mine admin and support activities, however this only a shaft with minimal associated surface activities.

The mine supplies high-grade manganese ore to both local and international markets. Only underground mining methods are presently utilised at BRMO. The mining method for Gloria, Nchwaning II and III, is via underground bord and pillar methods, making use of trackless machines and underground conveyer systems. The current authorised operations have a projected maximum capacity of 6.3 mtpa.

Ore extraction activities are all undertaken below surface. Ore is drilled, blasted, and crushed underground before being conveyed to the processing facilities on the surface. Operations underground consist mainly of:

- Drilling;
- Blasting;
- Crushing;
- Handling and loading of ore;

Facilities underground include, *inter alia*:

- Materials handling systems;
- Water storage and reticulation systems;
- Engineering and support facilities;
- Fuel storage facilities and re-fuelling bays;
- Ventilation systems, and other activities that are typical of underground mining facilities.

There is no extraction of ore via opencast operations at present. Recovery of fines and low grade ore is also undertaken from surface stockpiles. The thickness of the mined seams in

conjunction with underground crushing ensures that waste rock is not generated and brought to surface. At the surface, the ore is crushed, and separated into various grades which are stockpiled in preparation for transport off the site. Transport is via rail and road.

Surface activities at the Gloria and Nchwaning complexes are comprised of:

- Offices, administration, and support facilities
- Engineering services and facilities
- Underground mining access shafts, vent shafts and related infrastructure;
- Ore Processing Plant;
- Ore (including fines) storage and laydown areas;
- Stacking, reclaiming and loading facilities for transportation of ore;
- Roads, rail, and conveyor systems;
- Current and historical tailings facilities;
- Contractor laydown areas;
- Contractor camps;
- Waste storage and separation facilities;
- Historical and current tailings storage facilities;
- Salvage Yards;
- Potable water and process water storage and management facilities;
- Sewage treatment plant;
- Sub-stations and electrical works;
- Bulk fuel storage and refuelling station;
- Explosives magazines;
- Unpaved and paved roads connecting the above and other BRMO operations;
- Other ancillaries typical of such a mining operation.

Black Rock mine consists mainly of supporting and ancillary services for the active mining and ore processing facilities at the Gloria and Nchwaning mines. These consist of, *inter alia*:

- Offices, administration and support facilities
- Engineering services
- Old Black Rock mine works
- Old Black Rock Processing Plant
- Ore laydown areas
- Black Rock waste management
- Salvage Yards
- A landing strip and hangars
- Top soil stockpiles
- Potable water and process water storage and management facilities
- Tailings/Slimes storage facilities

- A back-up diesel power generation plant
- Sub-stations and electrical works
- Bulk fuel storage and refuelling station
- Explosives magazines
- Other ancillaries typical of such a mining operation
- Unpaved and paved roads connecting the above and other BRMO operations.

BRMO also owns residential facilities which are outside of the mining areas. Mining areas are fenced off. Therefore, these residential facilities are separately accessed from public roads and have no interconnecting access to mining areas. These include:

- Black Rock Village which includes, recreational facilities, and a commercial area;
- Santoy housing and recreational club;

Facilities located within Black Rock's boundaries which are owned and operated by external parties include:

- Eskom's Klipkop substation
- Sedibeng Water's Potable water storage facilities connected to the Vaal Gamagara Water Scheme pipeline.

The historical mine works are not active. The remnants of the works are visible but fenced off.

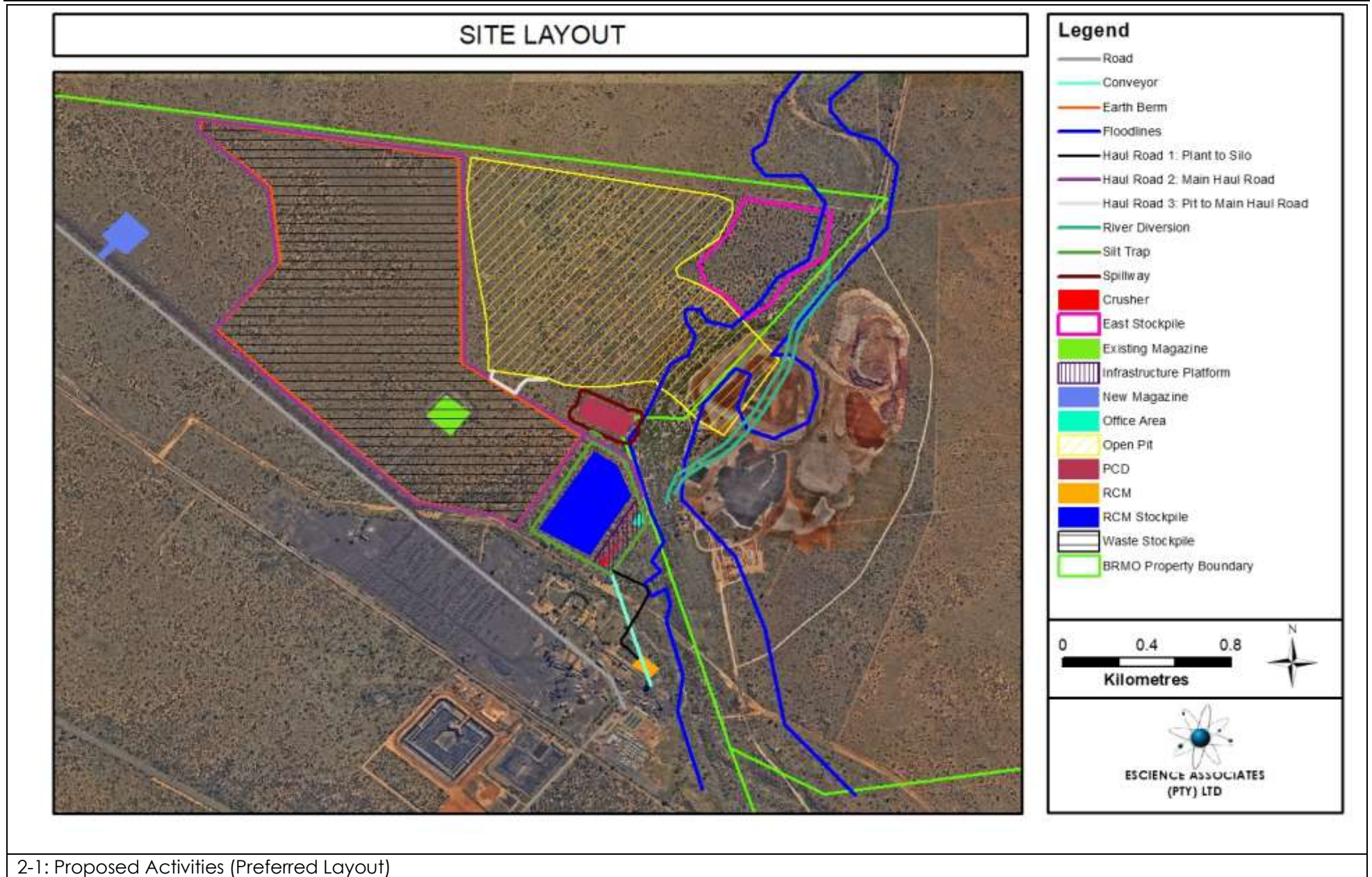
2.2 SCOPE OF THE PROPOSED ACTIVITIES

BRMO proposes to expand its mining activities through the establishment of a new Open Cast Mine north of the existing Gloria mine underground complex. The project will include the excavation and establishment of the mining area and required supplementary infrastructure which includes:

- Site establishment and contractor laydowns area for the construction phase;
- Clearing of land;
- Excavation of topsoil, subsoil, overburden, and waste rock, as well as the stockpiling thereof;
- Blasting, Excavation and extraction of the desired minerals;
- Primary crushing and screening (mobile and/or stationery) and transported of crushed ore by conveyor to join the Gloria ore stream to the Gloria ore silo and processing plant;
- Overburden, and product stockpiles within the mining right area;
- Mechanical conveyance infrastructure (conveyors, loading stations, pipelines, et cetera) and their related civil, and electrical works;
- Potable water and process water reticulation and storage management facilities;
- A river diversion (Gamagara River);
- Storm water management systems;
- Process water management systems;

- Haul, access, and maintenance roads;
- Fencing and access control,
- Waste storage and separation facilities;
- Salvage Yards;
- Sub-stations and electrical works;
- Bulk fuel storage and refuelling station;
- Explosives magazines;

The general preferred location is illustrated in 2-1. It is notable that there is potential for infringement on the Gamagara River and its flood plain, however stockpiles will be located outside of a 100m buffer from the river.



2.2.1 CONSTRUCTION PHASE

The construction phase will broadly consist of:

- Erecting a fences and access control;
- Removal and relocation of protected plant species;
- Clearing of remaining vegetation and establishment of roads, contractor laydown areas and project service facilities;
- Excavation and stockpiling of topsoil;
- Excavation and stockpiling of subsoil;
- Excavation and stockpiling of remaining overburden;
- Site preparation and establishment of civil structures;
- Equipment installation (primary crushing and screening, conveyors, electrical infrastructure, water management infrastructure, sewage treatment, bulk fuelling, etc)
- Installation of fines and water conveyance infrastructure (pipelines, pumps et cetera and their related civil, mechanical, and electrical works)

2.2.2 OPERATIONAL PHASE

The operational phase will consist of:

- Blasting and excavation of ore;
- Primary crushing and screening;
- Conveying and/or hauling of the crushed ore to the existing Gloria facility;
- Related material handling (loading, unloading, etc)
- General maintenance of the facility,

2.2.3 CLOSURE AND DECOMMISSIONING PHASE

Three closure scenarios are under consideration:

1. Complete refilling of the pit, with a small overburden stockpile remaining due to material swell.
2. Partial back-filling filling of the pit, with remaining overburden stockpiles.
3. No refill of the pit. Pit will be stabilised and slopes shaped to

The closure and decommissioning phase will broadly consist of:

- Removal of infrastructure;
- Refilling of voids;
- Shaping of filled voids;
- Ripping and scarifying compacted footprints (e.g. roads and areas previously under stockpiles;
- Depositing of subsoil and topsoil, rehabilitation and aftercare;
- Post closure monitoring.

Note that options under consideration for rehabilitation of the pit include:

- No refilling of the open pit, only shaping and rehabilitation of the sloped faces.
- Partial Refilling of the pit in the south eastern section;
- Partial Refilling of the pit;

2.3 ALTERNATIVES CONSIDERED

The EIA regulations require that alternatives be considered. The regulations define "alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the -

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

A summary of alternatives considered is set out in the ensuing sub-sections.

2.3.1 LOCATION ALTERNATIVES

Optional locations within the Gloria property have been considered for positioning and alignment of the proposed activities. These are illustrated in Figure 2-2.

Notably the location of the open cast pit is dependent on the ore body, and therefore it follows that the location of the pit is pre-determined by the location of feasibly extractable ore.

2.3.2 TYPE OF ACTIVITY TO BE UNDERTAKEN

Opencast mining activities will be undertaken. Underground mining has been considered; however, this was found to be unsafe and unfeasible due to the shallow depth to the ore body and the lack of a competent hanging wall.

In respect of the processing of ore the following alternatives have been considered:

- Primary crushing and screening and subsequent transport of crushed ore to the existing Gloria processing plant. This includes:
 - Belt conveyor to the Gloria plant.
 - Haul roads to the Gloria plant.
- Establishment of a primary, secondary, and tertiary crushing and screening and output of final product. This would also include the establishment of related infrastructure such as:
 - Tailings storage facility (TSF).
 - Process water reticulation related to transport of fines to a TSF, and return a return water dam and water storage reservoirs.
 - Product silos or stockpiles.
 - Load-out stations.
 - Possible rail infrastructure.

2.3.3 DESIGN OR LAYOUT

In essence the positioning of the various facets of the proposed development has been considered in different orientations and layouts within the proposed footprint.

In order to minimise footprint, optimise material handling costs, and to optimise ore extraction and transport to the Gloria processing plant, the proposed infrastructure is positioned to exploit existing infrastructure where possible and minimise distances as well, without impinging on the Gamagara River with the exception of the open pit.

2.3.4 TECHNOLOGY TO BE USED IN THE ACTIVITY

The nature of the proposed activities is relatively established in terms of mining and processing technology. At a macro level the potential of viable technology options is limited by the size and scope of the proposed mine. No technology alternatives have been considered at a scale that would be of environmental significance for the proposed activities.

Impact management technologies considered include:

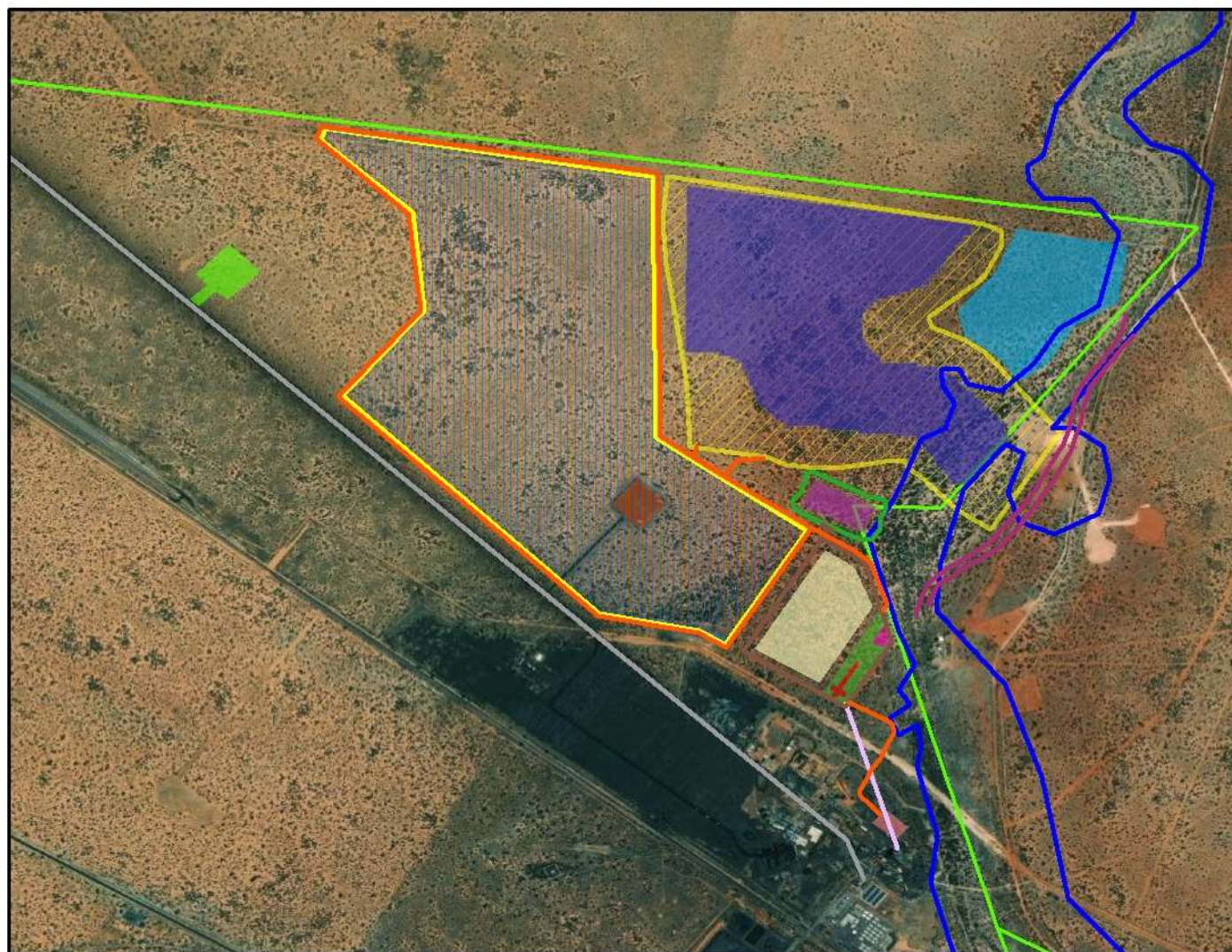
- Use of water for dust suppression and palliation.
- Use of binder different binder technologies for dust suppression and palliation.

2.3.5 OPERATIONAL ASPECTS OF THE ACTIVITY

Various operational alternatives have been considered, these include:

- Blasting schedules and frequency of blasting.
- Operational hours for excavation and materials handling.
- Processing plant operational hours.

SITE LAYOUT



Legend

- Road
- Floodlines
- Haul Road
- Conveyor
- Earth Berm
- River Diversion
- Silt Trap
- Spillway
- BRMO Property Boundary
- Crusher
- East Stockpile
- Existing Magazine
- Infrastructure Platform
- New Magazine
- Office Area
- Open Pit
- PCD
- RCM
- RCM Stockpile
- Waste Stockpile
- Ore body

0 0.25 0.5
Kilometres



Figure 2-2: Proposed Layout (within 400ha boundary)

2.4 NO-GO ALTERNATIVE

The no-go option refers to the alternative of the proposed development not going ahead at all. The baseline status quo would be maintained in this case. The proposed activities will attract significant potential economic benefit, but will also result in potentially significant impacts. It is therefore necessary to consider the no-go alternative on the basis of the findings of the environmental impact assessment when it has been completed.

The proposed open cast mine will support the economic sustainability of Black Rock Mine Operations, and therefore ensure that the significant socio-economic contribution of the mine to the region and the national economy continues.

3 NEED AND DESIRABILITY

This project supports the ultimate need and desirability of the greater BRMO; where the activities being applied for are an expansion of the mining operations undertaken and an extension of the mine's life and economic viability. The operation of the mine will continue to contribute towards the fiscus and employment within the area, as well to the national GDP and export balance of South Africa.

The activities being applied for have direct benefits to society in general, and the local communities in the vicinity in respect of economic stimulus, continued employment opportunities, and continued support through the mine's social and labour plan initiatives.

Limited short term and medium term (6 months -18 months) employment will be created during the construction phase of the project for members of the local community (as available skills allow) and the broader region as well as nationally.

During the operational life of the mine employment opportunities also be created and sustained. The anticipated life of mine is in the order of 10 years.

The proposed facilities will be located in proximity to similar existing facilities, within BRMO's existing boundaries. Although there will be transformation of undisturbed land, this will occur within mining right area, and is an expansion of existing operations.

The ecological sustainability of the proposed development will be assessed in the EIA phase and must be assured through the provisions of the Environmental Management Programme that will be developed based on the findings and recommendations of the EAP, the specialists' assessments, and the input of stakeholders and authorities.

3.1 POLICY AND SPATIAL DEVELOPMENT FRAMEWORKS

BRMO is located within the Gamagara Mining Corridor as identified in the John Taolo Gaetsewe spatial development framework (SDF). According to the SDF the Gamagara Mining Corridor that is currently loosely demarcated as an area stretching from Danielskuil and Postmasburg in the south to Hotazel and Moshaweng in the north, was identified as the area where a lack of infrastructure provision is causing serious constraints in the growth of the mining industry as well as limiting the economic development of the area.

The Gamagara Development Corridor is part of the Strategic Integrated Projects (SIPs). The SIPs are a product of the National Infrastructure Projects (NIP). The NIP was initiated to provide a background on cabinet's decision to establish a body to integrate and coordinate the long-term infra-structure build known as the Presidential Infrastructure Coordinating Council (PICC). The PICC presents the spatial mapping of infrastructure gaps which analyses future population growth, projected economic growth and areas of the country which are not served with water, electricity, roads, sanitation or communication.

Based on this work, eighteen (18) Strategic Integrated Projects (SIPs) have been developed and approved to support economic development and address service delivery in the poorest provinces.

The Gamagara Development Corridor constitutes the SIP 3 (South-Eastern node & corridor development – Increase manganese rail capacity in the Northern Cape and SIP 5 (Saldanha-Northern Cape development corridor - Expansion of iron ore mining production and beneficiation).

It is therefore clear that the sustainable operation and expansion of the BRMO's activities are desirable in terms of both the municipal SDF as well as the national SIPs. The proposed open cast mine development is integral to increasing and sustaining production capacity of the Gloria mine.

3.2 NEED AND DESIRABILITY IN THE CONTEXT OF THE PREFERRED LOCATION

Notably the location of the open cast pit is dependent on the ore body, and therefore it follows that the location of the pit is pre-determined by the location of feasibly extractable ore.

4 POLICY AND LEGISLATIVE CONTEXT

The section summarises relevant environmental legislation applicable to the proposed development at Gloria Mine.

4.1 CONSTITUTION OF SOUTH AFRICA

Section 24 of the Constitution provides the following rights:

“Everyone has the right -

- a. to an environment that is not harmful to their health or well-being; and*
- b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -*
 - i. prevent pollution and ecological degradation;*
 - ii. promote conservation; and*

secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

Accordingly, legislative measures as summarised in ensuing sections have been promulgated.

4.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998)

The National Environmental Management Act (NEMA), 1998 (Act 107 of 1998, as amended) is South Africa's overarching environmental legislation, and contains a comprehensive legal framework to give effect to the environmental rights contained in section 24 of The Constitution. Section 2 of NEMA contains environmental principles that form the legislated foundation for sustainable environmental management in South Africa.

4.2.1 EIA & ENVIRONMENTAL AUTHORISATION

NEMA introduces the principle of integrated environmental management that is achieved through the environmental assessment process in Section 24, which stipulates that certain identified activities may not commence without an Environmental Authorisation from the competent authority, in this case the Department of Mineral resources (DMR). Section 24(1) of NEMA requires applicants to consider, investigate, assess and report the potential environmental impact of these activities. The requirements for the investigation, assessment and communication of potential environmental impacts are contained in the so-called EIA regulations (currently GN. R 982:2014 amended by GN. R 326:2017).

The Regulations identify specific activities that are either subject to a Basic Assessment process, or Scoping and EIA process (GN R. 983, GN R. 984 and GN R. 985; 4 December 2014, as amended by GN R.324, GN .R325, GN R.326 and GN R.327 of 2017 respectively). The listed activities relevant to the proposed development are presented in Table 4-1.

Table 4-1: NEMA Listed Activities
GN.R 983 – Listing Notice 1, as amended
Activity No. 9: The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water-
(i) with an internal diameter of 0,36 metres or more; or

Table 4-1: NEMA Listed Activities

- (ii) with a peak throughput of 120 litres per second or more;
- excluding where-
- (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or
 - (b) where such development will occur within an urban area.

REASON: Infrastructure will be required for transport of potable water to the open cast mine activities.

Activity No. 10: The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes—

- (i) with an internal diameter of 0,36 metres or more; or
- (ii) with a peak throughput of 120 litres per second or more;

excluding where—

- (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or
- (b) where such development will occur within an urban area.

REASON: Infrastructure may be required for transport of process water between the open cast mine, the ore processing facilities, and BRMO existing process water reticulation systems.

Activity No. 11: The development of facilities or infrastructure for the transmission and distribution of electricity—

- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or
 - (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more;
- excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is—
- (a) temporarily required to allow for maintenance of existing infrastructure;
 - (b) 2 kilometres or shorter in length;
 - (c) within an existing transmission line servitude; and
 - (d) will be removed within 18 months of the commencement of development.

REASON: Electrical infrastructure may be required with a capacity of more than 33 but less than 275 kilovolts.

Activity No. 12: The development of—

- (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or
 - (ii) infrastructure or structures with a physical footprint of 100 square metres or more;
- where such development occurs—
- (a) within a watercourse;
 - (b) in front of a development setback; or
 - (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —
- excluding—
- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;

Table 4-1: NEMA Listed Activities
<p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</p> <p><u>REASON:</u> Infrastructure for diversion of Gamagara river for the development of the open cast mine activities.</p>
<p>Activity No. 13: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.</p> <p><u>REASON:</u> Total planned capacity of water storage may exceed 50 000 m³.</p>
<p>Activity No. 14: The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</p> <p><u>REASON:</u> This activity will apply if facilities for the storage and handling of a dangerous good (e.g. bulk storage of diesel, emulsions, and lubricants) will be constructed with a capacity of greater than 80 m³ but less than 500 m³.</p>
<p>Activity No. 19: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from –</p> <ul style="list-style-type: none"> (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</p> <ul style="list-style-type: none"> (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies. <p><u>REASON:</u> This activity will apply if more than 5 m³ of soil and/or sand is deposited or excavated in the Ga-Mogara watercourse for the development of the open cast mine activities.</p>
<p>Activity No. 24: The development of—</p> <ul style="list-style-type: none"> (i) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; <p>but excluding a road—</p>

Table 4-1: NEMA Listed Activities
<p>(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;</p> <p>(b) where the entire road falls within an urban area; or</p> <p>(c) which is 1 kilometre or shorter.</p> <p>REASON: The final sighting of the open cast mine may require new roads for access, delivery and distribution.</p>
<p>Activity No. 45: The expansion of infrastructure for the bulk transportation of water or storm water where the existing infrastructure—</p> <p>(i) has an internal diameter of 0,36 metres or more; or</p> <p>(ii) has a peak throughput of 120 litres per second or more; and</p> <p>(a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or</p> <p>(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more;</p> <p>excluding where such expansion—</p> <p>(aa) relates to transportation of water or storm water within a road reserve or railway line reserve; or</p> <p>(bb) will occur within an urban area.</p> <p>REASON: Upgrades and expansion of infrastructure for transport of water may be required.</p>
<p>Activity No. 46: The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes where the existing infrastructure—</p> <p>(i) has an internal diameter of 0,36 metres or more; or</p> <p>(ii) has a peak throughput of 120 litres per second or more; and</p> <p>a. where the facility or infrastructure is expanded by more than 1000 metres in length; or</p> <p>b. where the throughput capacity of the facility or infrastructure will be increased by 10% or more;</p> <p>excluding where such expansion—</p> <p>(aa) relates to transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes within a road reserve; or</p> <p>(bb) will occur within an urban area.</p> <p>REASON: Upgrades and expansion of infrastructure for transport of sewage and process water may be required.</p>
<p>Activity No. 50: The expansion of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, where the combined capacity will be increased by 50000 cubic metres or more.</p> <p>REASON: The total expanded installed capacity as a result of the proposed activities is in excess of 50 000 m³.</p>
<p>Activity No. 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—</p> <p>(i) where the existing reserve is wider than 13,5 meters; or</p> <p>(ii) where no reserve exists, where the existing road is wider than 8 metres;</p> <p>excluding where widening or lengthening occur inside urban areas.</p>

Table 4-1: NEMA Listed Activities

REASON: The final site of the proposed activities may require link roads from the existing road network at the mine to be widened or lengthened for access of construction and maintenance vehicles and/or transfer of machinery.

GN.R 984:2014 – Listing Notice 2, as amended

Activity No. 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—

- (i) activities which are identified and included in Listing Notice 1 of 2014;
- (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental
- (iii) Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;
- (iv) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a
- (v) daily throughput capacity of 2 000 cubic metres or less; or
- (vi) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.

REASON: An amendment of the mine's existing Water Use Licence, or a new Water Use Licence, is required per S22 of the National Water Act (Act 36 of 1998). It is notable that the potential waste rock and other mineral residues, derived from the open cast operations, and stockpiled within the mining right area, are a listed activity in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008).

Activity No. 12: The development of railway lines, stations or shunting yards excluding —

- (i) railway lines, shunting yards and railway stations in industrial complexes or zones;
- (ii) underground railway lines in a mining area; or
- (iii) additional railway lines within the railway line reserve.

REASON: The option of rail transport for the ore is being considered.

Activity No. 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—

- (i) the undertaking of a linear activity; or
- (ii) maintenance purposes undertaken in accordance with a maintenance management plan.

REASON: The proposed activity is expected to require the clearance of land exceeding 20ha of indigenous vegetation.

Activity No. 17. Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—

- (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource [,] ; or
- (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;

Table 4-1: NEMA Listed Activities
<p>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 this Notice applies.</p> <p>REASON: The proposed activity will require a mining right.</p>
<p>Activity No. 19. The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—</p> <ul style="list-style-type: none"> (a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; <p>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 this Notice applies.;</p> <p>REASON: The proposed activity will include a primary processing plant.</p>

4.2.2 DUTY OF CARE

NEMA also places a duty of care on all persons who may cause significant pollution or degradation of the environment. Specifically, Section 28 of the Act states:

“28 (1) Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

(2) Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which-

- (a) any activity or process is or was performed or undertaken; or*
- (b) any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.*

(3) The measures required in terms of subsection (1) may include measures to-

- (a) investigate, assess and evaluate the impact on the environment;*
- (b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;*
- (c) cease, modify or control any act, activity or process causing the pollution or degradation;*

- (d) contain or prevent the movement of pollutants or the causant of degradation;
- (e) eliminate any source of the pollution or degradation; or
- (f) remedy the effects of the pollution or degradation."

Consequently, BRMO must take "reasonable steps" to prevent pollution or degradation of the environment which may result from the existing or proposed mining and related activities. These reasonable steps include the investigation and evaluation of the potential impact and identification of means to prevent an unacceptable impact on the environment, and to contain or minimise potential impacts where they cannot be eliminated.

4.3 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008 (ACT 59 OF 2008)

4.3.1 DEFINITION OF WASTE

The NEM:WA defines 'Waste' as

"(a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or

(b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste-

(i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;

(ii) where approval is not required, once a waste is, or has been re-used, recycled or recovered;

(i) where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or,

(ii) where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste."

Schedule 3 of the Act includes the following definition under CATEGORY A: Hazardous Waste:

*"hazardous waste" means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, **residue deposits** and **residue stockpiles** as outlined below:*

"residue deposits" means any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right;

"residue stockpile" means any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act.

Residue deposits and residue stockpiles include:

1. Wastes resulting from exploration, mining, quarrying, and physical and chemical treatment of minerals	(a) wastes from mineral excavation
	b) wastes from physical and chemical processing of metalliferous minerals
	(c) wastes from physical and chemical processing of nonmetalliferous minerals
	(d) wastes from drilling muds and other drilling operations

It is clear from the above that the proposed open cast mine will create residue stockpiles, which will thus be classified as waste according to the Act.

4.3.2 GENERAL DUTY IN RESPECT OF WASTE MANAGEMENT

S16 of the Act is of particular relevance to this application related to the proposed development and requires as follows:

"(1) A holder of waste must, within the holder's power, take all reasonable measures to-

- (a) avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;
- (b) reduce, re-use, recycle and recover waste;
- (c) where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;
- (d) manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts;
- (e) prevent any employee or any person under his or her supervision from contravening this Act; and
- (f) prevent the waste from being used for any unauthorised purpose.

(3) The measures contemplated in this section may include measures to-

- (a) investigate, assess and evaluate the impact of the waste in question on health or the environment;
- (b) cease, modify or control any act or process causing the pollution, environmental degradation or harm to health;
- (c) comply with any norm or standard or prescribed management practice;

- (d) eliminate any source of pollution or environmental degradation; and*
- (e) remedy the effects of the pollution or environmental degradation."*

4.3.3 RESIDUE STOCKPILES AND RESIDUE DEPOSITS

According to S43A of NEMWA:

(1) Residue stockpiles and residue deposits must be managed in the prescribed manner on any site demarcated for that purpose in the environmental management plan or environmental management programme for that prospecting, mining, exploration or production operation.

(2) No person may temporarily or permanently deposit any residue stockpile or residue deposit on any site other than on a site contemplated in subsection (1).

S69(1)(1A) stipulates

The Minister may make regulations regarding the management and control of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation.

The requirements are gazetted in GN.R 632 of 2015: Regulations Regarding The Planning And Management Of Residue Stockpiles And Residue Deposits, 2015, subsequently amended by GN 990 of 2018.

4.3.4 WASTE MANAGEMENT LICENCING

According to section 19(1) and 19(3) of the NEM:WA, the Minister may publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment and must specify whether a waste management licence is required to conduct these activities. Under these provisions, a list of 'Category A', 'Category B' and 'Category C' waste management activities have been published in General Notice No: 921 on 29 November 2013 (with subsequent amendments) as Schedule 1 to NEM:WA. Category A and B activities require a Waste Management Licence in terms of section 20(b) of NEM:WA, whereas Category C activities require that the person conducting these activities complies with the relevant requirements or standards as stated in GN 921, as amended.

In terms of this notice, a person who wishes to commence, undertake or conduct any of these listed activities must, as part of the Waste Management Licence application, conduct either a Basic Assessment process (for Category A activities), or a scoping and EIA (for Category B) as stipulated in the EIA Regulations. Activities listed under category C do not require a Basic Assessment or Scoping and EIA. The licensing process for waste management activities and the supporting information required is therefore the same as for activities listed in the EIA listing notices that require an Environmental Authorisation.

The establishment of an open cast mine requires a Waste Management Licence, other potentially applicable listed activities have also been identified with respect to the proposed development and are listed within the in Table 4-2 below. It must be noted that the manganese super fines are defined as a hazardous waste in Schedule 3 of NEM:WA.

Table 4-2: Listed Activities applicable to the Mine
GN. 921:2014: Category B
<p>Activity No. 11: The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).</p> <p><u>REASON:</u> Debris, discard, tailings, screening, slurry, waste rock, derived from the open cast operations will be stockpiled within the mining right area and will thus require a waste management licence as part of the operations.</p>
<p>Activity No. 10: The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).</p> <p><u>REASON:</u> Construction of waste management related structures and infrastructure for the aforementioned activities.</p>

4.3.5 WASTE ASSESSMENT

The National Norms and Standards for the Assessment of Waste for Landfill Disposal published in GN 635 of 2013, prescribe the requirements for the assessment of waste prior to disposal to landfill. Although these regulations may not specifically apply to open cast mines, the requirements thereof will be considered for guideline purposes in this scoping and EIA process. GN 635 requires that all wastes that are to be disposed of in landfills be assessed in terms of their composition and leaching properties. The total concentrations and leachable concentrations of specified analytes are used to assess the waste. These values are then compared to threshold values to determine the waste "type". The complete list of compounds that are to be assessed under these regulations is given in Table 4-3, along with the applicable leachable concentrations thresholds (LCT) and total concentration thresholds (TCT), used to define the waste type. The leachable concentrations are of particular significance for mineral residue deposits and stockpiles.

Table 4-3: Total Concentration Thresholds and Leachable Concentration Thresholds							
Elements & Chemical Substances in Waste	Total Concentration Threshold (TCT) Limits (mg/kg)			Leachable Concentration Threshold (LCT) Limits (mg/l)			
	TCT0	TCT1	TCT2	LCT0	LCT1	LCT2	LCT3
Metal Ions							
Arsenic (As)	5.8	500	2000	0.01	0.5	1	4
Boron (B)	150	15 000	60000	0.5	25	50	200
Barium (Ba)	62.5	6250	25000	0.7	35	70	280
Cadmium (Cd)	7.5	260	1040	0.003	0.15	0.3	1.2
Cobalt (Co)	50	5000	20000	0.5	25	50	200
Total Chromium (Cr)	46000	800000	N/A	0.1	5	10	40
Hexavalent Chromium (Cr(VI))	6.5	500	2000	0.05	2.5	5	20
Copper (Cu)	16	19500	78000	2	100	200	800
Mercury (Hg)	0.93	160	640	0.006	0.3	0.6	2.4
Manganese (Mn)	1000	25000	100000	0.5	25	50	200

Table 4-3: Total Concentration Thresholds and Leachable Concentration Thresholds

Elements & Chemical Substances in Waste	Total Concentration Threshold (TCT) Limits (mg/kg)			Leachable Concentration Threshold (LCT) Limits (mg/l)			
	TCT0	TCT1	TCT2	LCT0	LCT1	LCT2	LCT3
Molybdenum (Mo)	40	1000	4000	0.07	3.5	7	28
Nickel (Ni)	91	10600	42400	0.07	3.5	7	28
Lead (Pb)	20	1900	7600	0.01	0.5	1	4
Antimony (Sb)	10	75	300	0.02	1	2	8
Selenium (Se)	10	50	200	0.01	0.5	1	4
Vanadium (V)	150	2680	10720	0.2	10	20	80
Zinc (Zn)	240	160000	640000	5	250	500	2000
Inorganic Anions							
TDS				1000	12500	25000	100000
Chloride				300	15000	30000	120000
Sulphate				250	12500	25000	100000
NO3 as Nitrate (N)				11	550	1100	4400
F Fluoride	100	10000	40000	1.5	75	150	600
CN Cyanide Total	14	10500	42000	0.07	3.5	7	28
Organics							
Benzene		10	40		0.01	0.02	0.08
Benzo(a)pyrene		1.7	6.8		0.035	0.07	0.28
Carbon tetrachloride		4	16		0.2	0.4	1.6
Chlorobenzene		8800	35200		5	10	40
Chloroform		700	2800		15	30	120
2-Chlorophenol		2100	8400		15	30	120
Di (2 ethylhexyl) phthalate		40	160		0.5	1	4
1,2-Dichlorobenzene		31900	127600		5	10	40
1,4-Dichlorobenzene		18400	73600		15	30	120
1,2-Dichloroethane		3.7	14.8		1.5	3	12
1,1-Dichloroethylene		150	600		0.35	0.7	2.8
1-2-Dichloroethylene		3750	15000		5	20	
Dichloromethane		16	64		0.5	2	
2,4-Dichlorophenol		800	3200		10	20	80
2,4-Dinitrotoluene		5.2	20.8		0.065	0.13	0.52
Ethylbenzene		540	2160		3.5	7	28
Formaldehyde		2000	8000		25	50	200
Hexachlorobutadiene		2.8	5.4		0.03	0.06	0.24
Methyl ethyl ketone		8000	32000		100	200	800
MTBE (Methyl t-butyl ether)		1435	5740		2.5	5	20
Nitrobenzene		45	180		1	2	8
PAHs (total)		50	200		N/A	N/A	N/A

Table 4-3: Total Concentration Thresholds and Leachable Concentration Thresholds							
Elements & Chemical Substances in Waste	Total Concentration Threshold (TCT) Limits (mg/kg)			Leachable Concentration Threshold (LCT) Limits (mg/l)			
	TCT0	TCT1	TCT2	LCT0	LCT1	LCT2	LCT3
C6 to C 9 Petroleum H/Cs		650	2600		N/A	N/A	N/A
C10 to C 36 Petroleum H/Cs		10000	40000		N/A	N/A	N/A
Phenols (total, non-halogenated)		560	2240		7	14	56
Polychlorinated biphenyls		12	48		0.025	0.05	0.2
Styrene		120	480		1	2	8
1,1,1,2-Tetrachloroethane		400	1600		5	10	40
1,1,2,2-Tetrachloroethane		5	20		0.65	1.3	5.3
Tetrachloroethylene		200	800		0.25	0.5	2
Toluene		1150	4600		35	70	280
Trichlorobenzenes (total)		3300	13200		3.5	7	28
1,1,1-Trichloroethane		1200	4800		15	30	120
1,1,2-Trichloroethane		48	192		0.6	1	4
Trichloroethylene		11600	46400		0.25	2	8
2,4,6-Trichlorophenol		1770	7080		10	20	80
Vinyl chloride		1.5	6		0.015	0.03	0.12
Xylenes (total)		890	3560		25	50	200
Pesticides							
Aldrin + Dieldrin	0.05	1.2	4.8		0.015	0.03	0.03
DDT + DDD + DDE	0.05	50	200		1	2	2
2,4-D	0.05	120	480		1.5	3	3
Chlordane	0.05	4	16		0.05	0.1	0.1
Heptachlor	0.05	1.2	4.8		0.015	0.03	0.03

Notably, Type 4 wastes have additional concentration limits that should not be exceeded as presented in Table 4-4.

Table 4-4: Additional concentration limits applicable to Type 4 wastes	
Chemical Substance	Concentration (mg/kg)
TOC	30 000 (3%)
BTEX	6
PCBS	1
Mineral oil (C10 to C40)	500
Pesticides	
Aldrin + Dieldrin	0.05
DDt + DDD + DDE	0.05
2,4-D	0.05
Chlorodane	0.05
Heptachlor	0.05

There are five waste types, numerically ordered from type 0 to type 4. Type 0 waste being most hazardous in respect of landfilling, and type 4 being the least hazardous. The waste types are determined as shown in Table 4-5.

Table 4-5: Waste type classification of waste according to concentration thresholds from the national norms and standards (GN 635 of 2013)

Leachable Concentration	Total Concentration	Waste Type
$LC \leq LCT0$	$TC \leq TCT0$	Type 4 [#]
$LCT0 < LC \leq LCT1$	$TC \leq TCT1$	Type 3
$LCT1 < LC \leq LCT2$	$TC \leq TCT1$	Type 2
$LCT2 < LC \leq LCT3$	$TCT1 < TC \leq TCT2$	Type 1
$LCT3 < LC$	$TCT2 < TC$	Type 0

4.3.5.1 Waste Acceptance Criteria for Disposal to Landfill

The waste types determine the class of landfill to which they may be disposed. The National Norms and Standards for Disposal of Waste to Landfill gazetted in GN 636 of 2013 stipulate the applicable classes as presented in Table 4-6. It must be noted that the Regulations Regarding The Planning And Management Of Residue Stockpiles And Residue Deposits, 2015, GN.R 632 of 2015, subsequently amended by GN 990 of 2018, stipulate the means by which the pollution control, mitigation, and management measures must be determined for residue deposits and stockpiles. The leachable concentrations are of particular significance for mineral residue deposits and stockpiles.

Table 4-6: Landfill requirements based on waste type (per GN 636 of 2013)

Waste type	Landfill requirements
Type 0	The disposal of Type 0 waste to landfill is not allowed. The waste must be treated and re-assessed in terms of the Norms and Standards for Assessment of Waste for Landfill Disposal.
Type 1	Type 1 waste may only be disposed of at a Class A landfill designed in accordance with section 3(1) and (2) of these Norms and Standards, or, subject to section 3(4) of these Norms and Standards, may be disposed of at a landfill site designed in accordance with the requirements for a Hh/HH landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., Department of Water Affairs and Forestry, 1998).
Type 2	Type 2 waste may only be disposed of at a Class B landfill designed in accordance with section 3(1) and (2) of these Norms and Standards, or, subject to section 3(4) of these Norms and Standards, may be disposed of at a landfill site designed in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).
Type 3	Type 3 waste may only be disposed of at a Class C landfill designed in accordance with section 3(1) and (2) of these Norms and Standards, or, subject to section 3(4) of these Norms and Standards, may be disposed of at a landfill site designed in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).
Type 4	Type 4 waste may only be disposed of at a Class D landfill designed in accordance with section 3(1) and (2) of these Norms and Standards, or, subject to section 3(4) of these Norms and Standards, may be disposed of at a landfill site designed in accordance with the requirements for a GLB landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).

4.4 AIR QUALITY

Air Quality Management in South Africa is primarily regulated through the National Environmental Air Quality Act (NEMAQA) {Act 39 of 2004, as amended}. The object of this Act is:

(a) *to protect the environment by providing reasonable measures for—*

(i) the protection and enhancement of the quality of air in the Republic;

(ii) the prevention of air pollution and ecological degradation; and

(iii) securing ecologically sustainable development while promoting justifiable economic and social development; and

(b) *generally, to give effect to section 24(b) of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.*

NEMAQA defines atmospheric emissions as

"atmospheric emission" or "emission" means any emission or entrainment process emanating from a point, non-point or mobile source that results in air pollution;

Air pollution as:

““air pollution” means any change in the composition of the air caused by smoke, soot, dust (including fly-ash), cinders, solid particles of any kind, gases, fumes, aerosols and odorous substances;”

NEMAQA is an effects-based legislation; consequently, activities that result in atmospheric emissions are to be managed through the setting of environmental health based ambient air quality standards. Facilities with potential impacts on air quality should ideally be assessed not only in terms of its individual contribution, but in terms of its additive contribution to baseline ambient air quality i.e. cumulative effects must be considered.

4.4.1 DUSTFALL AND DUST CONTROL REGULATIONS

Section 32 states that the Minister, or MEC, may prescribe measures relating to dust control; these have been published in terms of National Dust Control Regulations GN. R 827 2013. GN. R 827:2013, prescribe general measures for the control of dust in all areas. Dustfall standards for acceptable dustfall rates are given in Table 4-7 for residential and non-residential areas. The regulations also provide a method to be used for measuring dustfall rate and guidelines for locating sampling points. The method to be used is AST D1739:1970, or an equivalent method approved by any internationally recognised body.

Table 4-7: GN. R827:2013 Acceptable Dust Fall Rates		
Restriction Areas	Dustfall rate (D) (mg/m ² /day, 30-days average)	Permitted frequency of exceeding fall rate

Residential area	D < 600	Two within a year, not sequential months
Non-residential area	600 < D < 1200	Two within a year, not sequential months

These regulations of particular relevance as potentially significant dust may be generated from various activities.

4.4.2 NATIONAL NORMS AND STANDARDS

According to S9 of NEMAQA:

“(1) The Minister, by notice in the Gazette-

(a) must identify substances or mixtures of substances in ambient air which through ambient concentrations, bioaccumulation, deposition or in any other way, present a threat to health, well-being or the environment or which the Minister reasonably believes present such a threat; and

(b) must, in respect of each of those substances or mixtures of substances, establish national standards for ambient air quality, including the permissible amount or concentration of each such substance or mixture of substances in ambient air; ...”

The Minister of Water and Environmental Affairs published limits for ambient air quality in Government Notice N° 1210 of 24 December 2009, in terms of S9(1) of NEMAQA, as shown in Table 4-8.

Table 4-8: National Ambient Air Quality Standards - GN 1210:2009			
Pollutant	Averaging period	Concentration (µg/m³)	Permissible FOE*
PM ₁₀	24-hours	75	4
	Annual	40	0
NO ₂	1-hour	200	88
	Annual	40	0
SO ₂	10-min (running)	500	526
	1-hour	350	88
	24-hours	125	4
	Annual	50	0
CO	1-hour	30	88
	8-hours (running)^	10	11
Pb	Annual	0.5	0
* FOE – Permitted Frequency of Exceedance in occurrences per year			
^ Calculated on 1-Hourly averages.			

The Ministry of Water and Environmental Affairs further published limits for PM_{2.5} on the 29th June 2012, in terms of S9(1) of NEMAQA, as shown in Table 4-9.

Table 4-9: National Ambient Air Quality Standards for PM_{2.5} - GN 486:2012

Pollutant †	Averaging period	Conc. µg/m³	Permissible FOE*	Compliance date
PM _{2.5}	24-hours	60	4	immediate
		40	4	01 January 2016
		25	4	01 January 2030
	Annual	25	0	immediate
		20	0	01 January 2016
		15	0	01 January 2030
* FOE – Permitted Frequency of Exceedance in occurrences per year				

BRMO is required to ensure that the impacts from their proposed development do not result in an impact on ambient air quality exceeding these standards. Given the nature of the proposed activities, it is anticipated that emissions of PM₁₀ and PM_{2.5} may be of particular significance.

4.5 WATER USE

The National Water Act (NWA), 1998 (Act 36 of 1998), aims to manage national water resources in order to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected, and integrated management of water resources takes place.

4.5.1 WATER USE LICENCE

In terms of the National Water Act, Act No. 36 of 1998 (NWA) a water use licence is required for:

- (a) taking water from a water resource;
- (b) storing water;
- (c) impeding or diverting the flow of water in a watercourse;
- (d) engaging in a stream flow reduction activity contemplated in section 36;
- (e) engaging in a controlled activity identified as such in section 37 (1) or declared under section 38 (1);
- (f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- (g) disposing of waste in a manner which may detrimentally impact on a water resource;
- (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- (i) altering the bed, banks, course or characteristics of a watercourse;
- (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- (k) using water for recreational purposes.

The relevant water uses for the proposed operations are as follows:

- 21(a) taking water from a water resource;
- 21(b) storing water;
- 21(c) impeding or diverting the flow of water in a watercourse.
- 21(g) disposing of waste in a manner which may detrimentally impact on a water resource;
- 21(i) altering the bed, banks, course or characteristic of a watercourse;
- 21(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people;

Other provisions of the NWA have been taken into account, specifically relating to Part 4 (Section 19), which deals with pollution prevention, in particular situations where pollution of a water resource occurs or might occur as a result of activities on land. A person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources. If these measures are not taken, the catchment management agency concerned may itself do whatever is necessary to prevent the pollution or to remedy its effects, and to recover all reasonable costs from the persons responsible for the pollution.

4.5.2 GN. R. 704 – REGULATION OF MINE WATER MANAGEMENT

Regulation 704 of 4 June 1999 was promulgated under the NWA with the primary goal of ensuring water resource protection from poorly effected mine water management. The requirements of GN.R. 704 must be seen as the minimum requirements to fulfil the above stated goal and apply to BRMO's activities.

Notably the waste deposits from the proposed activities are currently proposed to be located less than 100 meters from the Ga-Mogara watercourse. Possible relocation of the waste dumps will need to be investigated (refer to 2-1).

4.6 BIODIVERSITY

Legislation of potential significance to BRMO's operations includes:

- National Forests Act (Act No. 84 of 1998)
- Conservation of Agricultural Resources Act (Act 43 of 1983)
- National Environmental Management: Biodiversity Act (Act 10 of 2004)
- Northern Cape Nature Conservation Act (Act 109 of 2009)

4.6.1 NATIONAL FORESTS ACT (ACT NO. 84 OF 1998)

There are a number of tree species that are protected according to Government Notice no. 1012 under section 12(l)(d) of the National Forests Act, 1998 (Act No. 84 of 1998). In terms of section 15(1) of the National Forests Act, 1998 *"no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated)"*.

The occurrence of two such protected tree species such as camel thorn (*Vachellia erioloba*) and grey camel thorn (*Vachellia haematoxylon*) has been confirmed at BRMO. Permits for the removal of relevant species will be applied for where applicable.

4.6.2 CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT 43 OF 1983)

As per the Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983), Conservation is defined as: *"in relation to the natural agricultural resources, includes the protection, recovery and reclamation of those resources;"*

The objectives of the CARA, as stated in section 2 of the Act, entitled "Objects of Act", are:

"The objects of this Act are to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants."

The proposed development must meet these objectives as far as practicably possible. Of most significance to the project are the provisions stated in Regulation 5 of the Act for the "Prohibition of spreading weeds", which states that:

No person shall-

- (a) sell, agree to sell or offer, advertise, keep, exhibit, transmit, send, convey or deliver for sale, or exchange for anything or dispose of to any person in any manner for a consideration, any weed; or
- (b) in any other manner whatsoever disperse or cause or permit the dispersal of any weed from any place in the Republic to any other place in the Republic.

4.6.3 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT 10 OF 2004)

The National Environmental Management: Biodiversity Act (Act 10 Of 2004) (NEMBA) is the primary legislation governing biodiversity management in South Africa.

Section 2: "Objectives of the Act", states the following:

2. The objectives of this Act are-

- a) within the framework of the National Environmental Management Act, to provide for-
 - (i) the management and conservation of biological diversity within the Republic and of the components of such biological diversity.
 - (ii) the use of indigenous biological resources in a sustainable manner; and
 - (iii) the fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources;
- b) to give effect to ratified international agreements relating to biodiversity which are binding on the Republic;
- c) to provide for co-operative governance in biodiversity management and conservation; and
- d) to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

The proposed activities will be undertaken just north of the existing Gloria mine underground complex where there is currently undisturbed natural vegetation. BRMO will need to obtain the relevant permits to relocate any sensitive vegetation located on the area of concern.

Protected species expected to be encountered include:

Table 4-10: Protected species expected to be encountered.		
Scientific Name	Common Name	Regulation
<i>Acacia Erioloba</i> (now <i>Vachellia Erioloba</i>)	Camel Thorn	National Forests Act (1998) - Department of Agriculture, Forestry and Fisheries
<i>Acacia Haemotoxylon</i> (now <i>Vachellia Haemotoxylon</i>)	Grey Camel Thorn	
<i>Boscia albitrunca</i>	Shepherd's Tree	
<i>Ammocaris Coranica</i>	Karoo Lily	Schedule 4 Environmental and Conservation Ordinance No. 19 (1974) – Northern Cape Department of Environment and Nature Conservation
<i>Harpogophytum Procumbens</i>	Devil's Claw	
<i>Babiana Hypogaea</i>	Bobbejaanuintjie	
<i>Boophane Disticha</i>	Bushman's poison bulb	

Chapter 5 of NEMBA regulates activities involving invasive species, and lists duty of care as follows:

- the landowner/land user must take steps to control and eradicate the invasive species and prevent their spread, which includes targeting offspring, propagating material and regrowth, in order to prevent the production of offspring, formation of seed, regeneration or reestablishment;
- take all required steps to prevent or minimise harm to biodiversity; and
- ensure that actions taken to control/eradicate invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

An amendment to the NEMBA has been promulgated, which lists 225 threatened ecosystems based on vegetation types present within these ecosystems. Should a project fall within a vegetation type or ecosystem that is listed, actions in terms of NEMBA are triggered. Based on the preliminary sensitivity screening undertaken for the proposed site, none of the threatened ecosystems occur within the study area.

4.6.4 NORTHERN CAPE NATURE CONSERVATION ACT (ACT 109 OF 2009)

The Northern Cape Nature Conservation Act (Act 109 of 2009) {NCNCA} for the sustainable utilisation of wild animals, aquatic biota, and plants as well as permitting and trade regulations regarding wild fauna and flora within the province.

The NCNCA makes provision for Specially Protected and Protected species of fauna and flora. According to Section 49 of the Act:

- (1) No person may, without a permit -
- (a) pick;
 - (b) import;
 - (c) export;
 - (d) transport;

(e) possess;
(f) cultivate; or
(g) trade in,
a specimen of a specially protected plant.

(2) The provisions of subsection (1) (e), in so far as they prohibit the possession of a specially protected plant, do not apply to a landowner who is in possession of a specially protected plant which grows in its natural habitat and which was not planted by human interference.

"Protected plant" means a species of plant listed as such in Schedule 2. There are various protected species listed in schedule 2 of the Act that apply to the site. These include for example *Harpagophytum procumbens* (devil's claw) and *Boophone disticha* (Candelabra Flower). Permits for the removal, or relocation and transport, of relevant species will be applied for where applicable.

4.7 NATIONAL HERITAGE RESOURCES ACT (NHRA) (ACT 25 OF 1999)

The NHRA aims to promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations.

The Act protects as cultural heritage resources such as:

- a. Archaeological artefacts, rock structures, structures and sites older than 100 years;
- b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography;
- c. Objects of decorative and visual arts;
- d. Military objects, structures and sites older than 75 years;
- e. Historical objects, structures and sites older than 60 years;
- f. Proclaimed heritage sites;
- g. Graveyards and graves older than 60 years;
- h. Meteorites and fossils; and
- i. Objects, structures and sites of scientific or technological value.

A Heritage Impact Assessment (HIA) is the process to be followed in order to determine whether any heritage resources are located within the area of interest, in particular as per S38(1) any development categorised as:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site -

(i) exceeding 5 000m² in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or.

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000m² in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

Any person intending to undertake the above must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

The responsible heritage resources authority must, within 14 days of receipt of the notification indicate whether submit an impact assessment report and specify the information to be contained in the report.

The responsible heritage resources authority must then decide:

(a) whether or not the development may proceed;

(b) any limitations or conditions to be applied to the development;

(c) what general protections in terms of this Act apply, and what formal protections may be applied, to such heritage resources;

(d) whether compensatory action is required in respect of any heritage resources damaged or destroyed as a result of the development; and

(e) whether the appointment of specialists is required as a condition of approval of the proposal.

However, according S38(8) the above does not apply where environmental impact assessment is required, provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.

4.7.1.1 Structures

Section 34 (1) of the NHRA states that no person may demolish any structure or part thereof which is older than 60 years without a permit issued by the relevant provincial heritage resources authority; where a structure means '*any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith*'.

Alter means '*any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means*'.

4.7.1.2 Archaeology, palaeontology and meteorites

Section 35(4) of the Act deals with archaeology, palaeontology and meteorites. The Act states that *no person may, without a permit issued by the responsible heritage resources authority (national or provincial):*

- a) Destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;*
- b) Destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;*
- c) Trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or paleontological material or object, or any meteorite;*
- d) Bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and paleontological material or objects, or use such equipment for the recovery of meteorites; or*
- e) Alter or demolish any structure or part of a structure which is older than 60 years as protected.*

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

4.7.1.3 Burial Grounds and Graves:

According to section 36 (3) (a) *No person may, without a permit issued by South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority:*

- a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or*
- c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.*

4.8 NOISE

The Noise Control Regulations (R 154 GG 13717 of 10 January 1992) promulgated in terms of ECA, defines:

- Nuisance noise, as "any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person"
- Disturbing noise, as "any noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more".

Regulation 4 states 'No person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof.' In addition, Section 28 of NEMA imposes a 'duty of care' on every person who may cause significant pollution to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the

environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

4.9 MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (ACT 28 OF 2002)

Assmang currently holds a mining right for underground works as submitted with the MWP for the existing right. An SLP is also in place, along with Environmental Authorisations for current works and expansions under construction.

A mining right or amended mining right is required for the proposed open cast facilities. BRMO owns the relevant properties and thus has applicable surface land rights.

5 PUBLIC PARTICIPATION

5.1 INTRODUCTION

Public participation provides the opportunity for interested and affected parties (IAPs) to participate in the Environmental Authorisation process on an informed basis, and to ensure that their concerns are considered during the environmental impact assessment process. In so doing, a sense of ownership of the project is vested in both the project proponent and interested or affected parties. The Public Participation Process is aimed at achieving the following:

- Provide opportunities for IAPs to obtain information about the expected environmental impacts of the proposed development.
- Establish a formal platform for IAPs to raise queries and give input regarding the environmental impact of the project.
- Utilise the opportunity to formulate ways for reducing or mitigating any negative environmental impacts of the project, and for enhancing its benefits.
- Enable the applicant to consider the needs, preferences and values of IAPs in their decisions.
- Ensure transparency and accountability in decision-making.

The public participation must include:

- Notification of the public and potential IAPs through newspaper advertisements;
- Notification of the public and potential IAPs using site notices;
- Notifying specified IAPs, as stipulated in the EIA regulations, namely
 - the owners, occupiers, and persons in control of the site if the proponent or applicant is not the owner or person in control of the site.
 - owners, persons in control of, and occupiers of land adjacent to the site
 - the municipal councillor of the ward
 - the municipality which has jurisdiction in the area;
 - any organ of state having jurisdiction in respect of any aspect of the activity; and
 - any other party as required by the competent authority;
- Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to illiteracy, disability, or any other disadvantage.

The scoping report and subsequently the Environmental Impact Report must be available to registered IAPs for comment and input. These comments and input must be considered accordingly and addressed at each relevant stage in the scoping and EIA process.

5.2 STAKEHOLDER NOTIFICATION

The public and stakeholder participation process to date has entailed the following:

- Advertising of the proposed activities and the associated S&EIR process in the Noordkap Bulletin on 11 August 2022 and in the Kathu Gazette on 06 August 2022. The adverts indicated where the written comments may be directed to and who to contact in order to be registered as an IAP.
- Placement of site notices at a place conspicuous to the public at the BRMO entrance, Gloria Mine Entrance and the Black Rock Shopping Centre.
- Pre-identification and notification to Interested and Affected Parties based on the existing list of the mines registered IAPs including neighbouring landowners and occupiers, the ward councillor, the local municipality, the district municipality, the provincial environmental authority, and other stakeholders.

The following is to be conducted through the distribution of the Basic Assessment Report to registered interested and affected parties including:

1. owners and occupiers of the of the land adjacent to the site where the activity is or is to be undertaken,
2. the municipal councillor of the ward,
3. the local municipality,
4. the district municipality,
5. the provincial environmental authority,
6. any other party required by the competent authority

Refer to subsequent items for their relevant appendices:

- Proof of site notices (Refer to Appendix 2.1: Site Notices)
- Proof of Newspaper advertisements (Refer to Appendix 2.2: Advertisements)
- List of identified IAPs (Refer to Appendix 2.3: Interested and Affected Parties List)

6 DESCRIPTION OF THE RECEIVING ENVIRONMENT

The description of the receiving environment is described herein based on observations at the site and the findings of previous environmental impact assessments undertaken for the wider mine environmental management programme. Although this is sufficient for the scoping phase, further detail may be added or amended during the EIA phase.

The area of interest is adjacent to existing mine activities, although some portions of the land may have previously been disturbed the area largely consists of undisturbed land. The area is classified as having natural/indigenous vegetation. The site is *not* located on a shallow water table, dolomitic, sinkhole, or doline areas, seasonally wet soils, unstable rocky slopes or steep slopes with loose soil, dispersive soils, soils with high clay content and or an area sensitive to erosion.

6.1 PHYSICAL

6.1.1 CLIMATE

There are no South African Weather stations (SAWS) in the region. As such data for Kuruman is used to provide an overview of the climatology of the area. Kuruman is approximately 65km south east of the BRMO operations. The meteorological conditions at this site may not be exactly representative of meteorological conditions at the site, however they are expected to be representative of the general conditions of the region.

6.1.2 WIND

The observed wind direction and wind speed are dominantly from the north northwest with an average wind speed of 4.1m/s (for the windier months of the year, July to January) (Figure 6-1). The length of the colour-coded line in the windroses is proportional to the frequency of occurrence of wind blowing from that direction. Wind speed classes are also colour coded and the length of each class/category is proportional to the frequency of occurrence of wind speed.

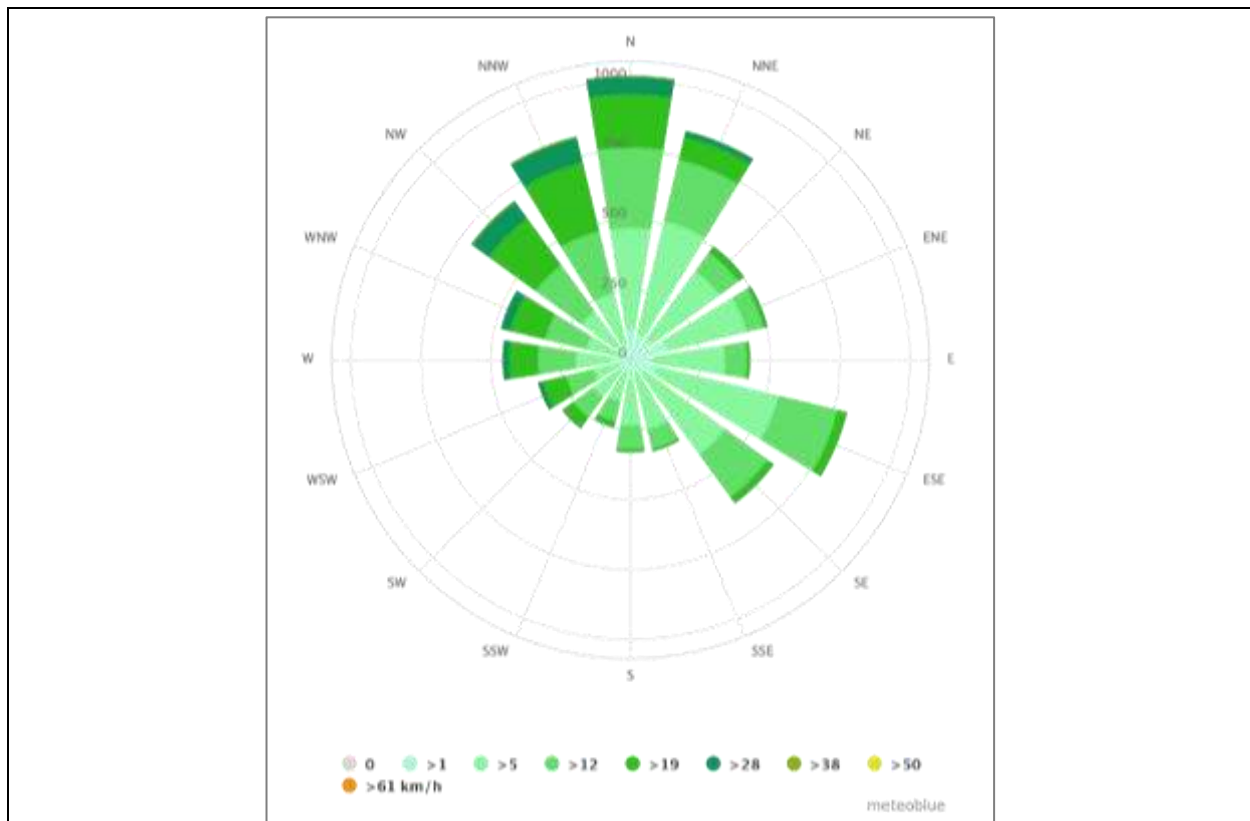


Figure 6-1: Annual windrose for Kuruman (right) (<https://www.meteoblue.com>)

6.1.3 RAINFALL AND TEMPERATURE

Rainfall occurs predominantly in summer and autumn (Dec – Apr) while the least amount of rain falls in the months of winter (May – Sep). The maximum daily temperature occurs in January/December whilst the minimum daily temperature occurs in July/August for Kuruman. The maximum daily temperature occurs in January whilst the minimum daily temperature occurs in July/August (Figure 6-2). Temperatures are high in summer months, with a maximum temperature of around 32°C for Kuruman. Winter temperatures do drop below freezing, however the average minimum temperature for Kuruman is 1°C.

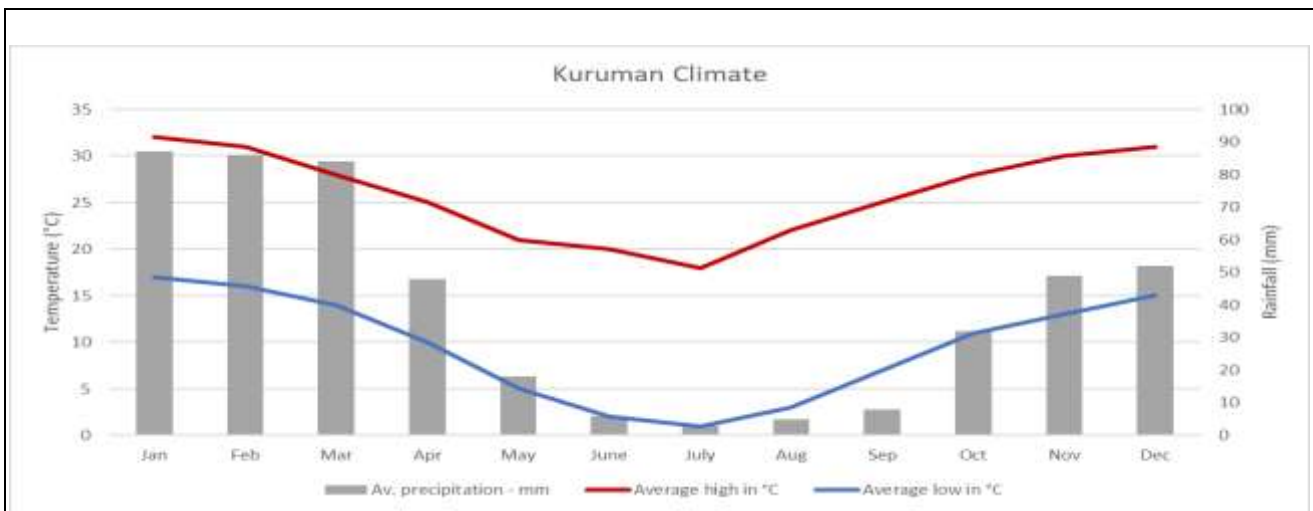


Figure 6-2: Monthly average temperature and rainfall for Kuruman (<https://www.climatedata.eu>)

6.1.4 EVAPORATION AND CLIMATIC WATER BALANCE

The region is arid with relatively high evaporation rates and low rainfall. Although site specific data is not available, the mean annual precipitation versus evaporation rates can be estimated from mean rates from other stations in the area.

Average monthly rainfall and evaporation data for the area was obtained the following stations:

- Kuruman Station (D4E004), approximately 65 km south east.
- Olifantshoek station (D4E002), approximately 85 km north west.

The average monthly and annual data is summarised in Table 6-1.

Table 6-1: Precipitation and Evaporation Data				
Month	Kuruman-D4E004		Olifantshoek-D4E002	
	Rainfall (mm)	Evaporation (mm)	Rainfall (mm)	Evaporation (mm)
January	26.4	236.3	19	234.9
Feb	45.1	243.6	27.4	266.6
March	44.9	272.7	32.7	293.2
April	85.6	259	59.6	276.1
May	82.9	208.4	52.1	221.6
June	86.5	161.3	63.3	191.9
July	45.1	122.3	33.4	139.8
August	21.5	113.2	14.1	105.3
September	7.4	82.5	5.3	79.8
October	2.8	99.1	3.2	90.7
November	9.8	131.2	5.5	132.6
December	7.9	188.5	5.8	180.3
Annual	465.9	2118.1	321.4	2212.8
Water Balance*	-1652		-1891	
* The climatic water balance is calculated as total rainfall - total evaporation.				

It is clear from the above that there is a significantly negative climatic water balance for the area. This is significant for the site as it implies that there is limited potential for rainwater infiltration and related leaching of material disposed, and significant potential for loss of water through evaporation.

6.1.5 SURFACE WATER AND WETLAND/RIPARIAN ZONES

The gradient of the site is flat, and the landform associated with the site is plain. (Refer to Figure 6-4). Notably the Gamagara river runs to the east of the site, however there are no apparent drainage channels to the river. The Gamagara River and its associated wetland/riparian features (including a 32 m buffer zone) can be considered as an ecologically sensitive area in relation to the proposed development activities (Figure 6-3). The proposed activities will be outside of this area, located to the west of the

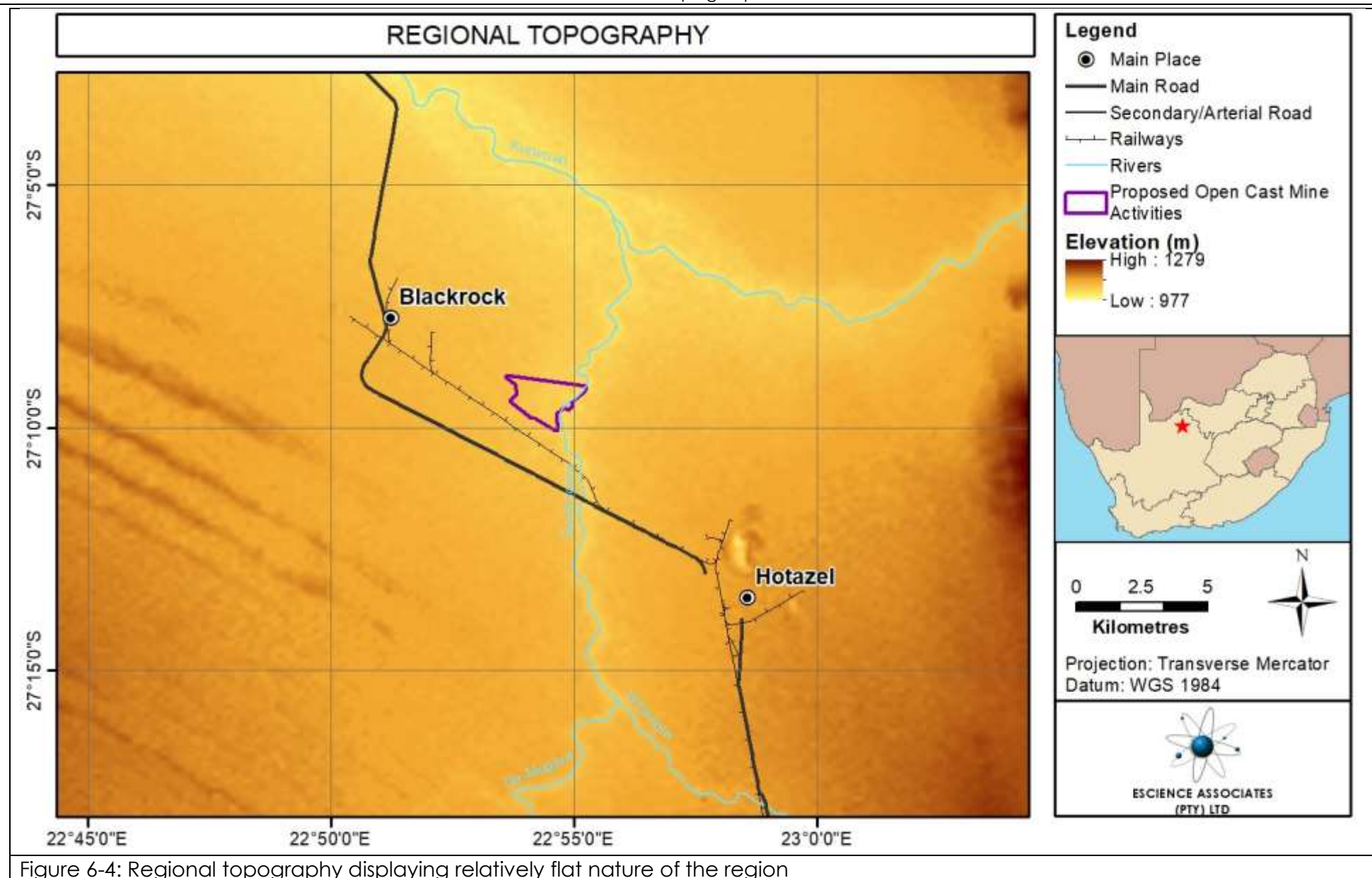
Gamagara River with a 100m buffer, with the possible exception of the pit which be within the 100m buffer.

According to a previous hydrological assessment undertaken at BRMO (African Environmental Development, report number AED0201/2011) the site is located in the arid and endorheic Kalahari Basin, it does not have any true surface water, although there are a few areas where quarries have intercepted the water table below a dry streambed and this water was considered to be surface water (with certain reservations). The study further demonstrated that the area where the mine is located is very flat with low slopes and that in general, hardly any actual surface run-off would enter the Gamagara River.

If, indeed surface run-off did reach the river, it would rapidly be absorbed by the riverbed and become part of the groundwater environment. Due to the endorheic nature of the Kalahari Basin, any contamination of groundwater would remain there for an extremely long time. This places an extended responsibility on BRMO and the other mines operating in this area, as negligent actions on the part of the mines leading to contamination of groundwater could be responsible for this contamination lingering in the groundwater potentially for millions of years.



Figure 6-3: Gamagara River Wetland Delineation



6.1.6 GROUNDWATER

Various specialist hydrogeological assessments have been undertaken at BRMO. These include (Geo Pollution Technologies, Report Reference Number: EBR-10-320, Envass report GEO- REP-107-08-19)). The site is underlain by the Kalahari formation. This formation at BRMO consists of a top layer of aeolian sands followed by calcrete of tertiary age. If weathered, the calcareous sands have the favourable characteristics of porosity and permeability. There is limited surface runoff in the Kalahari area (high infiltration rates during precipitation). Due to high porosity and permeability of the Kalahari sands, the calcrete deposit below the top layer of Kalahari sands acts like a "sponge".

The arithmetic average depth of the water levels below surface in the boreholes found at BRMO is 69.6 mbgl with a maximum depth of 110 m below surface. If the depth of the Kalahari formation is considered with the water levels found in the hydrocensus it can be concluded that the farmers tap their water from this weathered/fractured calcrete aquifer. The average recharge values assigned to calcrete is $\pm 10\%$ of the mean annual precipitations. The water quality from the boreholes sampled is generally good. Considering the geology and hydro-geological characteristics of the site (i.e. the calcrete aquifer used by the surrounding farming communities, as well as boreholes visited during the hydrocensus and used for general farming), the aquifer should be regarded as "Major aquifer system", based on the following:

- Public supply and other purposes: The aquifer plays a major role in the livelihood of the farming community surrounding BRMO; and
- Water quality: The water quality is good.

The groundwater specialists deemed there to be a low risk for the users found in the hydrocensus to be impacted by either dewatering, or contaminated groundwater originating from the larger BRMO operations. The potential impact of the proposed development must however be assessed, and the background hydrogeological status of the site based on updated data.

6.1.7 SOIL

A soil survey has previously been undertaken at BRMO to assess soil characteristics and establish how and to what depth topsoil should be removed to prepare the area, how the removed soil should be stored and treated when reused to remediate the disturbed area after mine closure (Report: Soil Survey and Soil Management Program for the Black Rock Mine Operations Concerning Establishing A New Sinter Plant and Shaft Complex - Prof Claassens 2011). The area around Black Rock, in the vicinity where the mining operations are undertaken, consists mainly of Kalahari sand. Kalahari sand is typically homogenously very deep with the exception of certain areas which are under laid by calcrete. Soil fertility is low as is typical of sandy soils. Based on soil auguring undertaken the soils in the area surveyed were deep yellowish-red sandy soils.

Due to a very low organic content, it was concluded that no specific recommendation on how deep the topsoil should be excavated to prepare the area is necessary. Due to the texture of the soil and the size distribution it will not tend to compact while it is stockpiled thus no special arrangements are necessary for stockpiling.

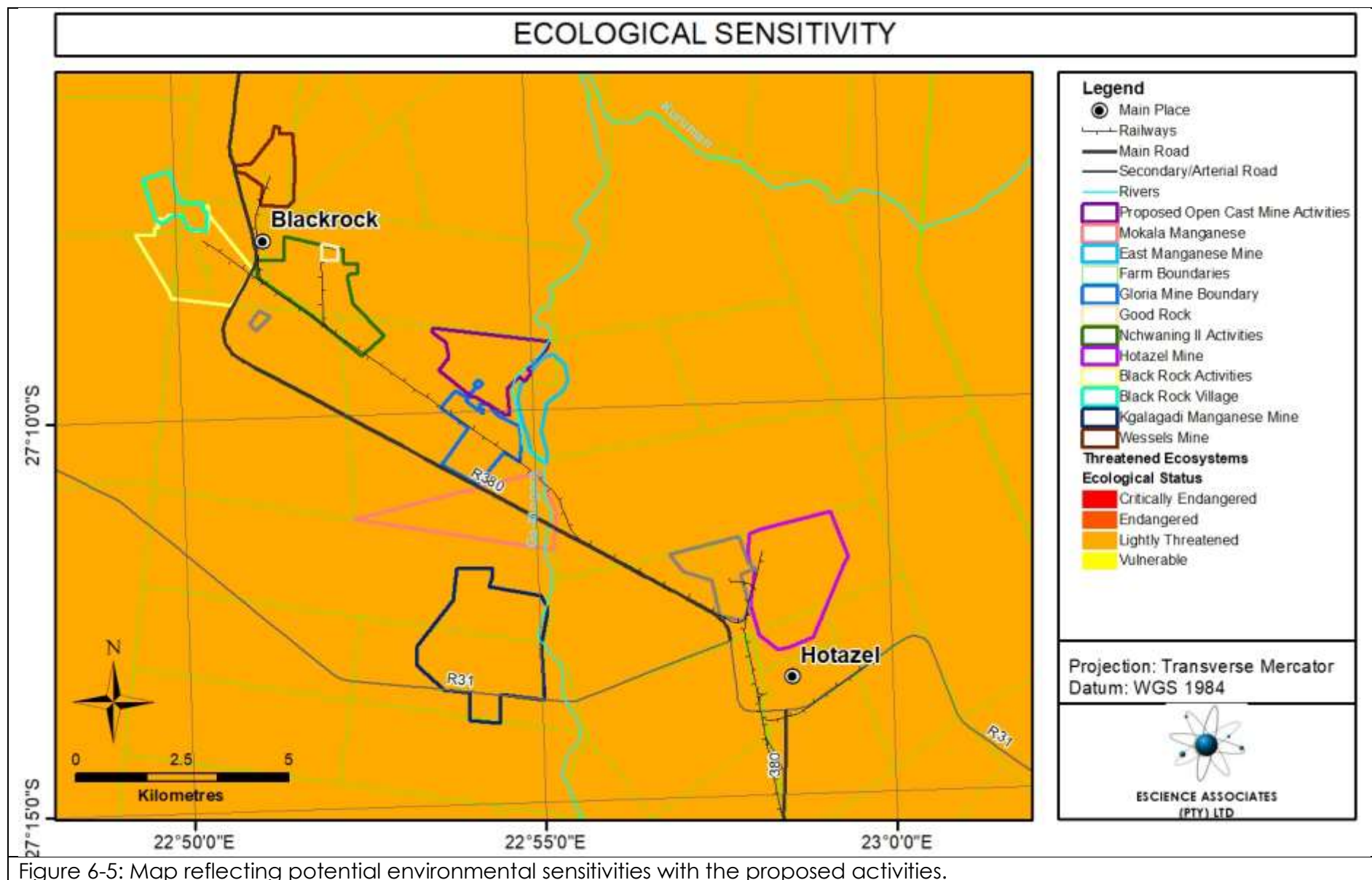
Although the soil is not very fertile, the stockpiled soils can be used as such to reclaim the disturbed area at mine closure. No fertilizer programme is recommended because it is assumed that the disturbed areas will be re-vegetated with natural grasses which are adapted to the local environment.

6.2 BIOLOGICAL

As previously mentioned, the target area is currently adjacent to existing activities of the mine, although some portions of the land have previously been disturbed the area largely consist of undisturbed land. The area is classified as having natural/indigenous vegetation.

The surrounding area as depicted by the threatened ecosystems database is shown in Figure 6-5. The entire area is described as "lightly threatened".

Based on the findings of previous assessments (Biodiversity Action Plan For The Assmang Black Rock Manganese Ore Mine authored by SAS Environmental, 2011, Report Reference N^o SAS 211022), the biodiversity of the area in ensuing sections. This will be updated by specialist studies during the EIA phase that are specific to the target area.



6.2.1 BIODIVERSITY

BRMO is located within the Savanna biome and more specifically within the Eastern Kalahari Bushveld Bioregion with some incursion into Kalahari Duneveld, according to a biodiversity assessment undertaken by Scientific Aquatic Services (Report Reference: SAS 211022 dated in May 2011, refer to Figure 6-6). The site consists of transformed land (current and legacy mining and related infrastructure), open veld (presently used rented to farmers who graze livestock), the Belgravia Game Farm (the only on-site area presently considered of increased sensitivity), and limited riparian habitat (related to the Ga Magara River).

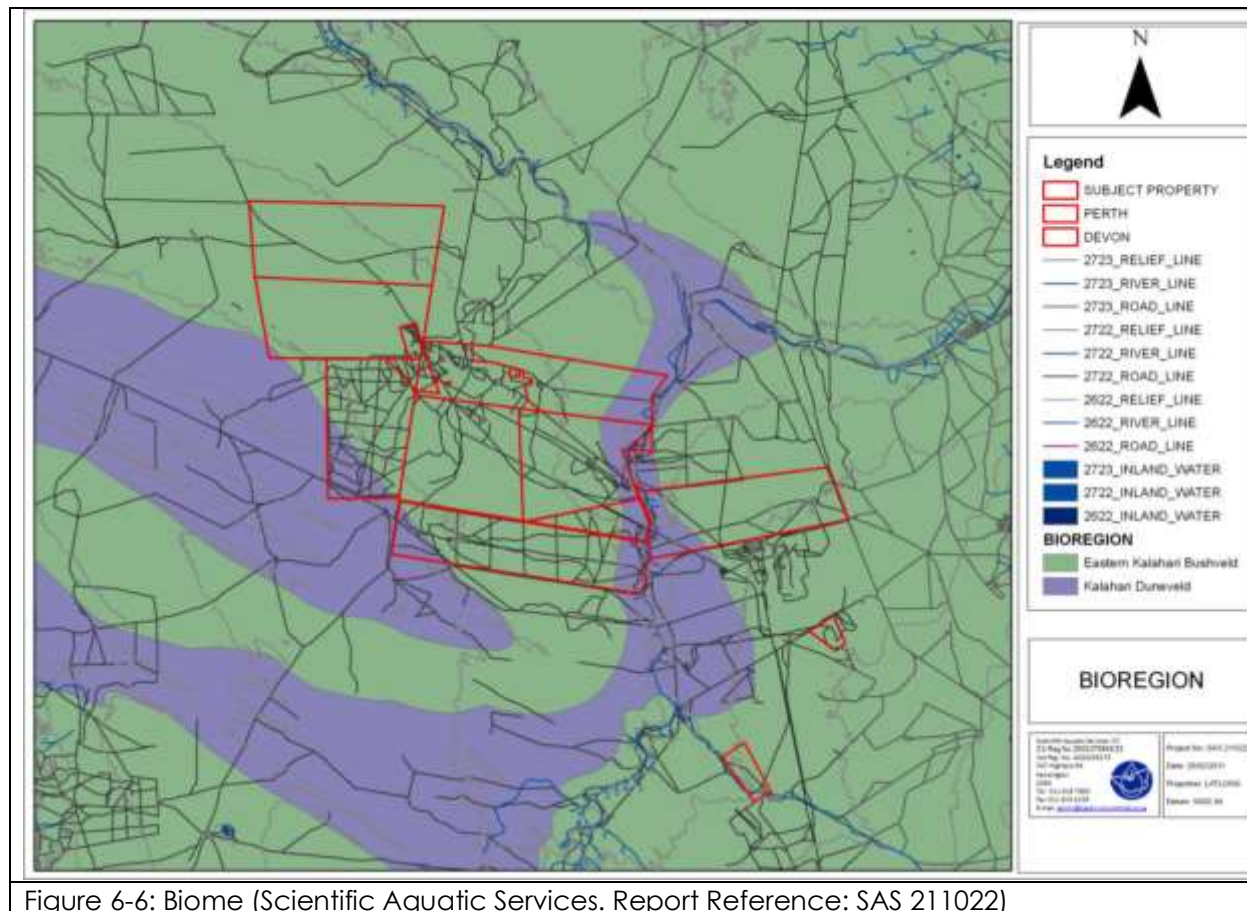


Figure 6-6: Biome (Scientific Aquatic Services. Report Reference: SAS 211022)

6.2.1.1 Floral Diversity

When the boundary of the assessment site is superimposed on the vegetation types of the surrounding area, it is evident that the subject property falls within the Kalahari Thornveld and Shrub Bushveld veld type, Kathu Bushveld vegetation type and partly in the Gordonia Duneveld vegetation type.

Several red data listed (RDL)/protected floral species are documented within the area, as shown in Table 6-2 below. The species identified are expected to be found throughout the site. None of the listed species may be cut, removed, relocated, or destroyed without permits having been issued by the relevant licensing authorities.

Table 6-2: Protected Floral Species Identified on Site



Scientific Name	Common Name	Regulation
<i>Acacia Erioloba</i> (now <i>Vachelia Erioloba</i>)	Camel Thorn	National Forests Act (1998) - Department of Agriculture, Forestry and Fisheries
<i>Acacia Haemotoxolyn</i> (now <i>Vachellia Haemotoxolyn</i>)	Grey Camel Thorn	
<i>Boscia albitrunca</i>	Shepherd's Tree	
<i>Ammocaris Coranica</i>	Karoo Lily	Schedule 4 Environmental and Conservation Ordinance No. 19 (1974) – Northern Cape Department of Environment and Nature Conservation
<i>Harpogophytum Procumbens</i>	Devil's Claw	
<i>Babiana Hypogaea</i>	Bobbejaanuintjie	
<i>Boophane Disticha</i>	Bushman's poison bulb	

6.2.1.2 Faunal Diversity

Evidence of the Common Duiker, Whitetailed Mongoose, Suricate and Scrub Hare have been noted within the area. Field signs (diggings) of Porcupine have also been noted. The old Black Rock mine works could provide suitable habitat for bats, of which there are several threatened species in the Northern Cape. Numerous bird species have been observed on the site. Various reptiles including lizards, skinks, snakes and tortoises are noted or expected within the site. The Gamagara River may also host amphibians. Numerous invertebrates also inhabit the site.

Likely species categorised as threatened, include African White-backed Vulture, Cape Griffon/Cape vulture, European Roller, Ruppell's horseshoe bat, Geoffrey's horseshoe bat, and Darlings horseshoe bat. Red Data Sensitivity Index Score assessment of the property provided a moderate score of 37%, indicating low to medium importance to RDL faunal species conservation within the region.

6.3 SOCIO-ECONOMIC

A development of this nature has the potential to result in both positive and negative socio-economic impacts. The economic impacts from such a development are usually positive as the mine will contributing directly towards employment (locally and further afield as skills availability dictates), skills development locally, increase in the local fiscus related to procurement as well as the employment created, fiscal benefits on local, regional and national scale.

There is potential for negative social effects primarily from influx of employment seekers and changes to existing land-use. In the context of the proposed development however an influx of employment seekers is unlikely and has not historically been the case due to the remoteness of BRMO as well there being no significant communities close-by that are not directly related to BRMO (i.e. the Black Rock village for example is owned by the mine and houses only mine employees and their families).

6.4 HERITAGE

6.4.1 ARCHAEOLOGICAL AND CULTURAL

Heritage impact assessments have been undertaken at BRMO in 2009 (African Heritage Consultants CC, Cultural Heritage Impact Assessment, 2009) and 2011 (Archaeos, Culture & Cultural report ASBR, 2011). Various sites of significance have been identified within the BRMO properties; these include:

- The Old Black Rock Mine works (otherwise referred to as the Black Rock Koppie and associated infrastructure.
- Mine workers cemetery
- Sites of stone age origin in the Gamagara river basin.
- Farm cemetery on the farm Belgravia

BRMO has subsequently developed a heritage management plan. At present all identified sites of heritage significance are outside the proposed location of the planned open cast mine.

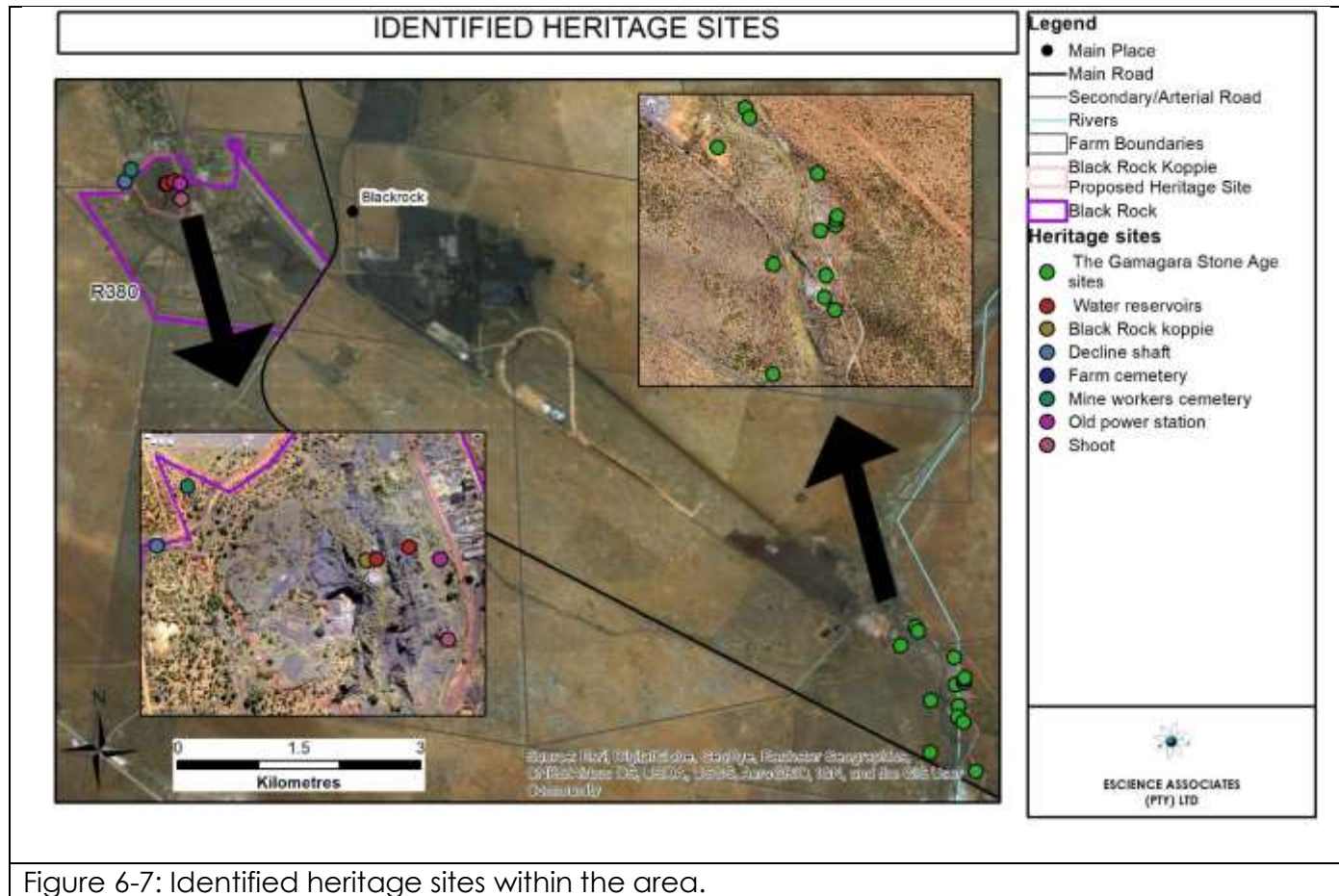


Figure 6-7: Identified heritage sites within the area.

Given the potential for identifying archaeological findings of significance, a heritage specialist will be required to provide a specialist assessment during the EIA phase.

6.4.2 PALAEOLOGICAL

BRMO development is underlain by the Cretaceous to Tertiary Kalahari Formation (Qs) and underlying Griqualand West Basin rocks, Transvaal Supergroup of Vaalian age.

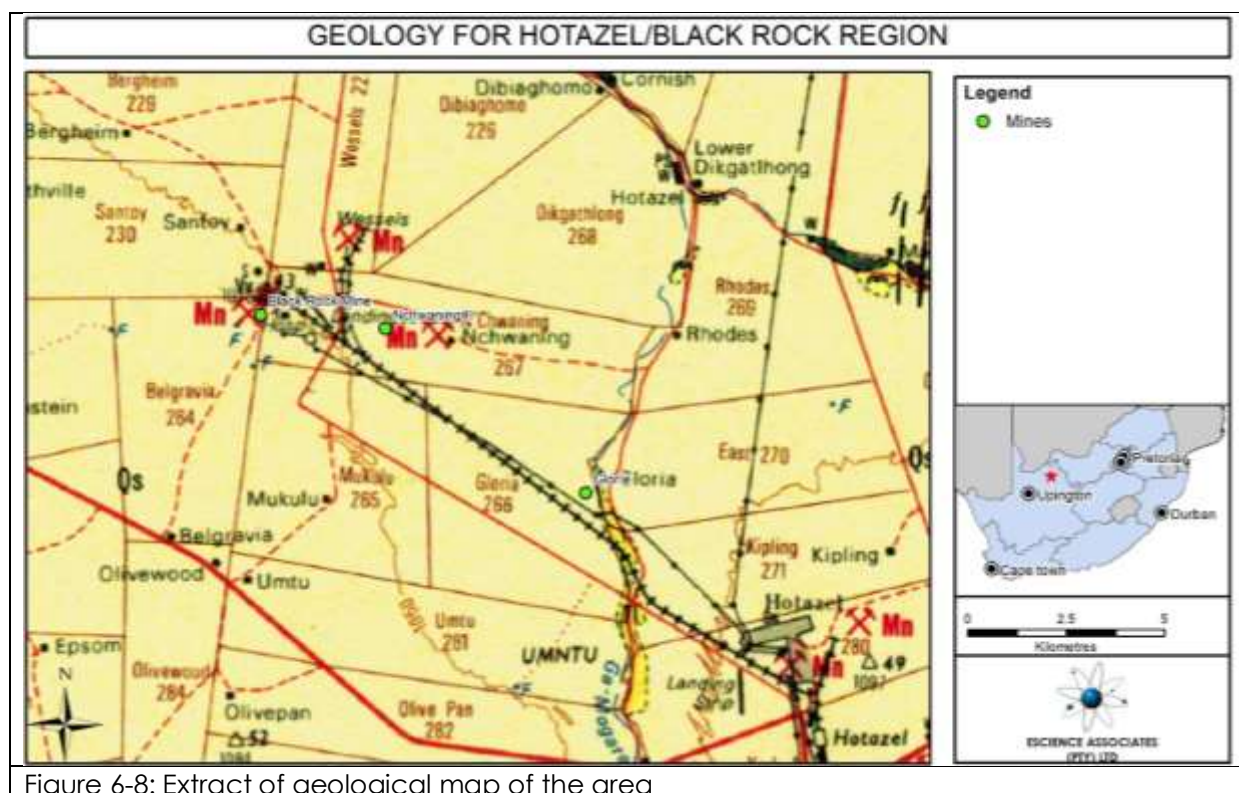


Figure 6-8: Extract of geological map of the area

The Kalahari deposits are approximately Ca 65 – 2.5 million years old (Ma). The Cenozoic Kalahari Group is the most widespread body of terrestrial sediments in southern Africa. The Cenozoic sands and calcretes of the Kalahari Group range in thickness from a few metres to more than 180m (Partridge et al., 2006). The youngest formation of the Kalahari group is the Gordonia Formation which is generally termed Kalahari sand and comprises of red aeolian sands that covers most of the Kalahari Group sediments. The pan sediments of the area originated from the Gordonia Formation and contains white to brown fine-grained silts, sands and clays. Some of the pans consist of clayey material mixed with evaporates that show seasonal effects of shallow saline groundwaters. Quaternary alluvium, aeolian sands, surface limestone, silcrete, and terrace gravels are also included in the Kalahari Group (Kent 1980).

The fossil assemblages of the Kalahari are generally very low in diversity and occur over a wide range and thus the palaeontological diversity of this Group is low. These fossils represent terrestrial plants and animals with a close resemblance to living forms, refer to Table 6-3. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods and trace fossils.

Table 6-3: Fossil Heritage (adapted from Almond and Pether 2009)

Subgroup/ sequence	Group	Formation	Fossil Heritage	Comment
Tertiary- Quaternary	Kalahari	-	Terrestrial organisms	Trace fossils, ostracods, bivalves, gastropod shells, diatoms
Griqualand West Super Group	Campbell	Ghaapplat o (Vgh)	Stromatolites	Cyanobacterial microfossils are present
-	Griquaastad	Asbestos Hills	Stromatolites	Cyanobacterial microfossils are present

Hotazel is located in the Griqualand West Basin, Northern Cape Province which consists of clastic sediments as well as volcanic rocks, diamictites and banded iron formations. Manganese deposits are present in the Hotazel Formation, upper Postmasburg Group (approximately 2222 Ma). The Vryburg Formation is the basal unit and overlies unconformably the granite and rocks of the Ventersdorp Supergroup. The Campbell Group overlies the Vryburg Formation and consists of the Schmidtsdrif Formation and the upper Ghaap Plateau Formation. The Griquatown Group is divided into two formations namely the Asbestos Hills and Koegas Formations. The Gamagara Formation follows and is positioned on the Maremane Anticline, and is overlain by the Makganyene Formation. The Cox Group comprises of the lower Ongeluk Formation and the upper Voëlwater Formation. The Ongeluk Formation was deposited under water and reaches a thickness of between 400 and 900 m. This Formation is basal and is mainly volcanic (Visser 1989). Manganese is present in the upper Voëlwater Formation (Snyman 1996). According to Kent (1980) and Snyman (1996) Griqualand West Basin attains a maximum thickness of 4500 m.

Algal growth structures, also known as "Stromatolites", are fossil structures described from the dolomites of the Transvaal Supergroup. Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. These structures were originally formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (simplest form of modern carbon-bases life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils. The oxygen atmosphere that we depend on was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era.

According to the SAHRIS palaeo-sensitivity map (Figure 6-9) there is a low to moderate chance of finding fossils in this area, and a desktop study of the area of interest is required. A paleontological specialist will be required to undertake such a study during the EIA phase.

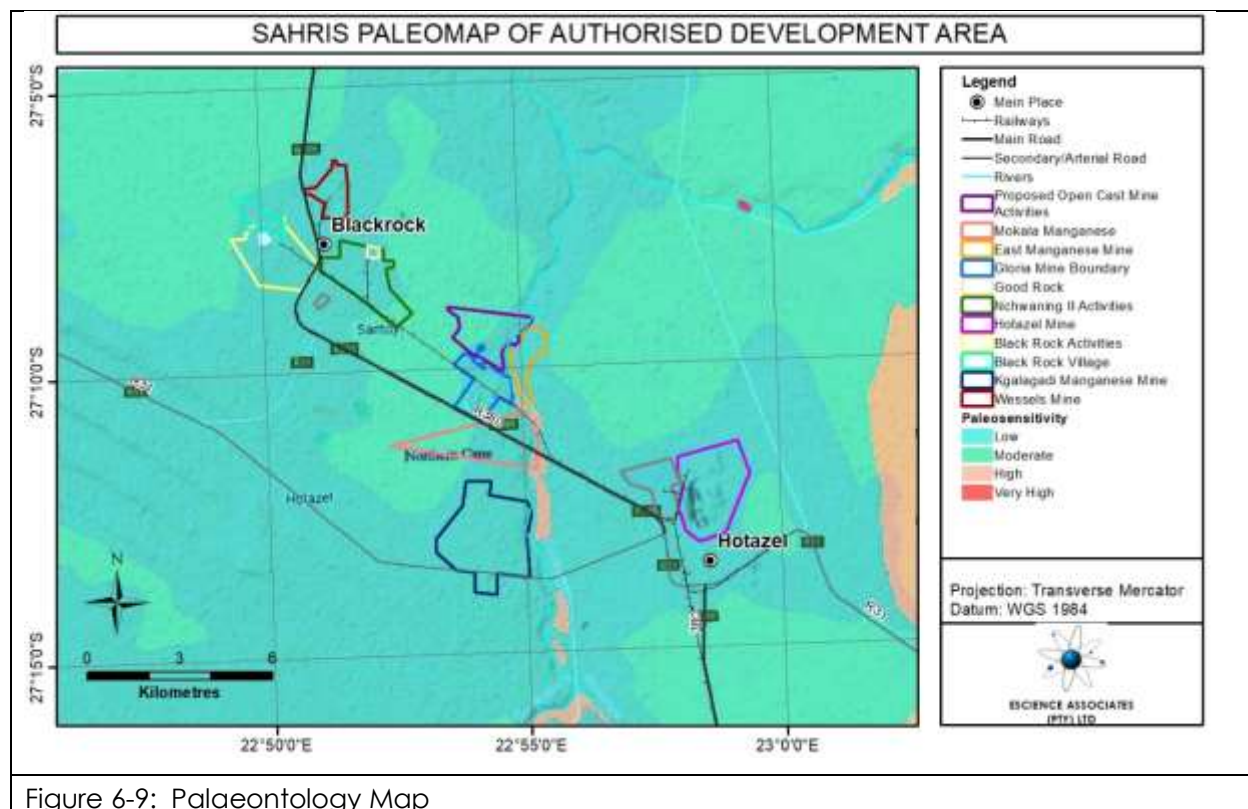
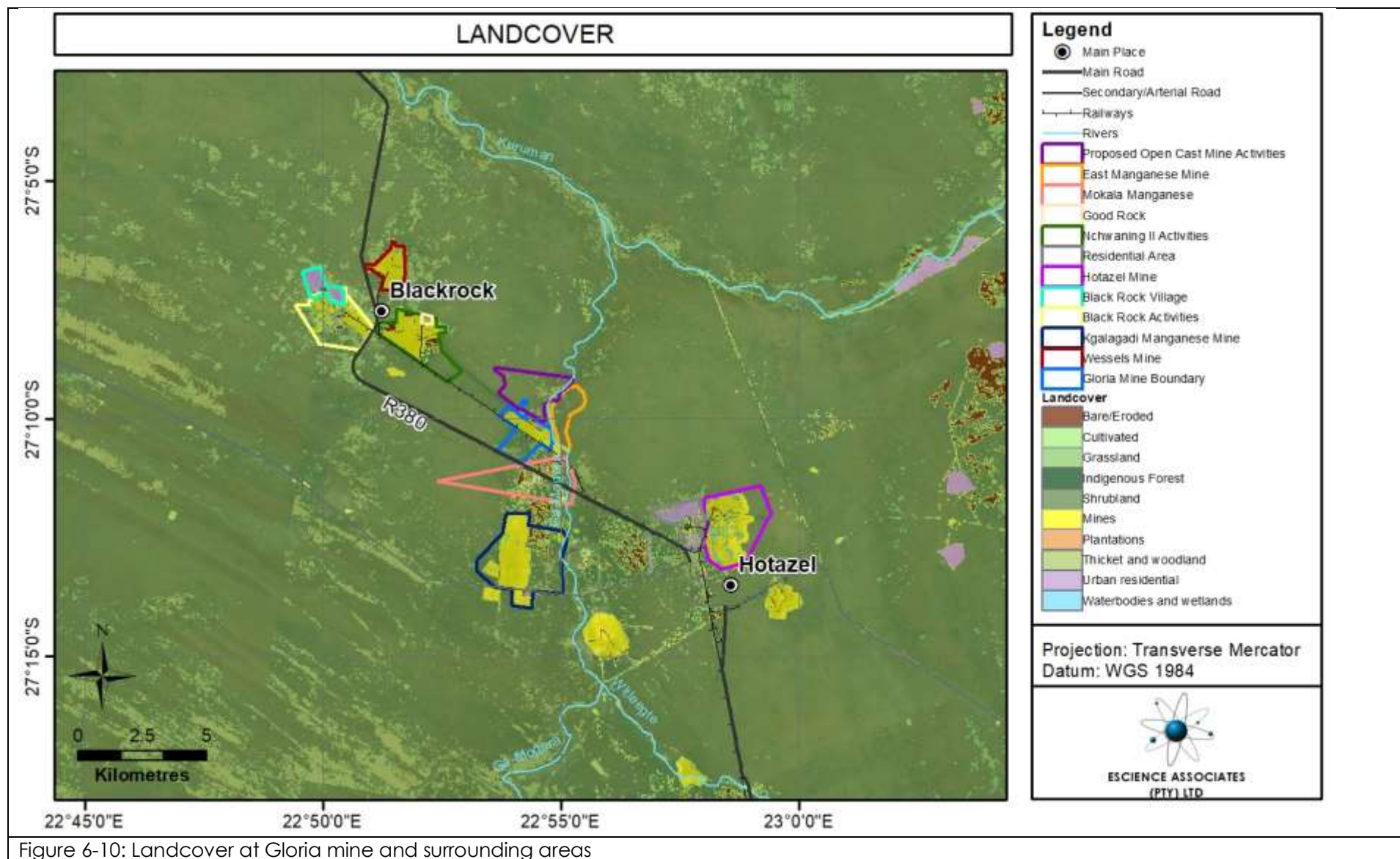
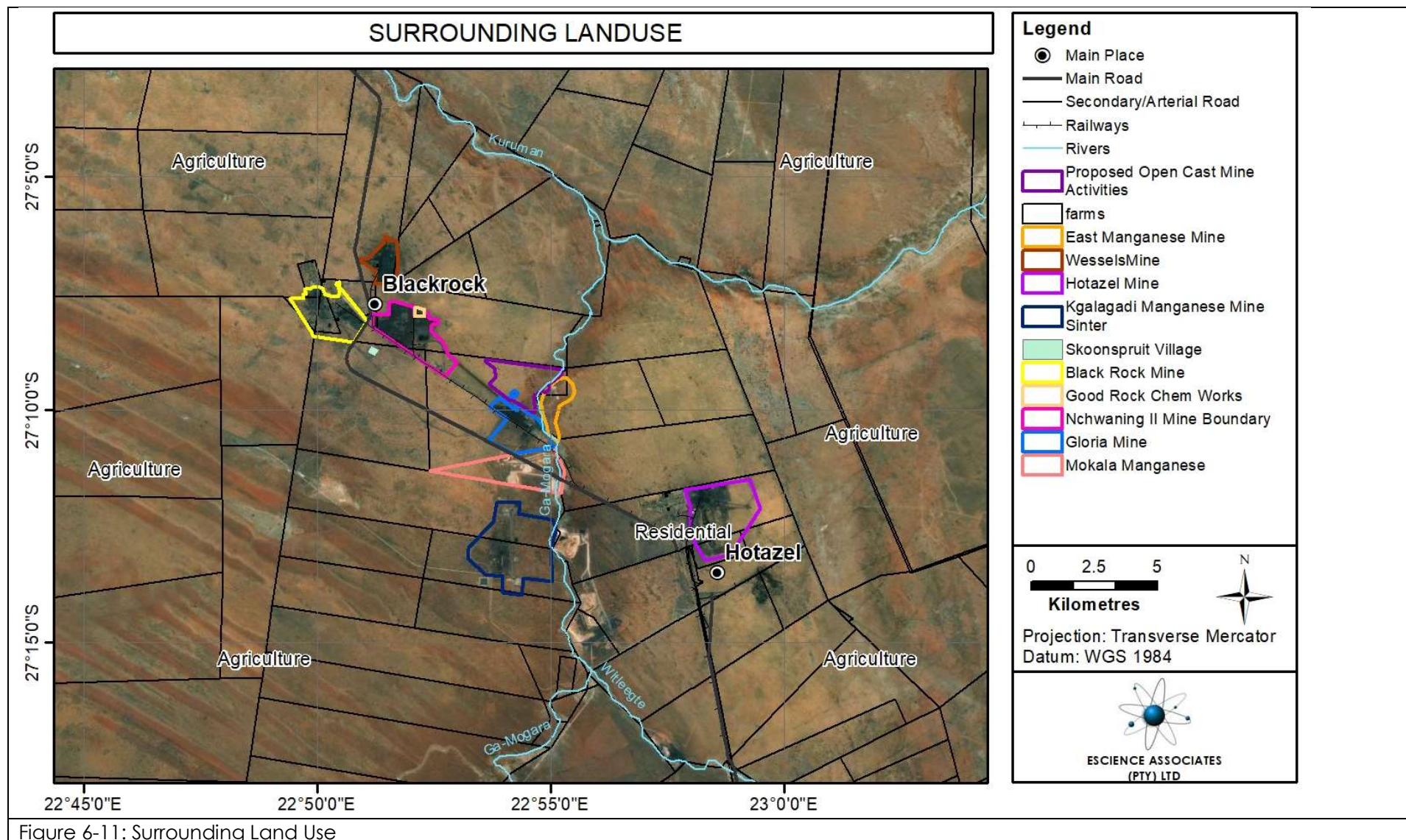


Figure 6-9: Palaeontology Map

6.5 CURRENT LAND USE AND LAND COVER

The current proposed sites are within the mining right area. All the alternatives fall within areas dominated by natural vegetation. As indicated in section 1.3 of this report, the region surrounding BRMO is dominated by mining, industrial and agricultural (generally livestock production) land uses. Land in the immediate vicinity of BRMO that is not used for mining/industrial purposes, is utilised for livestock farming (i.e. sheep, goats, and cattle) and game farming (Refer to Figure 1 2). The proposed site is currently reserved for mining activities.





7 SITE SELECTION

No fatal flaws have been identified for the site locations considered. Notably the selection of potential sites for the open cast mine is largely limited to the available ore body, and the Gamagara River forms a natural barrier to the east of the Gloria surface activities. The river has been significantly transformed upstream and has recently been rerouted for the Mokala Manganese open cast operations approximately 2km upstream.

The ore body, existing infrastructure and the existing Gloria processing plant are significant factors in narrowing down potential sites to the site selected.

8 ENVIRONMENTAL ASPECTS & IMPACTS

Below is an initial assessment of environmental aspects and their associated impacts relating to the proposed project. Differentiation is made between significance of impact and priority for the management of an impact, which is determined by impact significance, and existence of applicable legislation. Detailed analysis/interrogation of the following impacts is proposed for the EIA phase of the project. Note that assessment of the location alternatives has been conducted collectively as all the alternatives are located within close proximity and therefore all potential impacts are assumed to be similar with the limited information available at the scoping phase.

The following criteria and methodology is proposed to determine the significance of environmental impacts that may result from the facility. It must be noted that this preliminary assessment is undertaken in the absence of detailed specialist studies to inform plan of for environmental impact assessment and the environmental impact assessment phase.

8.1 TYPE/NATURE OF IMPACTS

Potential environmental impacts may either have a positive or negative effect on the environment, and can in general be categorised as follows:

a. Direct/Primary Impacts

Primary impacts are caused directly due to the activity and generally occur at the same time and at the place of the activity.

b. Indirect/Secondary Impacts

Secondary impacts induce changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken.

c. Cumulative Impacts

Cumulative impacts are those that result from the incremental impact of the activity on common resources when added to the impacts of the other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

8.2 DETERMINING SIGNIFICANCE

The following criteria were used to determine the significance of an impact. The scores associated with each of the levels within each criterion are indicated in brackets after each description [like this].

8.2.1 NATURE

Nature (N) considers whether the impact is:

- Positive [- ¼]
- Negative [+1].

8.2.2 EXTENT

Extent (E) considers whether the impact will occur:

- on site [1]
- locally: within the vicinity of the site [2]
- regionally: within the local municipality [3]
- provincially: across the province [4]
- nationally or internationally [5].

8.2.3 DURATION

Duration (D) considers whether the impact will be:

- very short term: a matter of days or less [1]
- short term: a matter of weeks to months [2]
- medium term: up to a year or two [3]
- long term: up to 10 years [4]
- very long term: 10 years or longer [5].

8.2.4 INTENSITY

Intensity (I) considers whether the impact will be:

- negligible: there is an impact on the environment, but it is negligible, having no discernible effect [1]
- minor: the impact alters the environment in such a way that the natural processes or functions are hardly affected; the system does however, become more sensitive to other impacts [2]
- moderate: the environment is altered, but function and process continue, albeit in a modified way; the system is stressed but manages to continue, although not with the same strength as before [3]
- major: the disturbance to the environment is enough to disrupt functions or processes, resulting in reduced diversity; the system has been damaged and is no longer what it used to be, but there are still remaining functions; the system will probably decline further without positive intervention [4]
- severe: the disturbance to the environment destroys certain aspects and damages all others; the system is totally out of balance and will collapse without major intervention or rehabilitation [5].

8.2.5 PROBABILITY

Probability (P) considers whether the impact will be:

- unlikely: the possibility of the impact occurring is very low, due either to the circumstances, design or experience [1]

- likely: there is a possibility that the impact will occur, to the extent that provisions must be made for it [2]
- very likely: the impact will probably occur, but it is not certain [3]
- definite: the impact will occur regardless of any prevention plans, and only mitigation can be used to manage the impact [4].

8.2.6 MITIGATION OR ENHANCEMENT

Mitigation (M) is about eliminating, minimising or compensating for negative impacts, whereas enhancement (H) magnifies project benefits. This factor considers whether –

- A negative impact can be mitigated:
- unmitigated: no mitigation is possible or planned [1]
- slightly mitigated: a small reduction in the impact is likely [2]
- moderately mitigated: the impact can be substantially mitigated, but the residual impact is still noticeable or significant (relative to the original impact) [3]
- well mitigated: the impact can be mostly mitigated, and the residual impact is negligible or minor [4]

A positive impact can be enhanced:

- unenhanced: no enhancement is possible or planned [1]
- slightly enhanced: a small enhancement in the benefit is possible [2]
- moderately enhanced: a noticeable enhancement is possible, which will increase the quantity or quality of the benefit in a significant way [3]
- well enhanced: the benefit can be substantially enhanced to reach a far greater number of receptors or recipients and/or be of a much higher quality than the original benefit [4].

8.3 CALCULATING IMPACT SIGNIFICANCE

The table below summarises the scoring for all the criteria.

Table 8-1: Scoring for Significance Criteria						
CRITERION	SCORES					
	- ¼	1	2	3	4	5
N-nature	positive	negative	-	-	-	-
E-extent	-	site	local	municipal	provincial	national
D-duration	-	very short	short	moderate	long	very long
I-intensity	-	negligible	minor	moderate	major	severe
P-probability	-	very unlikely	unlikely	likely	very likely	definite
M-mitigation	-	none	slight	moderate	good	-
H-enhancement	-	none	slight	moderate	good	-
R-reversibility	-	none	slight	moderate	good	-

Impact significance is a net result of all the above criteria. The formula proposed to calculate impact significance (S) is:

- For a negative impact: $S = N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$; and
- For a positive impact: $S = N \times (E+D) \times I \times P \times (H)$.

Negative impacts score from 2 to 200. Positive impacts score from – ½ to -200.

8.4 UNDERSTANDING IMPACT SIGNIFICANCE

The following is a guide to interpreting the final scores of an impact (for negative impacts):

Table 8-2: Final Significance Scoring		
Final score (S)	Impact significance	
0 – 10	Negligible	The impact should result in no appreciable damage to the environment, except where it has the opportunity to contribute to cumulative impacts
10 – 20	Low	The impact will be noticeable but should be localized or occur over a limited time period and not cause permanent or unacceptable changes; it should be addressed in an EMP and managed appropriately.
20 – 50	Moderate	The impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition, the project benefits must be shown to outweigh the impact.
50 – 100	High	The impact will affect the environment to such an extent that permanent damage is likely, and recovery will be slow and difficult; the impact is unacceptable without real mitigation or reversal plans; project benefits must be proven to be very substantial; the approval of the project will be in jeopardy if this impact cannot be addressed.
100 – 200	Severe	The impact will result in large, permanent and severe impacts, such as, sterilising of essential environmental resources, local species extinctions, eco-system collapse; project alternatives that are substantially different should be considered, otherwise the project should not be approved.

8.5 CONSTRUCTION PHASE IMPACTS

8.5.1 MANAGEMENT AND DISPOSAL OF GENERAL WASTE

Nature (N)	Potential negative impact on water resource quality.	1
Extent (E)	Site: These activities will all occur within BRMO. BRMO operates a licensed general landfill that will receive all unrecyclable general waste.	1
Duration (D)	Long term: Waste will be permanently placed in landfill. Besides the landfill, impact on soil and water is only expected in the event of incorrect storage, transportation, or disposal of waste.	4
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected. Contaminants that have very limited possibility of entering groundwater and would be in small quantities and of limited risk.	2
Probability (P)	Likely: The potential for incorrect storage of waste without proper mitigation and management in place is high.	3
Mitigation (M)	Can be well mitigated: Providing adequate waste storage skips and bins, which will largely eliminate the potential for soil and groundwater contamination. Disposal will be to the licenced BRMO landfill.	4
Enhancement (H)	N/A	-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.	2
Significance without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Moderate 20
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low 10
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.5.2 MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE

Nature (N)	Potential negative impact on water resource quality		1
Extent (E)	Provincial: Hazardous wastes are expected to be minimal. These will be managed via BRMO's hazardous waste transfer facility. Hazardous wastes would however be disposed or recycled in other provinces due to the lack of suitable facilities locally.		4
Duration (D)	Long term: Impact on soil and water is only expected in the event of a spill outside of the bunded storage areas or during transport. The subsequent impact on groundwater for example may remain for several years.		5
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected mainly due to the low quantities.		1
Probability (P)	Likely: The potential for incorrect storage of waste without proper mitigation and management in place is high.		3
Mitigation (M)	Can be well mitigated: Providing adequate bunded facilities, for storage will largely eliminate the potential for soil and groundwater contamination. Hazardous waste such as used oil and lubricants will in any case be stored in sealed drums/containers. Using a suitable waste management contractor for transporting waste to licenced management facilities will also effectively reduce risk.		4
Enhancement (H)	N/A		-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.		2
Significance Rating without Mitigation -Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	18
Significance Rating with Mitigation -Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	9
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.5.3 GROUNDWATER CONTAMINATION

Nature (N)	Negative impact on water resource quality.	1
Extent (E)	Locally: Localised to the site and immediate surrounds.	2
Duration (D)	Long term: Only if a plume enters groundwater will it be a long process to remediate contaminated groundwater.	4
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected. Contaminants that may enter groundwater will be in small quantities.	2
Probability (P)	Unlikely: The probability of a significant spill taking place during construction is low. The probability of significant contamination from waste materials is also low as the majority of wastes are not hazardous. Hazardous waste such as used oil and lubricants will in any case be stored in sealed drums/containers.	2
Mitigation (M)	Well mitigated: Providing adequate bunded facilities, for storage will largely reduce the potential for soil and groundwater contamination.	4
Enhancement (H)	N/A	-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.	2
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low 16
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible 8
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$	-

8.5.4 SOIL CONTAMINATION

Nature (N)	Direct Negative impact on the site.	1
Extent (E)	On site.	1
Duration (D)	Long term: Only contaminated soil is not remediated the impact can be expected to remain for a long period of time depending on the nature of the contaminants.	4
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected. Contaminants that may contaminate soil will be in small quantities.	2
Probability (P)	Very likely: The clearance of undisturbed land will occur. The probability of a significant spill taking place during construction is low. The probability of significant contamination from waste materials is also low as the majority of wastes are not hazardous. Hazardous waste such as used oil and lubricants will in any case be stored in sealed drums/containers.	3
Mitigation (M)	Well mitigated: Providing adequate bunded facilities, for storage will largely reduce the potential for contamination. There are many measures that can be implemented in order to prevent soil and groundwater contamination.	4
Enhancement (H)	N/A	-
Reversibility (R)	Moderately reversible: the impact requires that effort is taken immediately after the impact.	3
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low 15
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible 9
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$.	-

8.5.5 AIR QUALITY

Nature (N)	Negative impact on ambient air quality.		1
Extent (E)	Locally: Localised to the site and immediate surrounds		2
Duration (D)	Short term: Construction phase anticipated to be up to 12 months)		2
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected by dust and dust deposition.		2
Probability (P)	Definite: Construction activities and transport of materials will result in entrainment of particulate matter.		5
Mitigation (M)	Moderately mitigated: Effective dust suppression methods readily available for transport, but less so for excavation and materials handling.		3
Enhancement (H)	N/A		-
Reversibility (R)	Slight: upon completion of construction the mining activity will start.		2
Significance Rating without Mitigation -Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Moderate	27
Significance Rating with Mitigation -Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	16
Significance Rating -Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.5.6 NOISE

Nature (N)	Negative impact on site.		1
Extent (E)	On site: Localised to the site.		1
Duration (D)	Short term: Construction phase anticipated to be up to 12 months.		2
Intensity (I)	Negligible: The facility is within a mining area and there are no nearby noise receptors outside of the facility.		1
Probability (P)	Definite: Noise will be generated by excavation and other equipment and activities.		5
Mitigation (M)	Well mitigated: To be limited to normal working hours, in accordance with locally applicable by-laws.		4
Enhancement (H)	N/A		-
Reversibility (R)	Irreversible: The status quo will return to the previous status quo upon completion of construction.		1
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Low	15
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	6
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.5.7 BIODIVERSITY

Nature (N)	Negative impact on vegetation.		1
Extent (E)	Site: Construction will occur within the BRMO site boundary but will occur over undisturbed land.		1
Duration (D)	Very long term. The mine has a predicted lifespan past 2041.		5
Intensity (I)	Moderate: Protected plant and tree species must be removed. It is not expected that the removal will result in a critical impact on species diversity and vulnerable ecosystems in isolation, but it is important to consider this impact in the context of the wider cumulative impact.		3
Probability (P)	Definite: clearance of undisturbed land will occur.		5
Mitigation (M)	May be well mitigated by relocation of protected plant species, and minimisation of tree removal.		3
Enhancement (H)	N/A		-
Reversibility (R)	Reversible: Site will be rehabilitated upon decommissioning based on the existing mine wide EMPr for BRMO, and the EMPr developed as part of this Basic Assessment.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Moderate	36
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Moderate	26
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$.		-

8.5.8 SOCIO ECONOMIC

Nature (N)	Positive impact on job creation.	-0.25
Extent (E)	Local: Expected to have an impact within the surrounds of the local municipality.	2
Duration (D)	The duration of the construction will be short term.	2
Intensity (I)	Moderate: The number of jobs created will not be large and these jobs may be temporary. It is likely that contractors with existing employees will largely be used.	3
Probability (P)	Definite: Impact will occur.	5
Mitigation (M)	N/A	-
Enhancement (H)	Moderate enhancement, in the form of the proponent making a concerted effort to employ workers from the surrounding areas, can be applied.	3
Reversibility (R)	N/A	N/A
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	Positive (Moderate) -45

8.5.9 GROUNDWATER AVAILABILITY/INTERCEPTION

Groundwater Availability/Interception

Nature (N)	Negative impact on water resource quantity.	1
Extent (E)	Locality: Localised to the site and immediate surrounds.	2
Duration (D)	Long term: If groundwater is intercepted and abstracted the resulting drawdown will be long term due to the low recharge rates in the area.	4
Intensity (I)	Moderate: Natural processes or functions are not expected to be appreciably affected. The only aquifers which may be intercepted are disconnected calcrete aquifers and the Gamagara river.	3
Probability (P)	Very Unlikely: Existing geohydrological investigations and monitoring boreholes indicate the depth to appreciable ground water exceeds the depth of construction activities.	1
Mitigation (M)	Well mitigated: Adequate geotechnical and geohydrological investigation may prevent locating the site where there would be an appreciable impact.	4
Enhancement (H)	N/A	-
Reversibility (R)	Slightly reversible: If groundwater is intercepted and abstracted the resulting drawdown will be long term due to the low recharge rates in the area.	2
Significance Rating without Mitigation -Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low 12
Significance Rating with Mitigation -Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible 6
Significance Rating -Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.5.10 ODOUR

Nature (N)	Negative nuisance impact on ambient air quality.		1
Extent (E)	Site: Besides fumes from diesel engines no odour impact is not expected.		1
Duration (D)	Short term: Construction phase anticipated to be up to 12 months.		2
Intensity (I)	Negligible: No natural processes or other receptors are expected to be appreciably affected.		1
Probability (P)	Negligible: No natural processes or other receptors are expected to be appreciably affected.		1
Mitigation (M)	No mitigation required.		1
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of construction the impacts the status quo is expected to revert.		4
Significance without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	1.2
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	1
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.5.11 VISUAL/AESTHETIC

Nature (N)	Negative impact on ambient air quality.		1
Extent (E)	Site: The activities facility will only be visible from the site.		1
Duration (D)	Short term: Construction phase anticipated to be up to 12 months.		2
Intensity (I)	Negligible: No receptors are expected to be appreciably affected.		1
Probability (P)	Very unlikely: The activities facility will only be visible from the site.		1
Mitigation (M)	Well mitigated: Grassing of the facilities slopes will blend the facility with natural surrounding veld.		4
Enhancement (H)	N/A		-
Reversibility (R)	Irreversible: If the facility is not removed prior to closure of the mine then it will remain in perpetuity.		1
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	3
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	1
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.5.12 HERITAGE RESOURCES

Nature (N)	Negative impact on heritage resources if they are present.		1
Extent (E)	Locally: Localised to the site but may be of significance in respect of the wider heritage aspects of the surrounding area.		2
Duration (D)	Permanent: Once damaged or destroyed the impact may be permanent.		5
Intensity (I)	Minor: Previous studies of the area have shown that the probability of significant finds is low.		2
Probability (P)	Unlikely: Previous studies of the area have shown that the probability of significant finds is low.		1
Mitigation (M)	Well mitigated: Adequate assessment and planning may be effective for identifying protecting heritage resources.		3
Enhancement (H)	N/A		-
Reversibility (R)	Not reversible.		1
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Low	14
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	7
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$.		-

8.5.13 SURFACE WATER

Nature (N)	Negative impact on water quality.		1
Extent (E)	Site: there is no evidence of natural surface water or drainage on the site.		1
Duration (D)	Short term: Construction phase anticipated to be up to 12 months.		2
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected.		2
Probability (P)	Very unlikely: There is no evidence of natural surface water or drainage on the site. The site has high infiltration and evaporation rates.		1
Mitigation (M)	Well mitigated: Effective procedures can be adopted to prevent contamination of surface water from the proposed activities.		3
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of construction the impacts the status quo will remain until closure.		1
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	6
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	3
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$.		-

8.5.14 TRAFFIC

Nature (N)	Negative impact on traffic in the area.		1
Extent (E)	Site: The majority of vehicular movement will be within the BRMO boundaries.		1
Duration (D)	Short term: Construction phase anticipated to be up to 12 months.		2
Intensity (I)	Negligible: No external users are expected to be appreciably affected. The majority of vehicular movement will be within the BRMO boundaries.		1
Probability (P)	Negligible: The activities facility will only be visible from the site.		1
Mitigation (M)	No mitigation required		1
Enhancement (H)	N/A		-
Reversibility (R)	Slight – After completion of the construction phase, mining activities will be occurring on site.		2
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	2
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	2
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$.		-

8.6 OPERATION PHASE IMPACTS

8.6.1 MANAGEMENT AND DISPOSAL OF GENERAL WASTE

Nature (N)	Potential negative impact on water resource quality.	1
Extent (E)	Site: These activities will all occur within BRMO. BRMO operates a licensed general landfill that will receive all unrecyclable general waste.	1
Duration (D)	Long term: Waste will be permanently placed in landfill. Besides the landfill, impact on soil and water is only expected in the event of incorrect storage, transportation, or disposal of waste.	4
Intensity (I)	Negligible: Very low quantities of waste will be generated by the operational phase of the facility. Natural processes or functions are not expected to be appreciably affected	1
Probability (P)	Likely: The potential for incorrect storage and disposal of waste without proper mitigation and management in place is high.	3
Mitigation (M)	Can be well mitigated: Providing adequate waste storage skips and bins, which will largely eliminate the potential for soil and groundwater contamination. Disposal will be to the licenced BRMO landfill.	4
Enhancement (H)	N/A	-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.	2
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low 10
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible 5
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.6.2 MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE

Nature (N)	Potential negative impact on water resource quality		1
Extent (E)	Provincial: Hazardous wastes are expected to be minimal. These will be managed via BRMO's hazardous waste transfer facility. Hazardous wastes would however be disposed or recycled in other provinces due to the lack of suitable facilities locally.		4
Duration (D)	Long term: Impact on soil and water is only expected in the event of a spill outside of the bunded storage areas or during transport. The subsequent impact on groundwater for example may remain for several years.		5
Intensity (I)	Negligible: Very low quantities of waste will be generated by the operational phase of the facility. Natural processes or functions are not expected to be appreciably affected.		1
Probability (P)	Likely: The potential for incorrect storage and disposal of waste without proper mitigation and management in place is high.		3
Mitigation (M)	Can be well mitigated: Providing adequate bunded facilities, for storage will largely eliminate the potential for soil and groundwater contamination. Hazardous waste such as used oil and lubricants will in any case be stored in sealed drums/containers. Using a suitable waste management contractor for transporting waste to licenced management facilities will also effectively reduce risk.		4
Enhancement (H)	N/A		-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.		2
Significance without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	18
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	9
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$		-

8.6.3 GROUNDWATER CONTAMINATION

Nature (N)	Negative impact on water resource quality.	1
Extent (E)	Locally: Site and surrounds.	2
Duration (D)	Long term: Only if a plume enters groundwater will it be a long process to remediate contaminated groundwater.	4
Intensity (I)	Major: Without adequate mitigation there may be potential for significant quantities of affected water percolating to groundwater. This must be assessed in the EIA phase.	4
Probability (P)	Very Likely: Without adequate mitigation there may a high probability of significant quantities of affected water percolating to groundwater. This must be assessed in the EIA phase.	4
Mitigation (M)	Well mitigated: Effective design, monitoring and management measures can prevent potentially significant impacts.	4
Enhancement (H)	N/A	-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.	2
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	High 64
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Moderate 32
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.6.4 SOIL CONTAMINATION

Nature (N)	Negative impact on water resource quality	1
Extent (E)	Site: This would apply to soil beneath the site, and immediate surrounds in case of a spill or slippage.	1
Duration (D)	Long term: If the impacted area is not addressed.	4
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected. Contaminants that may contaminate soil will be in small quantities.	2
Probability (P)	Very Likely: Without adequate mitigation there may a high probability of significant quantities of affected water percolating to subsoil. This must be assessed in the EIA phase.	4
Mitigation (M)	Well mitigated: Effective design, monitoring and management measures can prevent potentially significant impacts.	4
Enhancement (H)	N/A	-
Reversibility (R)	Reversible: Affected soil may be removed.	4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low 16
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low 10
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.6.5 AIR QUALITY

Nature (N)	Negative impact on ambient air quality.		1
Extent (E)	Locally: Localised to the site and immediate surrounds		2
Duration (D)	Long term: these impacts (if they occur) will occur as long as the facility is in operation.		4
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected by dust and dust deposition.		2
Probability (P)	Definite: Transport of materials will result in entrainment of particulate matter.		5
Mitigation (M)	Moderately mitigated: Effective dust suppression methods readily available for transport, but less so for excavation and materials handling.		3
Enhancement (H)	N/A		-
Reversibility (R)	Good: Upon completion of mining activities the current status quo should return		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Moderate	24
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	17
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.6.6 NOISE

Nature (N)	Negative impact on site.		1
Extent (E)	On site: Localised to the site.		1
Duration (D)	Very long term. The mine has a predicted lifespan past 2038.		5
Intensity (I)	Moderate: The mine is in an existing mining area and there are no nearby receptors outside of the facility.		3
Probability (P)	Definite: Noise will be generated by excavation and other equipment and activities.		5
Mitigation (M)	Well mitigated: To be limited to normal working hours, in accordance with locally applicable by-laws.		4
Enhancement (H)	N/A		-
Reversibility (R)	Reversible: The status quo will return to the previous status quo upon completion of mine activities		4
Significance Rating without Mitigation -Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Moderate	36
Significance Rating with Mitigation -Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Moderate	22.5

8.6.7 BIODIVERSITY

Nature (N)	Negative impact on vegetation.		1
Extent (E)	Established Site only. No new disturbed areas after construction is completed.		1
Duration (D)	Very long term. The mine has a predicted lifespan past 2038.		5
Intensity (I)	Negligible: No new disturbed areas.		1
Probability (P)	Negligible: No new disturbed areas.		1
Mitigation (M)	None. Mitigation not required.		1
Enhancement (H)	N/A		-
Reversibility (R)	Reversible: Site will be rehabilitated upon decommissioning based on the existing mine wide EMPr for BRMO, and the EMPr developed as part of this Basic Assessment.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	2.4
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	2.4
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.6.8 SOCIO ECONOMIC

Nature (N)	Positive impact on job creation.	-0.25
Extent (E)	Local: Expected to have an impact within the surrounds local municipality.	2
Duration (D)	Long term: The duration of operation of the facility.	4
Intensity (I)	Moderate: There is expected to be a moderate level of job creation	3
Probability (P)	Definite	5
Mitigation (M)	N/A	-
Enhancement (H)	There will be moderate socioe economic benefits arising from the mining activities	3
Reversibility (R)	N/A	N/A
Significance Rating -Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	Positive (High) -67.5

8.6.9 ODOUR

Nature (N)	Negative nuisance impact on ambient air quality.		1
Extent (E)	Site: No significant sources are anticipated. The material to be deposited is inorganic and odourless.		1
Duration (D)	Long term: The impact, if it is present, will persist for the duration of operation.		4
Intensity (I)	Negligible: No natural processes or other receptors are expected to be appreciably affected.		1
Probability (P)	Negligible: The material to be deposited is inorganic and odourless.		1
Mitigation (M)	No mitigation required		1
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of construction the impacts the status quo is expected to revert.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	2
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	2
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.6.10 VISUAL/AESTHETIC

Nature (N)	Negative impact on ambient air quality.	1
Extent (E)	Locally: The activities facility will only be visible from the site and potentially surrounding areas.	2
Duration (D)	Long term: The impact, if it is present, will persist for the duration of operation.	4
Intensity (I)	Negligible: No receptors are expected to be appreciably affected. The sense of place is not expected to be affected.	1
Probability (P)	Low: The activities facility will only be visible from the site and potentially surrounding areas.	1
Mitigation (M)	Moderately mitigated: Effective dust suppression methods readily available for transport, but less so for excavation and materials handling.	3
Enhancement (H)	N/A	-
Reversibility (R)	Upon completion of mining activities the impacts the status quo is expected to revert.	4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible 4.8
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible 3
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.6.11 HERITAGE RESOURCES

Nature (N)	Negative impact on heritage resources if they are present.	1
Extent (E)	Locally: Localised to the site but may be of significance in respect of the wider heritage aspects of the surrounding area.	2
Duration (D)	Permanent: Once damaged or destroyed the impact may be permanent.	5
Intensity (I)	Minor: Previous studies of the area have shown that the probability of significant finds is low.	2
Probability (P)	Very unlikely: Previous studies of the area have shown that the probability of encountering palaeontological or archaeological artefacts at the proposed site is low. However, any findings of significance would have been made during the construction phase.	1
Mitigation (M)	Well mitigated: Adequate assessment and planning may be effective for identifying protecting heritage resources.	3
Enhancement (H)	N/A	-
Reversibility (R)	Not reversible	1
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Low 14
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible 7
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.6.12 SURFACE WATER

Nature (N)	Negative impact on water quality.		1
Extent (E)	Site: there is no evidence of natural surface water or drainage on the site.		1
Duration (D)	Short term: Due to the low frequency of rainfall and absence of surface drainage it is unlikely that there would be any long-term surface water impacts.		2
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected.		2
Probability (P)	Very unlikely: There is no evidence of natural surface water or drainage on the site. The site has high infiltration and evaporation rates.		1
Mitigation (M)	Well mitigated: Effective procedures can be adopted to prevent contamination of surface water from the proposed activities.		3
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of construction the impacts the status quo will remain until closure.		1
Significance without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	6
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	3
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.6.13 TRAFFIC

Nature (N)	Negative impact on traffic in the area.		1
Extent (E)	Site: Vehicular movement, if any, will be within the BRMO boundaries.		1
Duration (D)	Long term		2
Intensity (I)	Negligible: No external users are expected to be appreciably affected. The majority of vehicular movement will be within the BRMO boundaries.		1
Probability (P)	Long term: these impacts (if they occur) will occur as long as the facility is in operation.		4
Mitigation (M)	No mitigation required		1
Enhancement (H)	N/A		-
Reversibility (R)	Upon closure impact the status quo is expected to revert.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	4.8
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	5
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7 CLOSURE AND POST CLOSURE PHASE IMPACTS

8.7.1 MANAGEMENT AND DISPOSAL OF GENERAL WASTE

Nature (N)	Potential negative impact on water resource quality.		1
Extent (E)	Site: These activities will all occur within BRMO. BRMO operates a licensed general landfill that will receive all unrecyclable general waste.		1
Duration (D)	Long term: Waste will be permanently placed in landfill. Besides the landfill, impact on soil and water is only expected in the event of incorrect storage, transportation, or disposal of waste.		4
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected. Contaminants that have very limited possibility of entering groundwater and would be in small quantities and of limited risk.		2
Probability (P)	Likely: The potential for incorrect storage of waste without proper mitigation and management in place is high.		3
Mitigation (M)	Can be well mitigated: Providing adequate waste storage skips and bins, which will largely eliminate the potential for soil and groundwater contamination. Disposal will be to the licenced BRMO landfill.		4
Enhancement (H)	N/A		-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.		2
Significance without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Moderate	20
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	10
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7.2 MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE

Nature (N)	Potential negative impact on water resource quality		1
Extent (E)	Provincial: Hazardous wastes are expected to be minimal. These will be managed via BRMO's hazardous waste transfer facility. Hazardous wastes would however be disposed or recycled in other provinces due to the lack of suitable facilities locally.		4
Duration (D)	Long term: Impact on soil and water is only expected in the event of a spill outside of the bunded storage areas or during transport. The subsequent impact on groundwater for example may remain for several years.		5
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected mainly due to the low quantities.		1
Probability (P)	Likely: The potential for incorrect storage of waste without proper mitigation and management in place is high.		3
Mitigation (M)	Can be well mitigated: Providing adequate bunded facilities, for storage will largely eliminate the potential for soil and groundwater contamination. Hazardous waste such as used oil and lubricants will in any case be stored in sealed drums/containers. Using a suitable waste management contractor for transporting waste to licenced management facilities will also effectively reduce risk.		4
Enhancement (H)	N/A		-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.		2
Significance without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	18
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	9
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7.3 GROUNDWATER CONTAMINATION

Nature (N)	Negative impact on water resource quality.	1
Extent (E)	Regional: Over the long term the impact may spread significantly if not prevented/mitigated at closure.	3
Duration (D)	Long term: Only if a plume enters groundwater will it be a long process to remediate contaminated groundwater.	4
Intensity (I)	Major: Without adequate mitigation there may be potential for significant quantities of affected water percolating to groundwater. This must be assessed in the EIA phase.	4
Probability (P)	Unlikely: Without adequate mitigation there may a high probability of significant quantities of affected water percolating to groundwater. This must be assessed in the EIA phase.	4
Mitigation (M)	Well mitigated: Effective design, monitoring and management measures can prevent potentially significant impacts.	4
Enhancement (H)	N/A	-
Reversibility (R)	Slightly reversible: Groundwater remediation is possible but is a lengthy and costly process.	2
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	High 74.67
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Moderate 37.33
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.7.4 SOIL CONTAMINATION

Nature (N)	Negative impact on water resource quality.		1
Extent (E)	Site: This would apply to soil beneath the site, and immediate surrounds in case of a spill or slippage.		1
Duration (D)	Long term: If the impacted area is not addressed.		4
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected. Contaminants that may contaminate soil will be in small quantities.		2
Probability (P)	Very Likely: Without adequate mitigation there may a high probability of significant quantities of affected water percolating to subsoil. This must be assessed in the EIA phase.		4
Mitigation (M)	Well mitigated: Effective design, monitoring and management measures can prevent potentially significant impacts.		4
Enhancement (H)	N/A		-
Reversibility (R)	Reversible: Affected soil may be removed.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	16
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	10
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7.5 AIR QUALITY

Nature (N)	Negative impact on ambient air quality.		1
Extent (E)	Locally: Localised to the site and immediate surrounds.		2
Duration (D)	Long term: Closure activities anticipated to be up to 6 months, but post closure impacts may continue in perpetuity.		2
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected by dust and dust deposition.		2
Probability (P)	Definite: Closure activities and transport of materials will result in entrainment of particulate matter. Without adequate closure procedures dust entrainment can occur over long periods after closure.		5
Mitigation (M)	Moderately mitigated: Effective dust suppression methods readily available for transport, but less so for excavation and materials handling.		3
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of closure phase activities, the impacts the status quo is expected to revert.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Low	16
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Low	11
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7.6 NOISE

Nature (N)	Negative impact on site.		1
Extent (E)	On site: Localised to the site.		1
Duration (D)	Short term: Closure phase activities anticipated to be up to 6 months. No noise expected post-closure.		2
Intensity (I)	Negligible: The facility is within a mining area and there are no nearby noise receptors outside of the facility.		1
Probability (P)	Definite: Noise will be generated by excavation and other equipment and activities.		5
Mitigation (M)	Well mitigated: To be limited to normal working hours, in accordance with locally applicable by-laws.		4
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of closure phase activities, the impacts the status quo is expected to revert.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	6
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	4
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7.7 BIODIVERSITY

Nature (N)	Positive: impact on vegetation.	-0.25
Extent (E)	Site: The site will be rehabilitated.	1
Duration (D)	Permanent.	4
Intensity (I)	Moderate: Rehabilitation back to prior land use.	3
Probability (P)	Definite: A closure plan is in place along with closure quantum guarantees for the mine.	5
Mitigation (M)	N/A	-
Enhancement (H)	Can be enhanced by future declaration of conservation status. Although this is not guaranteed.	2
Reversibility (R)	Reversible: Site will be rehabilitated upon decommissioning based on the existing mine wide EMPr for BRMO, and the EMPr developed as part of this Basic Assessment.	N/A
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$.	Positive (Moderate) -38

8.7.8 SOCIO ECONOMIC

Nature (N)	Positive impact on job creation.	-0.25
Extent (E)	Local: Expected to have an impact within the surrounds of the local municipality.	2
Duration (D)	The duration of the closure phase activities will be short term.	2
Intensity (I)	Moderate: The number of jobs created will not be large and these jobs will be temporary. It is likely that contractors with existing employees will largely be used.	3
Probability (P)	Definite: Impact will occur.	5
Mitigation (M)	N/A	-
Enhancement (H)	Moderate enhancement, in the form of the proponent making a concerted effort to employ workers from the surrounding areas, can be applied.	3
Reversibility (R)	N/A	N/A
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	Positive (Moderate) -45

8.7.9 ODOUR

Nature (N)	Negative nuisance impact on ambient air quality.		1
Extent (E)	Site: Besides fumes from diesel engines no odour impact is expected.		1
Duration (D)	Short term: closure phase activities anticipated to be up to 6 months.		2
Intensity (I)	Negligible: No natural processes or other receptors are expected to be appreciably affected.		1
Probability (P)	Negligible: No natural processes or other receptors are expected to be appreciably affected.		1
Mitigation (M)	No mitigation required.		1
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of closure phase activities the impacts the status quo is expected to revert.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	1.2
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	1
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7.10 VISUAL/AESTHETIC

Nature (N)	Negative impact on ambient air quality.		1
Extent (E)	Site: The activities facility will only be visible from the site.		1
Duration (D)	Short term: closure phase activities anticipated to be up to 6 months.		2
Intensity (I)	Negligible: No natural receptors are expected to be appreciably affected.		1
Probability (P)	Negligible: The activities facility will only be visible from the site.		1
Mitigation (M)	Moderately mitigated: Effective dust suppression methods readily available for transport, but less so for excavation and materials handling.		3
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of closure phase activities, the impacts the status quo is expected to revert.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	1.2
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	1
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7.11 HERITAGE RESOURCES

Nature (N)	Negative impact on heritage resources if they are present.	1
Extent (E)	Locally: Localised to the site but may be of significance in respect of the wider heritage aspects of the surrounding area.	2
Duration (D)	Permanent: Once damaged or destroyed the impact may be permanent.	5
Intensity (I)	Minor: Previous studies of the area have shown that the probability of significant finds is low.	2
Probability (P)	Very unlikely: Previous studies of the area have shown that the probability of encountering palaeontological or archaeological artefacts at the proposed site is low. However, any findings of significance would have been made during the construction phase.	1
Mitigation (M)	Well mitigated: Adequate assessment and planning may be effective for identifying protecting heritage resources.	3
Enhancement (H)	N/A	-
Reversibility (R)	Not reversible.	1
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Low 14
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible 7
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$	-

8.7.12 SURFACE WATER

Nature (N)	Negative impact on water quality.		1
Extent (E)	Site: there is no evidence of natural surface water or drainage on the site.		1
Duration (D)	Long term: If there are any impacts they may continue in perpetuity if not addressed during the closure design.		4
Intensity (I)	Minor: Natural processes or functions are not expected to be appreciably affected.		2
Probability (P)	Very unlikely: There is no evidence of natural surface water or drainage on the site. The site has high infiltration and evaporation rates.		1
Mitigation (M)	Well mitigated: Effective procedures can be adopted to prevent contamination of surface water from the proposed activities.		3
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of closure phase activities, the impacts the status quo is expected to revert.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	4
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	3
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H).$		-

8.7.13 TRAFFIC

Nature (N)	Negative impact on traffic in the area.		1
Extent (E)	Site: The majority of vehicular movement will be within the BRMO boundaries.		1
Duration (D)	Short term: closure phase activities anticipated to be up to 6 months.		2
Intensity (I)	Negligible: No external users are expected to be appreciably affected. The majority of vehicular movement will be within the BRMO boundaries.		1
Probability (P)	Negligible: The activities facility will only be visible from the site.		1
Mitigation (M)	No mitigation required.		1
Enhancement (H)	N/A		-
Reversibility (R)	Upon completion of closure phase activities, the impacts the status quo is expected to revert.		4
Significance Rating without Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(R)$	Negligible	1.2
Significance Rating with Mitigation - Negative Impact (S)	$N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$	Negligible	1
Significance Rating - Positive Impact (S)	$N \times (E+D) \times I \times P \times (H)$.		-

8.8 SUMMARY

A summary of the impact assessment outcomes is present in Table 8-3 below.

Table 8-3: Summary of scoping phase impact assessment			
Phase	Impact	Without Mitigation	With Mitigation
Construction	Management and Disposal of General Waste	Moderate	Low
	Management and Disposal of Hazardous Waste	Low	Negligible
	Groundwater Contamination	Low	Negligible
	Soil Contamination	Low	Negligible
	Air Quality	Moderate	Low
	Noise	Low	Negligible
	Biodiversity	Moderate	Moderate
	Socio-Economic	Positive (Moderate)	Not Applicable
	Groundwater Availability/Interception	Moderate	Negligible
	Odour	Negligible	Negligible
	Visual/Aesthetic	Negligible	Negligible
	Heritage Resources	Low	Negligible
	Surface Water	Negligible	Negligible
	Traffic	Negligible	Negligible
Operation	Management and Disposal of General Waste	Low	Negligible
	Management and Disposal of Hazardous Waste	Low	Negligible
	Groundwater Contamination	High	Moderate
	Soil Contamination	Low	Low
	Air Quality	Negligible	Negligible
	Noise	Moderate	Low
	Biodiversity	Negligible	Negligible
	Socio Economic	Positive (High)	Not Applicable
	Odour	Negligible	Negligible
	Visual/Aesthetic	Negligible	Negligible
	Heritage Resources	Low	Negligible
	Surface Water	Negligible	Negligible
	Traffic	Negligible	Negligible
Decommissioning	Management and Disposal of General Waste	Moderate	Low
	Management and Disposal of Hazardous Waste	Low	Negligible
	Groundwater Contamination	High	Moderate
	Soil Contamination	Low	Low

Table 8-3: Summary of scoping phase impact assessment

Phase	Impact	Without Mitigation	With Mitigation
	Air Quality	Low	Low
	Noise	Negligible	Negligible
	Biodiversity	Positive (Moderate)	Not Applicable
	Socio-Economic	Positive (Moderate)	Not Applicable
	Odour	Negligible	Negligible
	Visual/Aesthetic	Negligible	Negligible
	Heritage Resources	Low	Negligible
	Surface Water	Negligible	Negligible
	Traffic	Negligible	Negligible

9 PLAN OF STUDY FOR EIA

9.1 LEGAL REQUIREMENT FOR PLAN OF STUDY FOR EIA

This plan of study has been formulated to meet the requirements for a Plan of Study for Environmental Impact Assessment (EIA) as set out in Appendix 2(i) of GN R.982, which states: "A plan of study for undertaking the environmental impact assessment process to be undertaken, including-

- (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;
- (ii) a description of the aspects to be assessed as part of the environmental impact assessment process;
- (iii) aspects to be assessed by specialists;
- (iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;
- (v) a description of the proposed method of assessing duration and significance;
- (vi) an indication of the stages at which the competent authority will be consulted;
- (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and
- (viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;
- (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored."

9.2 ALTERNATIVES TO BE CONSIDERED

A summary of alternatives to be considered is presented in Table 9-1.

Table 9-1: Alternatives to be assessed	
Property or location alternatives	The preferred locations will be in accordance with the site selection outcomes considered in section 7 of this report.
Design or layout of activity	Layout alternatives will be considered as per section 2.3.3 of the report.
Technology to be used in the activity	Technology alternatives will be considered as per section 2.3.4 of the report.
Operational aspects of activity	Operational alternatives will be considered as per section 2.3.5 of the report.
Not implementing activity "No-Go Alternative"	The no-go alternative relates to no proceeding with the proposed activities, i.e. maintaining the status quo. This will be assessed as required by the EIA regulations.

9.3 ASPECTS TO BE ASSESSED

The aspects identified in section 8 of the report will be assessed.

9.3.1 SPECIALIST ASSESSMENTS

The identification and initial assessment of environmental aspects as well as a screening assessment indicate the following potentially significant environmental aspects which require further detailed assessment. These will be conducted during the EIA-phase. These are based on regulatory requirements as well as the impact assessment outcomes and the requirement to develop adequate management and mitigation measures as well:

- **Noise Impact Assessment:** to determine the environmental hazards posed by the proposed establishment and operation of the open cast mine and its ancillary processes;
- **Air Quality Impact Assessment:** to determine the potential impact of atmospheric emission from the proposed activities on ambient air quality (including dustfall);
- **Biodiversity Assessment:** to identify and assess the potential impact on biota related in particular, but not limited to, to land clearing and the proposed activities;
- **Freshwater Ecological Assessment:** to identify and assess the potential impact on biota related to potential impingement on the Gamagara River;
- **Soil and Land Capability:** to assess the soil and land capability and undertake agricultural site sensitivity verification in particular as relates to the proposed change of land use and rehabilitation outcomes as well;
- **Archaeological Assessment:** to identify and assess the potential for sites/attributes of cultural and archaeological significance;
- **Palaeontology Assessment:** to identify and assess the potential for sites/attributes of palaeontological significance and propose management and mitigation measures
- **Waste treatment and disposal process assessment:** to determine the environmental hazards posed by the materials deposited;
- **Geotechnical:** to assess the geotechnical properties of the proposed sites and the related potential for impact in respect of sub-surface structures and ground water.
- **Geohydrological Assessment:** to assess the potential for impact on groundwater and identify management and mitigation measures;
- **Geochemical Assessment:** to assess the characteristics of the mineral residues derived from the activities as well the materials extracted and exposed in respect of the potential risk related to the management thereof and in particular potential for impact on groundwater;
- **Hydrological Impact Assessment:** To determine the flood lines for the Gamagara River in proximity to the proposed development as well as assess the potential for impact on the hydrological characteristics of the river;
- **Civil Aviation Site Sensitivity Verification:** This assessment is required in accordance with GN 960 of 2019 (GG 42561) and the outcomes of the mandatory DFFE screening tool which indicates high sensitivity, probably due to the current and historical presence of landing strips;
- **Socio-Economic Impact Screening Assessment:** This relates in particular to the potential socio-economic impacts from the proposed activities. Given the location and scope of the activities, and in cognisance of existing activities at BRMO and the surrounds, it is deemed that a screening assessment will suffice.

- **Traffic Impact Assessment:** All product will be transported by rail, thus there will be no increase in traffic related to product. All excavated materials and residues will be deposited onsite. During the construction phase there will be a temporary increase in traffic in bringing mining equipment to the site. During the operational phase there will be relatively low increase in traffic will relate to the increase in employees. Therefore a traffic impact assessment will only be undertaken if required by the competent authority, commenting authorities, or interested and affected parties.

9.3.1.1 Geotechnical

The objectives of this study are defined by the regulations regarding the planning and management of residue stockpiles and residue deposits, 2015 which requires the following in terms of geotechnical investigation:

- Characterisation of the soil and rock profiles over the entire area to be covered by the residue stockpile facility and associated infrastructure to define the spatial extent and depth of the different soil horizons; and
- Characterisation of the relevant engineering properties of foundations soils and the assessment of strength and drainage characteristics.

Notably, should the preferred site be found to be acceptable, and the outcomes of other specialist assessments also indicating that the preferred site is suitable, then a detailed geotechnical assessment of the alternative site would be obviated.

9.3.1.2 Geohydrological Assessment

The objectives of this study are defined by the regulations regarding the planning and management of residue stockpiles and residue deposits, 2015 which requires the following in terms of groundwater:

- Geohydrological properties of the strata within the zone that could potentially be affected by the quality of seepage;
- Vulnerability and existing potential use of the groundwater resource within the zone that could potentially be affected by the residue facility; and
- Potential rate of seepage from the facility and the quality of the seepage.
- A source-pathway-receptor risk assessment approach

9.3.1.3 Geochemical Assessment

The assessment will be undertaken in cognisance of the:

- The composition and leachability of residues produced;
- The geohydrological findings;
- Consideration of the climatic conditions, site physical and environmental attributes;
- Legislated requirements as per the Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits;
- Determination of Liner requirements;

9.3.1.4 Atmospheric impact assessment

- Review of proposed development components.
- Meso-scale meteorological modelling - WRF

- Fine-scale meteorological modelling – CALMET
- Emissions quantification:
 - Haul roads
 - Blasting
 - Excavation and Materials handling
 - Entrainment from denuded surfaces and stockpiles
 - Crushing and screening
 - Other fugitive sources
- Dispersion modelling and quantification of air quality impact – CALPUFF suite of models

9.3.1.5 Archaeological Assessment

- Survey of literature
- Field survey
- Review of oral histories
- Documenting of sites, objects, features and structures identified
- Significance assessment
- Management recommendations

9.3.1.6 Palaeontology Assessment

- Desktop review of geological and paleontological history of the area
- Assessment of geographical attributes of the site
- Assessment of potential impact significance
- Recommendations and mitigation measures

9.3.1.7 Biodiversity and Freshwater Ecological Assessments

- Desktop analysis of relevant conservation databases;
- Field assessment of the identified habitat units characterise the habitats' integrity, Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the receiving ecological environment;
- Site sensitivity mapping;
- Identification of permitting requirements in terms of provincial and national legislation;
- Recommendations and mitigatory measures in order to minimise impacts on both local and regional ecology;

9.3.1.8 Noise Impact Assessment

The noise and vibration study to determine the impact such an expansion of the existing mining operations may have on the environment will be based on:

- Guidelines for community noise impact assessments.

- Health and Safety Guidelines, IFC, World Bank.
- Relevant noise regulations applicable in area of jurisdiction.
- Ground vibration and air pressure standards.

The noise survey from an environmental noise point of view will have to be done during the day and night-time to evaluate the recommended residual noise levels laid down by IFC and to get a representative residual noise level for the project site/s. The following needs to be undertaken:

- Initial baseline noise measurement surveys to determine existing noise levels at the proposed site boundaries and affected parties;
- The prediction of the future noise regime outside the proposed boundaries of the site;
- Recommendation of mitigation methods should these be necessary or appropriate;
- Ground vibration and air pressure prediction during blasting operations;
- Noise modelling.

9.3.1.9 Soil and Land Capability

- Conduct a desktop assessment within the proposed development area using the digital satellite imagery and other suitable digital aids;
- Review historical as well as current land uses within the proposed development area; and
- Review and interpret existing Soil Maps and other relevant database(s) such as the Agricultural Geo-referenced Information Service (AGIS) to establish broad baseline conditions and areas of environmental sensitivity and sensitive agricultural areas.
- A detailed soil classification survey will be conducted within the proposed development area;
- Subsurface soil observations will be made by means of a manual hand auger;
- Dominant soil types will be classified, and soil boundaries established according to the South African Soil Classification System (Soil Classification Working Group, 2018);
- Soil properties of survey points will be recorded using a Global Positioning System (GPS); and
- Field assessment data will include a detailed description of physical soil properties
- Determine agricultural potential of the identified soil forms;
- Provide recommended mitigation measures to implement in order to manage the anticipated impacts and to comply with the applicable legislations;

9.3.1.10 Hydrological Assessment

- Desktop review;
- Review of quaternary catchments, geology, topography and surface drainage directions;
- Determination of food lines;

- Assessment of potential impacts and development of management and mitigation recommendations.

9.3.1.11 Civil Aviation Site Sensitivity Verification

- Review of locality and identification of airfields in the vicinity;
- Review of legislative requirements per the South African Civil Aviation Authority (CAA); National Department of Transport (DoT), and the dictates of the International Civil Aviation Organisation (ICAO).
- ICAO Classification and Licensing Status review
- Airspace infringement assessment
- Obstacle Limitation Surfaces Assessment
- Aviation Risk Assessment and development of management and mitigation recommendations.

9.3.1.12 Rehabilitation and Closure Planning

This will be undertaken in accordance with the requirements of NEMA, the EIA regulations, and the Financial Provisioning Regulations. following principles should be followed during the planning, implementation and post-implementation phases of the rehabilitation process:

- Define and agree upon end-goals for the rehabilitation process, such as land-use, rehabilitation objectives, areas to be rehabilitated, etc.;
- Prevent and continually manage the propagation and establishment of alien and invasive species;
- As far as is practical, implement concurrent rehabilitation in order to limit degradation of soil biota;
- Limit the footprint area of the disturbing activity in order to minimise environmental damage;
- Rehabilitation earthworks should aim to reshape the disturbed areas to represent the area prior to disturbance (with the exception of the two opencast voids) and to present a safe, functional and sustainable environment;
- Visual impacts of rehabilitated areas must be minimised by recreating natural landforms and ensuring that reshaped areas are visually suited to surrounding landscapes;
- Natural landforms such as drainage lines, undulating areas and ridges, which have been damaged during activities, must be restored;
- Implement erosion control measures to prevent the loss of topsoil;
- Rip and aerate all compacted soils in order to facilitate plant establishment and growth;
- Re-vegetate all disturbed areas with suitable vegetation cover and methods;
- After completion of activities ensure that the site is safe for use by the intended land users and remove all activity equipment; and
- Implement a monitoring plan to determine the efficacy of the rehabilitation exercise (this should be a long-term monitoring program).

The overall environmental objectives of mine closure are proposed as follows:

- To rehabilitate the disturbed areas to arable grazing land capable where practical;
- To restore the pre-development topography to the greatest extent that is practical and feasible at closure;
- To restore the site biodiversity and ecological system functioning to as close as practically possible to pre-development conditions;
- To ensure that the site is made safe; where such entails:
 - Remediation of contaminated land;
 - Effective sealing-off of shafts and declines; and
 - Effective removal and decommissioning of redundant structures and infrastructure;
 - Effective closure of the general landfill site; and,
 - Effective closure of the tailings facilities should they be in existence at the time of closure.
- To ensure that final site shaping allows for free drainage of rain water and the prevention of erosion;
- To ensure that the pollution generating potential of residue deposits and residue stockpiles is addressed through appropriate capping and closure thereof, where applicable; and
- To ensure that there are no significant residual impacts on the underlying calcrete aquifer.
- To ensure that significant entrainment of particulate matter is prevented through adequate land cover and shaping where necessary.

9.4 IMPACT ASSESSMENT METHODOLOGY

The following criteria and methodology is proposed to determine the significance of environmental impacts that may result from the proposed project. Note that in instances where there are clear regulatory requirements and standards for specialist assessments, these will be employed at the discretion of the specialist, and the result incorporated into the Environmental Impact Report. In such cases the methodology below may not be applicable.

9.4.1 TYPE/NATURE OF IMPACTS

Potential environmental impacts may either have a positive or negative effect on the environment, and can in general be categorised as follows:

a) Direct/Primary Impacts

Primary impacts are caused directly due to the activity and generally occur at the same time and at the place of the activity.

b) Indirect/Secondary Impacts

Secondary impacts induce changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken.

c) Cumulative Impacts

Cumulative impacts are those that result from the incremental impact of the proposed activity on common resources when added to the impacts of the other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time, and can include both direct and indirect impacts.

9.4.2 DETERMINING SIGNIFICANCE

The following criteria will be used to determine the significance of an impact. The scores associated with each of the levels within each criterion are indicated in brackets after each description [like this].

9.4.2.1 Nature

Nature (N) considers whether the impact is:

- Positive [- ¼]
- Negative [+1].

9.4.2.2 Extent

Extent (E) considers whether the impact will occur:

- on site [1]
- locally: within the vicinity of the site [2]
- regionally: within the local municipality [3]
- provincially: across the province [4]
- nationally or internationally [5].

9.4.2.3 Duration

Duration (D) considers whether the impact will be:

- very short term: a matter of days or less [1]
- short term: a matter of weeks to months [2]
- medium term: up to a year or two [3]
- long term: up to 10 years [4]
- very long term: 10 years or longer [5].

9.4.2.4 Intensity

Intensity (I) considers whether the impact will be:

- negligible: there is an impact on the environment, but it is negligible, having no discernible effect [1]
- minor: the impact alters the environment in such a way that the natural processes or functions are hardly affected; the system does however, become more sensitive to other impacts [2]
- moderate: the environment is altered, but function and process continue, albeit in a modified way; the system is stressed but manages to continue, although not with the same strength as before [3]
- major: the disturbance to the environment is enough to disrupt functions or processes, resulting in reduced diversity; the system has been damaged and is no longer what it used to be, but there are still remaining functions; the system will probably decline further without positive intervention [4]
- severe: the disturbance to the environment destroys certain aspects and damages all others; the system is totally out of balance and will collapse without major intervention or rehabilitation [5].

9.4.2.5 Probability

Probability (P) considers whether the impact will be:

- unlikely: the possibility of the impact occurring is very low, due either to the circumstances, design or experience [1]
- likely: there is a possibility that the impact will occur, to the extent that provisions must be made for it [2]
- very likely: the impact will probably occur, but it is not certain [3]
- definite: the impact will occur regardless of any prevention plans, and only mitigation can be used to manage the impact [4].

9.4.2.6 Mitigation or Enhancement

Mitigation (M) is about eliminating, minimising or compensating for negative impacts, whereas enhancement (H) magnifies project benefits. This factor considers whether –

A negative impact can be mitigated:

- unmitigated: no mitigation is possible or planned [1]
- slightly mitigated: a small reduction in the impact is likely [2]
- moderately mitigated: the impact can be substantially mitigated, but the residual impact is still noticeable or significant (relative to the original impact) [3]
- well mitigated: the impact can be mostly mitigated and the residual impact is negligible or minor [4]

A positive impact can be enhanced:

- unenhanced: no enhancement is possible or planned [1]
- slightly enhanced: a small enhancement in the benefit is possible [2]
- moderately enhanced: a noticeable enhancement is possible, which will increase the quantity or quality of the benefit in a significant way [3]
- well enhanced: the benefit can be substantially enhanced to reach a far greater number of receptors or recipients and/or be of a much higher quality than the original benefit [4].

9.4.2.7 Reversibility

Reversibility (R) considers whether an impact is:

- irreversible: no amount of time or money will allow the impact to be substantially reversed [1]
- slightly reversible: the impact is not easy to reverse and will require much effort, taken immediately after the impact, and even then, the final result will not match the original environment prior to the impact [2]
- moderately reversible: much of the impact can be reversed, but action will have to be taken within a certain time and the amount of effort will be significant in order to achieve a fair degree of rehabilitation [3]
- mostly reversible: the impact can mostly be reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily [4].

9.4.3 CALCULATING IMPACT SIGNIFICANCE

Significance is determined through the integration of impact characteristics in terms of the above-mentioned variables, resulting in a rating of high, medium or low significance. Impact significance is assigned both with and without mitigation, and the measures or outcome of mitigation or optimisation of impacts highlighted. The table below summarises the scoring for all the criteria.

Table 9-2: Scoring for Significance Criteria						
CRITERION	SCORES					
	- ¼	1	2	3	4	5
N-nature	positive	negative	-	-	-	-
E-extent	-	site	local	regional	provinci al	national
D-duration	-	very short	short	moderate	long	very long
I-intensity	-	negligible	minor	moderate	major	severe
P-probability	-	very unlikely	unlikely	likely	very likely	-
M-mitigation	-	none	slight	moderate	good	-
H-enhancement	-	none	slight	moderate	good	-
R-reversibility	-	none	slight	moderate	good	-

Impact significance is a net result of all the above criteria. The formula proposed to calculate impact significance (S) is:

- For a negative impact: $S = N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$; and
- For a positive impact: $S = N \times (E+D) \times I \times P \times (H)$.

Negative impacts score from 2 to 200. Positive impacts score from – ½ to -200.

Significance ratings are thus broadly defined as follows:

a) High - Impacts would be of a high significance if the following impact profile applies:

- the extent is local to international;
- the duration is long term to permanent;
- the ecological or social system will be affected to the point of collapse.

b) Medium - Impacts are considered moderately significant if the following applies:

- the extent is local to regional;
- the duration is medium- to long term;
- the ecological or social system will be affected but continue to function.

c) Low - Impacts of a low significance are identified according to the following profile:

- the extent is local or site specific;
- the duration is temporary to permanent;
- the ecological or social system will not be affected.

9.4.4 UNDERSTANDING IMPACT SIGNIFICANCE

The following is a guide to interpreting the final scores of an impact (for negative impacts):

Table 9-3: Final Significance Scoring		
Final score (S)	Impact significance	
0 – 10	negligible	the impact should cause no real damage to the environment, except where it has the opportunity to contribute to cumulative impacts

10 – 20	Low	the impact will be noticeable but should be localized or occur over a limited time period and not cause permanent or unacceptable changes; it should be addressed in an EMP and managed appropriately
20 – 50	moderate	the impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition, the project benefits must be shown to outweigh the impact
50 – 100	High	the impact will affect the environment to such an extent that permanent damage is likely and recovery will be slow and difficult; the impact is unacceptable without real mitigation or reversal plans; project benefits must be proven to be very substantial; the approval of the project will be in jeopardy if this impact cannot be addressed
100 – 200	severe	the impact will result in large, permanent and severe impacts, such as, local species extinctions, minor human migrations or local economic collapses; even projects with major benefits may not go ahead with this level of impact; project alternatives that are substantially different should be looked at, otherwise the project should not be approved

9.4.5 IMPACT MITIGATION/OPTIMISATION

Mitigation seeks to find ways of minimising the significance of, or eliminating, negative impacts, whereas optimisation enhances project benefits. Under each impact a summary is given of management actions recommended for the purpose of preventing or reducing the negative effects, or enhancing the positive benefits of the development.

Mitigating/optimising measures to be implemented will be assimilated into the Environmental Management Programme.

9.4.6 ASSIGNING IMPACT PRIORITY

The priority for the management of an impact is the product of impact significance and existence of applicable legislation. Thus, even insignificant impacts become high priorities if applicable legislation exists.

9.5 CONSULTATION WITH THE COMPETENT AUTHORITY

Table 9-4: Authority Consultation	
Phase	Details
Application	Lodge application and declaration of interest
	Receive confirmation of application
Scoping	Lodge Scoping Report (Including Plan of Study for EIA)
	Consideration of Scoping Report and PoS for Environmental Impact Assessment
	Authority site visit if required
	Receive confirmation of acceptance of Scoping Report and PoSEIA
EIR	Lodge Environmental Impact Assessment Report
	Receive confirmation of acceptance of EIR
	Authority site visit if required
	Decision on application

9.6 PUBLIC PARTICIPATION PROCESS

The proposed public participation process for the remainder of the Environmental Impact Assessment will consist of:

- Presenting registered Interested and Affected Parties and stakeholders with the opportunity to read and comment on environmental impact assessment report including specialist reports;
- Presenting registered Interested and Affected Parties and stakeholders with the opportunity to read and comment on draft environmental management programme;
- A stakeholder meeting to present and discuss the findings of the Environmental Impact Assessment and related specialist reports if requested by registered IAPs.

10 WAY FORWARD

Based on the independent evaluation and assessment of the proposed project during the Scoping Phase by the Environmental Assessment Practitioner (EAP), a Plan of Study for Environmental Impact Assessment (PoSEIA) has been developed. The POSEIA would inform the accurate assessment and mitigation of potential environmental impacts that may arise from the proposed project. This would result in the compilation of a detailed EIA Report that would allow the competent authority (DMR) to make an informed decision regarding the authorisation of the proposed project, or components thereof.

The EAP also believes that the information provided in this Scoping Report is sufficient/substantive, at a scoping stage, for I&APs to contribute meaningfully to the EIA process (as required by the EIA Regulations) and for the CA to make an informed decision as to whether, or not, the EAP can proceed to the EIA phase of the application process. It is, therefore, the EAPs recommendation that the CA approve this Scoping Report and Plan of Study for EIA (PoS), based on the content provided in the report itself and the procedure followed in compiling this Scoping Report.

11 AFFIRMATION BY EAP

EScience Associates (Pty) Ltd, as the Environmental Assessment Practitioner, led by Abdul Ebrahim hereby affirms that:

- The information herein is true and correct to the best of our knowledge;
- The EAP has kept a register of all interested and affected parties that participated in a public participation process;
- The EAP has ensured that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties has been facilitated in such a manner that all interested and affected parties have been provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- The Plan of Study that has been presented In the Scoping Report was distributed to Interested and Affected parties with the Scoping Report and no comments or objections thereto have been received, the EAP therefore concludes that the Plan of Study presented is of an acceptable standard.

12 DECLARATION BY EAP

EScience Associates (Pty) Ltd, as the Environmental Assessment Practitioner, led by Abdul Ebrahim hereby affirms that:

- The information herein is true and correct to the best of our knowledge;
- The EAP has kept a register of all interested and affected parties that participated in a public participation process;
- The EAP has ensured that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties has been facilitated in such a manner that all interested and affected parties have been provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- The EAP has included all comments and inputs made by stakeholders and interested and affected parties as well as the competent authority. Responses to comments are appended to this Environmental Impact Report.

Abdul Ebrahim

NAME OF EAP



SIGNATURE OF EAP

03 May 2023

DATE

APPENDIX 1: EAP AND PROJECT TEAM CURRICULUM VITAE

1. Lehlogonolo Chuene
2. Abdul Ebrahim
3. Sam Leyde
4. Emma Jepsen

CURRICULUM VITAE OF LEHLOGONOLO PRUDENCE CHUENE

Profession:	Environmental Assessment Practitioner (EAPASA Reg. no: 2019/1567)
Key Qualifications:	MSc. in Geography (Current), BSc. (Hons) in Geography, BSc. in Environmental & Resource Studies
Specialisation:	Environmental Impact Assessment, Water Use Licences, Environmental Compliance Monitoring/Audits, Environmental Education & Training, Stakeholder & Public Engagements, and GIS.
Work Experience:	8 years' experience in Environmental Management Field

VOCATIONAL EXPERIENCE

An EAPASA Registered Environmental Assessment Practitioner with over 8 years of experience in the environmental field. I hold a B.Sc. (Hons) qualification and a degree in B.Sc. Environmental and Resource studies both from the University of Limpopo. Currently pursuing MSc. In Geography specialising in waste management.

I have experience and knowledge in working on projects dealing with different environmental fields such as applying for environmental authorizations and water use licenses applications for mining activities, renewable energy facilities (Wind and Solar), waste management facilities, and construction of roads, bridges, dams, residential areas, filling stations, borrow pits, and agricultural lands.

And I conduct thorough environmental compliance evaluations, public participation process and stakeholder engagements, drafting, and implementation of the EMPs. I have exceptional oral and written skills and the ability to collect and interpret data using computer software (including the various GIS Software such as ArcGIS and QGIS). I am a registered SETA Assessor, registered with ETDP SETA/ LGSETA/ EWSETA & Agri - SETA.

SKILLS BASE AND CORE COMPETENCIES

- Project Management
- Undertaking projects and compiling of reports and other documentation as part of the following processes:
 - Environmental Impact Assessment, including full EIA and Basic Assessment.
 - Water Use License Application (WULA) covering a range of section 21 water uses.
 - Section 24G rectification applications for activities which transgressed - NEMA.
- Conduct regular environmental compliance monitoring on the projects and compile

compliance reports to submit to the relevant authorities and the client.

- Ensuring the proper implementation of the Environmental Management Programmes
- Usage of GIS software's (ArcGIS, SANBI BGIS, QGIS and Google Earth) to map, analyses and evaluate the spatial biodiversity information of the proposed project sites.
- Conduct public participation in variety of contexts, from rural to urban areas which each requires its own approach to ensure that the interested and affected parties and public in general are given adequate opportunities for having their voices heard.
- Working closely with officials from relevant authorities throughout the application processes.
- Excellent time management and ability to work through tight deadlines
- Organisational skills
- Effective communicator
- Reliable and Trustworthy
- MS Office Package (Word, PowerPoint and Excel)

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- Master of Science in Geography (current), University of Limpopo
- BSc. (Hons) in Geography (2014), University of Limpopo
- BSc. Environmental and Resource Studies (2013), University of Limpopo

Short Courses:

- IWRM, the NWA, and Water Use Authorisations, focusing on WULAS and IWWMPs, Carin Bosman Sustainable Solutions

Professional Society Affiliations:

- Environmental Assessment Practitioners Association of South Africa – Environmental Assessment Practitioner
- Local Government Sector Education & Training Authority (LGSETA) - Assessor
- The Energy & Water Sector Education Training Authority (EWSETA)- Assessor
- Agriculture Sector Education Training Authority (Agri-SETA) - Assessor

Other Relevant Skills:

- Compiling project budgets and proposals

EMPLOYMENT HISTORY		
Date	Company	Roles and Responsibilities
Current	EScience Associates	Senior Environmental Assessment Practitioner Task Include: <ul style="list-style-type: none">• Environmental Impact Assessment, including Scoping & EIA and Basic Assessment.• Water Use License Application (WULA) covering a range of section 21 water uses.• Environmental Monitoring and Environmental Compliance Audits.• Usage of GIS software (ArcGIS) to map project locality maps, project layout and landowner maps.
March 2022-September 2022	Savannah Environmental Planning	Senior Environmental Assessment Practitioner Task Include: <ul style="list-style-type: none">• Environmental Impact Assessment, including Scoping & EIA and Basic Assessment.• Water Use License Application (WULA) covering a range of section 21 water uses.• Usage of GIS software's (ArcGIS) to map project locality maps, project layout and landowner maps.• Drafting proposals for new projects• Environmental Monitoring and Environmental Compliance Audits.• Environmental Risk Management• Usage of GIS software's (ArcGIS) to map project locality maps, project layout and landowner maps.

<p>July 2017- March 2022</p>	<p>Polygon Environmental Planning</p>	<p>Senior Environmental Consultant</p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Undertaking projects and compiling of reports and other documentation as part of the following processes: <ul style="list-style-type: none"> ◦ Environmental Impact Assessment, including full EIA and Basic Assessment. ◦ Water Use License Application (WULA) covering a range of section 21 water uses. ◦ Section 24G rectification applications for activities which transgressed - NEMA. • Environmental Compliance Officer monitoring on various projects. • Ensuring the proper implementation of the Environmental Management Programmes. • Usage of GIS software's (SANBI BGIS, QGIS and Google Earth) to map, analyses and evaluate the spatial biodiversity information of the proposed project sites. • Public participation and stakeholder engagement on various projects.
<p>October 2016 – July 2017</p>	<p>Mthenganya and Associates</p>	<p>Environmental Facilitator (<i>War- on- Leaks Project</i>)</p> <p><u>Tasks Included</u></p> <ul style="list-style-type: none"> • Manage and lead a group of 30 water agents' trainees. • Facilitate and conduct lectures on water conservation, demand, management, and reticulation systems. • Asses the water agents' trainee's portfolio of evidence. • Do all the required weekly administrative work.

March 2016 – September 2016	Wildlife and Environmental Society of Southern Africa	Environmental Educator <u>Tasks Included</u> <ul style="list-style-type: none"> • Manage one of the environmental camps with over 100 school pupils weekly. • Facilitate and coordinate the outdoor environmental awareness programs for schools. • Ensure that everyone within the camp is always safe.
April 2015- February 2016	Limpopo Department of Economic Development, Environmental and Tourism	Environmental Education and Awareness Intern <u>Tasks Included</u> <ul style="list-style-type: none"> • Conduct environmental education at schools and the community. • Assist in formulating the environmental reading materials to be distributed to the public (Newspaper article and pamphlets readings about environmental calendar days). • Administration work for the whole directorate of Environmental Communication and Awareness in the Department. • Assisted during the assessment of the Greenest Municipality Competition.

REFERENCE S		
Abdul Ebrahim	Esience Associate	072 268 1119
Rendani Rasivhetshela	Savannah Environmental	072 721 4835
Thabang Mohale	Polygon Environmental Planning	071 325 1084
Nshalati Ndindani	Mthenganya & Associates	065 956 3454



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Johannesburg, 2192
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Curriculum Vitae:

Abdul
Ebrahim

Surname: Abdul Ebrahim

Date of birth: 07 December 1977

Country of Residency: Republic of South Africa

Position: Director

Key Qualifications: BEng (Hons) Environmental, BEng (Hons) Mechanical

Registrations: EAPASA (2022/5504)

Contact details

☎: 011 7186380

☎: 072 268 1119

✉: abdul@escience.co.za

Abstract

Abdul Ebrahim is a director of EScience Associates, an environmental consultancy specialising in waste and waste recovery, effluent, atmospheric emissions and air quality, as well as cleaner and renewable energy. EScience Associates caters for a diversity of industries and economic sectors and has forged strong relationships with other specialists, and specialist agencies, allowing the company to deal with complex and contentious environmental problems.

Abdul Ebrahim holds a BEng (Hons) in both Mechanical and Environmental Engineering disciplines. He specialises in air quality management, hazardous waste management and cleaner production, as well as their related environmental authorisation and licensing processes. His work experience includes numerous environmental impact assessments, cleaner production, waste recover-recuse-recycling, hazardous waste management assessments, and air quality impact management projects in power generation, manufacturing, minerals processing, and mining industries. His interests range from atmospheric modelling and wind energy, to the beneficial use of industrial wastes and effluents.

He is a certified Environmental Assessment Practitioner (EAP) and member of amongst other professional organisations: Engineering Council of South Africa (ECSA), and the National Association of Clean Air (NACA).

Abdul has provided Honours level lecturing at the University of Pretoria, UNISA, Cape Town University of Technology and various private training institutions in the fields of Environmental Compliance Enforcement, Environmental Impact Assessment, Cleaner Production and Air Quality Management since 2005.

His work experience includes:

- Environmental strategic, legal, and technical compliance advisory services
- Environmental Permitting - Environmental Authorisation, Waste Management Licensing, Atmospheric Emissions Licensing, Mine Environmental Management Programme development, and their relating environmental impact assessment and stakeholder engagement processes.
- Air quality management and Air Quality Management Plan development – Emissions quantification; meteorological and air quality modelling and impact assessment; development of emissions abatement and management strategies;
- Waste management consulting - classification, landfill assessment, mine residue liner risk assessments, development of waste minimisation treatment & recycling strategies;
- Development of specialist training courses (including EIA Administration and Review, Environmental Enforcement, Environmental Compliance Achievement for Industry).
- Environmental Due Diligence – due diligence assessment to inform purchase or ownership transfer of existing going concerns or proposed new establishments.

Abdul has 20 years post graduate experience of which four years are in industry, and the remainder in consulting.

Education

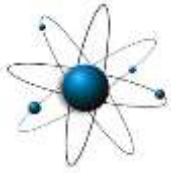
BEng (Hons) Mechanical Engineering

BEng (Hons) Environmental Engineering

Languages

English (excellent speaking and writing)

Limited French and Portuguese



Experience

Personal work experience includes:

- Waste management (classification, handling, storage, and disposal requirements and compliance assessment);
- Technical and environmental due diligence – industrial and energy projects
- Cleaner and renewable energy strategy development, plan and project development;
- Development of waste minimisation treatment & recycling strategies);
- Air quality management and emissions inventorying, development of abatement and management strategies;
- Environmental Impact Assessment and Permitting (EA, WML, AEL, WUL)
- Development and dissemination of specialist training for government and the private sector at NQF level 7 (honours degree).

Abdul's work experience in a wide diversity of economic sectors and industries and provides him with a good understanding of both small scale and large scale impacts of waste and pollution, as well as keeping up to date with various management alternatives available and their individual advantages and disadvantages, both locally and internationally implemented and pilot scale. Various waste streams have been dealt with to determine the most applicable disposal methods and impacts on the environment, from various industries:

- Metallurgical processes
- Power generation
- Mining
- Chemical Manufacturing
- Food processing
- Waste recovery, reuse, and recycling and waste to energy
- Cement manufacturing
- Other General Industrial and Commercial – waste management from various industries

Hourly Rate

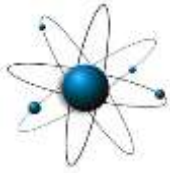
Nature of expertise offered

- Ability to interpret and analyse technical material on wide range of subjects
- Engineering expertise in energy, waste, air quality and multi-disciplinary subjects
- Ability to undertake technology feasibility studies, technical and financial due diligence
- Understanding of the green economy and technologies, ICT and agricultural and agro-processing sectors
- Ability to undertake a market research and investigation into the industry
- Proposal evaluation expertise

Experience and relevant projects

1. WASTE CLASSIFICATION, HAZARD RISK ASSESSMENT AND MANAGEMENT

- Lanxess Chrome Chemicals
- Assmang Chrome Smelting
- Assmang Manganese Smelting
- Black Rock Mine Operations
- Wispeco Aluminium
- Idwala Lime Operations
- Idwala Asbestos Waste
- Weir Minerals Africa
- Heavy Bay foundry Port Elizabeth
- Lafarge Gypsum
- Consolidated Wire Industries



- BPB Gypsum
- PG Bison Manufacturing Plant
- ABBW Electrical Manufacturing Plant
- CBI copper and fibre optical cable manufacture
- Holcim Cement
- Hayes Lemmerz SA Aluminium
- Auto industrial group (Pty) Ltd
- CBI Electrical
- Brother CISA Chrome Chemicals
- Healthcare risk waste
- Various mining residues

2. ENVIRONMENTAL IMPACT ASSESSMENT:

- Assmang Black Rock Mine expansions, tailings facilities, water treatment facilities
- Highveld Steel furnace off-gas power generation
- Lanxess CISA chrome chemicals plant expansion and hazardous waste landfilling
- Samancor chrome chemicals plant development
- Hernic Ferrochrome power generation from furnace off-gases
- Kanhym Biogas project
- Alumicor secondary aluminium recovery rotary salt furnaces
- Hays Lemmerz Aluminium smelters, furnace and alloy die casting
- Agricultural Research Commission hazardous waste incineration plant
- Darkling Metal Industries
- Idwala Lime Danielskuil asbestos waste disposal
- Plettenburg Polo Estates
- PG Bison Decorative Panels
- British Aerospace Land Based OMC Systems
- BPB Gypsum phosphogypsum plant
- Extrupet HPDE and PET recycling plants
- Assmang BRMO
- Assmang Machadodorp
- Interwaste waste recovery and waste to energy plants
- PPC Cement expansions, electricity generation, use of alternative fuels and resources
- Sephaku cement use of alternative fuels and resources
- ClinX Healthcare Risk Waste Management
- Turfontein Race Course night racing

3. ENVIRONMENTAL LEGAL COMPLIANCE ASSESSMENT & RECTIFICATION PLANNING:

- SASOL Synfuels
- NATCOS Petrochem
- Dwarsrivier Chrome Mine
- Angloplatinum Base Metals Recovery
- Samancor Hotazel Manganese Mines
- PG Bison (Pty) Ltd MDF manufacturing
- Samancor Manganese Division Samancor Metalloys Meyerton
- Holcim SA (Pty) Ltd Cement Plants:
 - DUDFIELD
 - ULCO
 - ROODEPOORT
- Natal Portland Cement Plants:



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Curriculum Vitae:

Abdul
Ebrahim

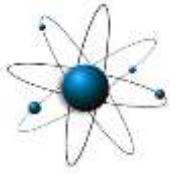
▪ **NEWCASTLE**

- Consolidated Wire Industries
- South African Airways (Pty) Ltd Technical Division
- TWK forestry strategic environmental legal compliance assessment
- Inergy Automotive Systems(Pty) Ltd
- Consolidated Wire Industries
- Mittal Steel Vereeniging and Dunswart plants – specialist assistance to DEAT environmental management inspectors
- Assmang Black Rock Mining Operations
- ClinX Medical Waste Management
- Extrupet PET and HDEP recycling plants
- Scaw Metals High Chromium Ball Plant
- Unilever waste recovery, recycling, and zero waste-to-landfill
- Numerous waste recycling facilities
- Oilflow
- The Smart Company
- Darkling Industrial Metals CC
- Unilever waste recovery, recycling, and zero waste-to-landfill
- Central Waste
- AT Packaging
- EWaste Africa
- Mpact Recycling
- Wasteplan
- Fine Metals
- Living Earth
- Industrial Plastic Recyclers
- SA Paper Mills
- Interwaste
- Matchem
- TGS
- Verigreen
- SB Boxes
- Drumpal
- Oscars Meat
- FOSECO South Africa (Pty) Ltd

4. AIR QUALITY MANAGEMENT:

1.1 Government & Regulatory

- Vaal Triangle Air-shed Priority Area - Air Quality Management Plan review, development of emissions inventory and Ambient Air Quality Impact Assessment.
- Highveld Priority Area Air Quality Management Plan – development of emissions inventory, and mitigation strategies.
 - Reference: Dr Thulile Mdluli
 - Tel: 012 310 3436
 - Email : tmdluli@environment.gov.za
- Ekurhuleni Metropolitan Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Edmund van Wyk
 - Tel: 011 999 2470
 - Email: Edmund.vWyk@ekurhuleni.gov.za



- Nkangala District Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Vusi Mahlangu
 - Tel: 013 249 2164
 - Email: Mahlangumv@nkangaladm.gov.za
- North West Province - development of provincial emissions inventory (PM, NO_x, SO₂ etc)
- Development of National Air Quality Officers Companion Guide for the Republic of South Africa
- Development of the atmospheric emissions licensing department for Nkangala District Municipality
- EThekweni Municipality (Durban) - Greenhouse gas emissions quantification
- Newcastle Local Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Phelelani Ntshingila
 - Tel: 034 328 3300
 - Phelelani.Ntshingila@newcastle.gov.za

1.2 Industrial and Mining

- A large variety of major industrial and mining operation across the Highveld and Vaal Triangle as part of Highveld Priority Area and Vaal Triangle Air-shed Priority Area AQMP projects.
- Lanxess CISA Chrome Chemicals Plant Expansion, CO₂ generation, Power Generation and hazardous waste treatment and recovery
- Samancor Chrome Proposed Chrome Chemicals plant
- Karbochem (Synthetic Rubber Manufacture) proposed Power Generation Plant
- PPC Cement Slurry Cement Plant Expansion
- PPC Cement Jupiter Cement Plant Expansion
- PPC Cement PE Cement Plant Expansion
- PPC Cement Dwaalboom waste heat recovery
- PPC Cement De Hoek, PE, Slurry, and Dwaalboom postponement applications
- Afrisam Cement - Dudfield Environmental Management Programme update.
- ClinX Medical Waste Incineration plant expansion
- Goedemoed organic waste incineration
- AWPP pyrolysis of organic waste
- Interwaste Waste Recovery, Waste to Energy and Waste Incineration plant
- Eskom power generation emissions off-setting
- Hayes Lemmerz SA Aluminium Wheel Manufacturing
- Evraz Highveld Steel and Vanadium proposed Powered Generation - Furnace Off-Gases
- Assmang Ferrochrome and Ferromanganese plants Powered Generation - Furnace Off-Gases
- Resource Generation Proposed Boikarabelo Power Station – coal fired
- Weir Minerals Africa (Isando, Alrode and Heavy Bay Foundries)
- Goedemoed Prison proposed Waste incineration and Landfill
- Consolidated Wire Industries Expansion
- Sylvania Proposed Open Cast PGE Mine and Processing Plant
- Assmang Black Rock proposed manganese mine expansion and sinter plant
- Assmang machadodorp proposed smelter plant expansion and cross-over to manganese
- Dwarsrivier Chrome Mine
- Nkwe proposed Platinum Mine
- Agricultural Research Commission hazardous and infectious waste incineration
- Sephaku Aganang proposed use of AFR's in cement manufacture
- Idwala Phalaborwa atmospheric emission licence for magnetite drying
- Mandini Wealth (Pty) Ltd tyre pyrolysis air quality health risk assessment



- Johnson Tiles a Division of Norcros Sa (Pty) Ltd Air quality health risk assessment
- Lanxess CISA (Pty) Ltd Air quality health risk assessment
- Namakwa Sands, South Africa – Tronox
- Devon Valley Landfill expansion
- Groblersdal limestone mine

5. GREENHOUSE GAS QUANTIFICATIONS AND ASSESSMENTS

- PPC Riebeeck
- Lafarge Lichtenburg
- Ilangabi Investments coal mining
- Lanxess CISA (Pty) Ltd
- Consolidated Wire Industries
- ClinX Waste Management
- ArcelorMittal Newcastle
- Development of emission factors for ferrochrome smelting

6. CLEANER PRODUCTION AUDITS, WASTE TO ENERGY, ENERGY RECOVERY, WASTE RECOVERY AND RELATED PROJECTS:

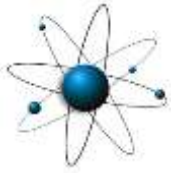
- Tuffy Plastics
- Proplas plastics
- WHS Distribution
- Premier Foods Pretoria Wheat Mill
- Alfred Nzou municipality
- Lanxess chrome chemicals residue recovery
- Karbochem power generation ash to bricks project
- Cement kilns alternative fuels and raw materials assessment for South Africa
- Kanhym Estates Biogas Generation from piggery effluent
- British American Tobacco:
- Tobacco Processors Zimbabwe
- Souza Cruz Brazil

7. ENVIRONMENTAL MANAGEMENT SYSTEM DEVELOPMENT & IMPLEMENTATION:

- British American Tobacco (full system development from scratch – ISO 14001 and ISO 9001)
 - Weir Minerals Aspects Identification, Rating, Assessment and Development of EMPs
 - Lafarge Gypsum Aspects Identification, Rating, Assessment and Development of EMPs
 - Environmental Aspects Identification, rating and formulation of EMPs for Samancor Metalloys Meyerton
 - Environmental Aspects Identification, rating and formulation of EMPs for DMS Powders.
 - Holcim Slagment development & implementation of EMS components including waste and air quality management
 - Holcim Roodepoort development & implementation of EMS components including waste and air quality management
 - Consolidated Wire Industries Environmental Aspects Identification, rating and formulation of EMPs and operational control procedures.
 - Samancor Metalloys Ferro Silicon Manganese and FerroSilicon production
 - DMS FeSi dense media prodcuton

8. ISO14001 AUDITING:

- Debswana Orapa and Letlhakane Mines



- Ingwe Colliery
- Arnot Colliery
- FOSECO South Africa (Pty) Ltd
- Lafarge Gypsum
- CWI

9. SPECIALIST TRAINING COURSE DEVELOPMENT & PRESENTATION

- 2011 Training of Atmospheric Emissions Licensing Authorities – air quality management, emissions quantification, regulation and enforcement.

- 2007-2015 Training of Authorities for EIA review and permitting

Responsible for development of NEMA EIA Review Course and Administrators EIA Review Manual, theoretical and practical training material, and training of Government Officials responsible for EIA Review - responsible for the whole manual other than Law applicable to EIA Review. As at May 2013 approximately 1000 officials from National, Provincial and Local Government.

- 2005&6 Bridging Training for Environmental Management Inspectors and Enforcement

ESA was part of a consortium selected to develop and conduct the EMI Training. More than 2000 officials and university students have completed the training.

- University Of Pretoria Specialist Lecturer
 - Environmental Legal Compliance inspections and investigations (RSA)
 - Environmental Legal Compliance achievement (RSA)
 - Environmental Legal Compliance inspections and investigations (Africa)

- University Of South Africa Specialist Lecturer
 - Environmental Legal Compliance inspections and investigations (RSA)

- Training for industry and mining

Development and presentation of training material for environmental impact identification and management in terms of South African environmental law for the SABS and other training institutions.

10. SOIL AND GROUNDWATER CONTAMINATION ASSESSMENT:

- Weir Heavy Bay Foundry
- Lafarge Gypsum
- Kanhym Estates
- SABAT (Pty) Ltd Johannesburg – investigation of heavy metal contamination of soils and groundwater
- Chemiphos SA (Pty) Ltd – investigation of phosphate and heavy metal contamination of soils and groundwater
- Castrol Lubricants Zimbabwe

11. ENVIRONMENTAL DUE DILIGENCE AUDITS, INCLUDING ASSESSMENT OF ENVIRONMENTAL AND CLOSURE LIABILITY:

- Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of smelting operations for Highveld Steel & Vanadium operations:



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Curriculum Vitae:

Abdul
Ebrahim

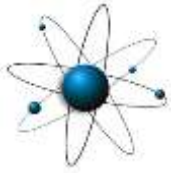
- HIGHVELD IRON AND STEEL WORKS
- VANCHEM
- TRANSALLOYS
- RAND CARBIDE
- MAPOCHS MINE

- Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of smelting operations for TransAlloys
- Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of mining operations for Samancor Chrome:
 - MIDDELBURG FERROCHROME
 - FERROMETALS
 - TUBATSE FERROCHROME
 - WESTERN CHROME MINES
 - EASTERN CHROME MINES
- Determination of critical environmental liability associated with the purchase of Xmeco Foundry by Weir Minerals Africa, and subsequent legal compliance achievement programme

12.

Possible timelines to commit to the assignment

- Not available during the December holiday period - from 15 December until 05 January – due to company's closure for the festive season.
- General commencement within 2 weeks subject to existing project commitments.



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Curriculum Vitae:

Sam Leyde

Surname: Leyde

Name: Sam

Date of birth: 25 November 1985

Nationality: RSA

Position: Environmental Consultant

Key Qualifications: BSc(hons) Mechanical Engineering

Contact details

☎: 011 7186380

📞: 074 570 8054

✉: sam@escience.co.za

Abstract

Sam Leyde is an employee of EScience Associates, an environmental consultancy specialising in waste and waste recovery, effluent, atmospheric emissions and air quality, as well as cleaner and renewable energy. EScience Associates caters for a diversity of industries and economic sectors and has forged strong relationships with other specialists, and specialist agencies, allowing the company to deal with complex and contentious environmental problems.

Sam Leyde holds a BSc (Hons) in Mechanical Engineering. He specialises environmental authorisation and licensing processes. His work experience includes numerous environmental impact assessments, , waste recover-recuse-recycling, waste disposal and classification assessments, and air quality impact management projects in the manufacturing sector.

Sam has 11 years post graduate experience of which 9 years are in the environmental industry, and the remainder in engineering.

Education

BSc (Hons) Mechanical Engineering

Languages

English (excellent speaking and writing)

Experience

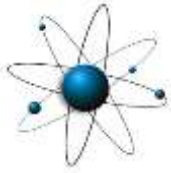
Personal work experience includes:

- Environmental Authorisation, Waste Management Licensing, Atmospheric Emissions Licensing, Environmental Management Programme development, and their relating environmental impact assessment and stakeholder engagement processes.
- Waste management (classification, handling, storage, and disposal requirements, development of waste minimisation treatment & recycling strategies);
- Air Quality Impact Assessments;
- External Environmental Auditing – due diligence assessment to inform purchase or ownership transfer of existing going concerns or proposed new establishments.

Experience and relevant projects

1. ENVIRONMENTAL IMPACT ASSESSMENT:

- Basic Assessment Report, Proposed Chrome Tanning Salts and Vitamin K Compounds Production Facility For Brother Cisa, Newcastle, Kwazulu-Natal,
- Environmental Impact Report for Proposed Avon Peaking Power Plant Gas Pipeline, Shakaskraal, KwaZulu Natal,
- Basic Assessment Report, Proposed Waste Pyrolysis Facility, Industrial Green Energy Solutions (Pty) Ltd, Centurion, Gauteng, 2020



Experience and relevant projects

- EIA for Sephaku Aganang proposed use of AFR's in cement manufacture
- EIA for PPC Cement Slurry Cement Plant Expansion
- Extrupet HPDE and PET recycling plants
- Assmang Machadodorp Reverse Osmosis Plant and Stormwater Upgrades;
- Interwaste Waste Recovery and Waste to Energy Plant
- ClinX Healthcare Risk Waste Management
- EIA for proposed Refuse Derived Fuel Energy Recovery Facility, Athlone, Cape Town;
- EIA for proposed pyrolysis of organic/abattoir waste – Square Root Trading Seven, Kroonstad;
- EIA for Interwaste proposed Waste to Energy and Waste Incineration plant;
- EIA Sylvania Proposed Open Cast PGE Mine and Processing Plant;
- EIA for Assmang Machadodorp proposed water treatment plant;
- Basic Assessment for Assmang Machadodorp Storm Water management upgrades;
- Water Use License Application for Assmang Machadodorp Storm Water management upgrades and water treatment facility;
- Water Use Licence for SA Dorper Leather Tannery;
- Oilflow oil blending facility
- The Smart Company Copper melting facility
- Darkling Industrial Metals CC – Scrap Metal Recovery Facility

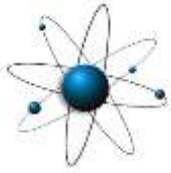
2. ENVIRONMENTAL LEGAL COMPLIANCE AUDITING & RECTIFICATION PLANNING:

- FFS Refiners, Storage facility Evander 2013 and 2019
- Assmang Black Rock Mining Operations
- ClinX Medical Waste Management
- Extrupet PET and HDEP recycling plants
- Scaw Metals High Chromium Ball Plant
- Oilflow oil blending facility
- The Smart Company Copper melting facility
- Darkling Industrial Metals CC – Scrap Metal Recovery Facility

3. AIR QUALITY MANAGEMENT:

- AQIA for Proposed Chrome Tanning Salts and Vitamin K Compounds Production Facility For Brother Cisa, Newcastle, Kwazulu-Natal, 2020,
- AQIA for Proposed Waste Pyrolysis Facility, Industrial Green Energy Solutions (Pty) Ltd, Centurion, Gauteng, 2020
- AQIA for Sephaku Aganang proposed use of AFR's in cement manufacture
- AQIA for PPC Cement Slurry Cement Plant Expansion
- Lanxess CISA Chrome Chemicals Plant Expansion, CO₂ generation, Power Generation and hazardous waste treatment and recovery
- ClinX Medical Waste Incineration plant expansion
- Interwaste Waste Recovery, Waste to Energy and Waste Incineration plant
- Weir Minerals Africa (Isando, Alrode and Heavy Bay Foundries)
- Sylvania Proposed Open Cast PGE Mine and Processing Plant
- Agricultural Research Commission hazardous and infectious waste incineration
- Johnson Tiles a Division of Norcross Sa (Pty) Ltd Air quality health risk assessment
- Proposed pyrolysis of organic/abattoir waste – Square Root Trading Seven, Kroonstad;

4. WASTE CLASSIFICATION, HAZARD RISK ASSESSMENT AND MANAGEMENT

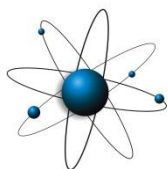


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Curriculum Vitae:

Sam Leyde

Experience and relevant projects
<ul style="list-style-type: none">○ Weir Minerals Africa○ Wispeco Aluminium○ ClinX Waste Management○ Various Waste Exclusion Applications



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Tel: +27 (0)11 718 6380

Curriculum Vitae:

Emma
Jepsen

Surname: Jepsen

Name: Emma

Date of birth: 09 May 1997

Residency: South Africa

Position: Junior Environmental Consultant

Key Qualifications: MSc Zoology, BSc (Hons) Zoology, BSc Zoology

Contact details

☎: 011 718 6380/ 079 858 4019

✉: emma@escience.co.za

Education

MSc Zoology

University of Pretoria: 2019-2020

BSc (Hons) Zoology

University of Pretoria: 2018

Bachelor of Science

University of Pretoria: 2015-2017

Languages

English (Speaking and writing - Excellent)

Experience

Junior Environmental Consultant (January 2021 – current)

EScience Associates (Pty) Ltd

Key tasks and project experience:

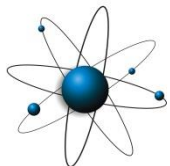
- Technical and Scientific Report Writing
- ArcGIS mapping
- R programming
- Data Capturing
- General administration and project management
- Tender/Grant Applications
- Public Participation

Technical and Scientific Reports:

- Visual Impact Assessments
- Noise Impact Assessments
- Faunal Impact Assessments
- Air Quality Impact Assessments
- Basic Assessment Reports
- Greenhouse Gas Impact Assessments

ArcGIS mapping

- Site Locality Maps
- Site Layout Maps
- Regional Topography Maps
- Landcover Maps
- Surrounding Landuse Maps
- Viewshed Maps



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Curriculum Vitae:

Emma
Jepsen

- Air Quality Dispersion Maps
- Terrestrial Development Maps
- Property Maps

Public Participation

- Comments and Responses Reports
- Site and Newspaper Advertisements
- Appeals process
- Contacting I&APs

APPENDIX 2.1: SITE NOTICES

**NOTIFICATION OF APPLICATION FOR WASTE MANAGEMENT LICENCE, WATER
USE LICENCE & ENVIRONMENTAL AUTHORISATION**
FOR
**PROPOSED OPEN CAST MINE AT THE ASSMANG BLACK ROCK MINE
OPERATIONS, SANTOY, NORTHERN CAPE**

Notice is hereby given, in terms of the National Environmental Management: Waste Act (Act No. 59 of 2008) [NEM:WA], and the National Environmental Management Act (Act 107 of 1998) [NEMA] and National Water Act (Act 36 of 1998)[NWA] that Assmang (Pty) Ltd is applying for the relevant environmental management licences, for the establishment of an Open Cast Mine on portion 1 of the farm Gloria 266 near Hotazel, Northern Cape. The relevant licences include applications to the Department of Mineral Resources (DMR), for a Waste Management Licence (WML) and Environmental Authorisation (EA), and an application to the Department of Water and Sanitation(DWS) for a Water Use Licence (WUL).

Applicant: Assmang (Pty) Ltd - Black Rock Mine Operations (BRMO)

Environmental Assessment Practitioner: EScience Associates (Pty) Ltd.

Competent Authorities: EA and WML - Department of Mineral Resources
WUL - Department of Water and Sanitation

The proposed project includes activities identified in terms of:

- Listing Notice 1 and 2 of the 2014 NEMA EIA Regulations (GN. R983 and GN. R 984, of 2014 as amended); and,
- Category A and B, waste management activities as listed in NEM:WA GN. 921 of 2013 as amended,

which require a Scoping and Environmental Impact Assessment process to be undertaken to assess the potential impacts thereof on the environment.

Additionally, water uses as listed in section 21 of the NWA require a Water Use Licence. The listed water uses are:

- 21(b) – Storing water
- 21(c) impeding or diverting the flow of water in a watercourse;
- 21(g) – Disposing of waste in a manner which may detrimentally impact on a water resource;
- 21(i) altering the bed, banks, course or characteristic of a watercourse;
- 21(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people;

In terms of the requirements of the Environmental Impact Assessment (EIA) regulations GN. R 982 of 2014 as amended, the Water Use Licence Application And Appeals Regulations GN.R 267 of 2017 NWA, and NEM:WA, all interested and affected parties (IAPs) must be provided with opportunity to participate in the Scoping and Environmental Impact Assessment process, and the Water Use Licence Application (WULA) process. This would include the opportunity to give input, request further information, review relevant reports, and submit comments. If you are interested in participating in these processes, please register as an IAP by submitting your name, contact information and interest in the project to the contact person below. Any queries or comments with respect to the processes can also be directed to the person below within 30 days of publication of this advertisement (i.e. 21st July 2021).

Emma Jepsen

E-mail: emma@escience.co.za

Tel: 011 718 6380

Fax: 086 516 6627



SITE NOTICES AT GLORIA MINE ENTRANCE



SITE NOTICES AT SANTOY SHOPPING CENTRE



SITE NOTICES AT MAIN ENTRANCE

[illegible]

APPENDIX 2.3: INTERESTED AND AFFECTED PARTIES LIST

Title	First Name/s or Initial/s	Surname	Organisation
Commenting Authorities			
Dr.	Sebusho	Sipho	John Taolo Gaetsewe District Municipality (Municipal Manager)
Mr.	Gaborone	Eric	Ga-Segonyana Local Municipality (Municipal Manager)
Mr.	Tshepo	Bloom	Joe Morolong Local Municipality (Municipal Manager)
Mrs.	Sylvia	Moholo	Department of Public Works
Mr.	Sunday	Mabaso	Department of Mineral Resources (Regional Head: Environment)
Mr.	Abader	Ishaam	Deputy-Director General: Legal, Authorisations, Compliance & Enforcement, Department of Environmental Affairs
Ms.	K.I.	Jonathan-Makhoiole	John Taolo Gaetsewe District Municipality.
Mr.	Sibongile	Lekiso	John Taolo Gaetsewe District Municipality.
	J	Swartt	John Taolo Gaetsewe District Municipality.
	J	Russouw	John Taolo Gaetsewe District Municipality.
Mr.	Nozie	Mazwie	Water Affairs: Lower Vaal
Mr.	Neo	Leburu	Department of Water and Sanitation
Ms.	Dineo	Kgosi	NCDENC: Waste Management
Ms.	L.P	Segapo	John Taolo Gaetsewe District Municipality
Ms.	Phabelo	Simpson	Joe Morolong Local Municipality
Ms.	Pinky	Maape	Gasegonyana Local Municipality
		Simon	Gasegonyana Local Municipality
Ms.	Lerato	Mokhoantle	Department of Water and Sanitation
Mr.	Julius	Muyorautu	NCDENC: Environmental Quality
Ms.	Nditsheni	Ramuhulu	NCDENC: Impact Management
Mrs.	Jacoleen	Mans	Department of Agriculture, Forestry and Fisheries

Title	First Name/s or Initial/s	Surname	Organisation
	Natasha	Higgitt	SAHRA
Dr.	Mariagrazia	Galimberti	SAHRA
Mr .	Gerrie	Van der Westhuizen	John Taolo Gaetsewe District Municipality
Ms.	Lorraine	Nobelsa	Department of Water and Sanitation
	Mlwayedwa	Markus Nhlapo	Ward Councillor
Interested and Affected Parties			
Mr.	Gert	Olivier	Kudumane Farmers Union
Mrs.	Charlmarie	Peché-Kroeze	Barrange (Pty) Ltd
Mr.	Danie	Pretorious	Barrange Farm
Mr.	Kgosietsile	Gaonnwe	Kalagadi Manganese
Mr.	Jeff	Leader	Ntsimbintle mining (Pty) Ltd
Mrs.	Marilette	van der Walt	Neighbouring Landowner
Mr.	Teboho	Zide	Zyde Investments (Pty) Ltd.
Mr.	Ruan	Buhr	Infrasors
Mr.	E. R.	van Schalkwyk	Farmer - lehating
Mr.	Alan	Roberts	Kalgadi Manganese
Mr.	Gawie	Stols	Farmer - Boerdraai
Mr.	Bobby	Reyneke	Neighbouring Farmer (landowner of Nchwaning 257 Portion O RE
Mr.	HJ	Lampbrecht	
Mr.	WP	van der Walt	
Mr.	JL	Reynecke	
Mr.	Francios	Erasmus	
Mr.	Maserame Conny(Connie)	Mashishi	
Mr	Marcel	Prinsloo	Family residing in Hotazel

APPENDIX 2.4: PROOF OF DISTRIBUTION TO IAPS

This is the draft report for distribution, comments will be detailed in the final report.

APPENDIX 3: DFFE SCREENING REPORT

**SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS
REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE
ENVIRONMENTAL SENSITIVITY**

EIA Reference number: None

Project name: Black Rock Mine Operations

Project title: Gloria Open Cast Mine

Date screening report generated: 03/05/2023 12:23:47

Applicant: Assmang Manganese

Compiler: EScience Associates

Compiler signature:

.....

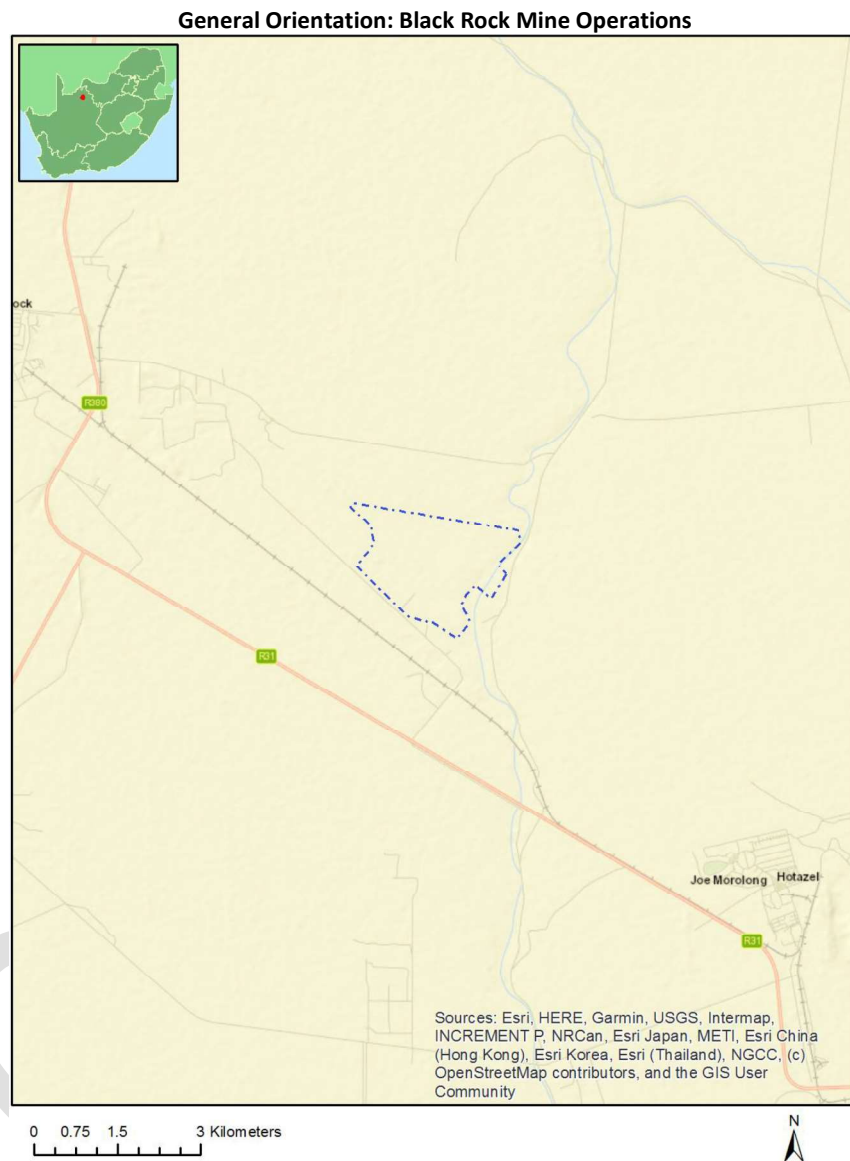
Application Category: Mining | Mining Right

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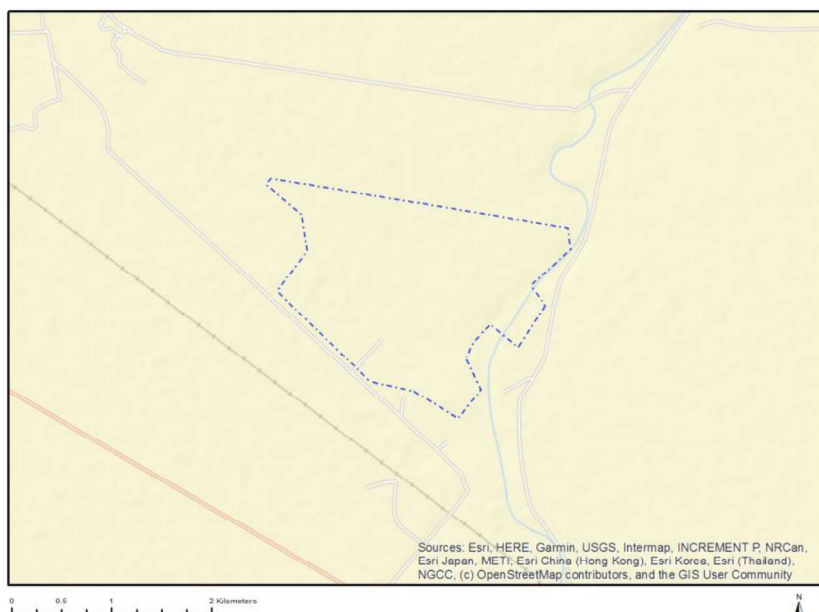
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Proposed Project Location

Orientation map 1: General location



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	EAST	270	0	27°9'42.38S	22°56'57.14E	Farm
2	GLORIA	266	0	27°10'0.37S	22°53'27.79E	Farm
3	N' CHWANING	267	0	27°8'14.19S	22°52'34.45E	Farm
4	GLORIA	266	1	27°10'2.24S	22°53'31.16E	Farm Portion
5	EAST	270	0	27°9'51.58S	22°56'2.77E	Farm Portion
6	N' CHWANING	267	0	27°8'20.53S	22°53'18.92E	Farm Portion
7	EAST	270	1	27°9'30.88S	22°55'8.88E	Farm Portion

Development footprint¹ vertices:

No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/1086	Solar PV	Approved	8.4

¹ “development footprint”, means the area within the site on which the development will take place and includes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

2	14/12/16/3/3/2/762	Solar PV	Approved	13.7
3	14/12/16/3/3/2/936	Solar PV	Approved	14.4
4	14/12/16/3/3/2/830	Solar PV	Approved	0
5	12/12/20/2567	Solar PV	Approved	25.5
6	14/12/16/3/3/2/761	Solar PV	Approved	13.7
7	14/12/16/3/3/2/829	Solar PV	Approved	0
8	14/12/16/3/3/2/839	Solar PV	Approved	0.2
9	14/12/16/3/3/2/934	Solar PV	Approved	13.7
10	14/12/16/3/3/2/615	Solar PV	Approved	0.2
11	12/12/20/2566	Solar PV	Approved	25.5
12	14/12/16/3/3/2/616	Solar PV	Approved	29.7

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is:

Mining | Mining Right.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

No intersection with any development zones found.

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme				X
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme			X	
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

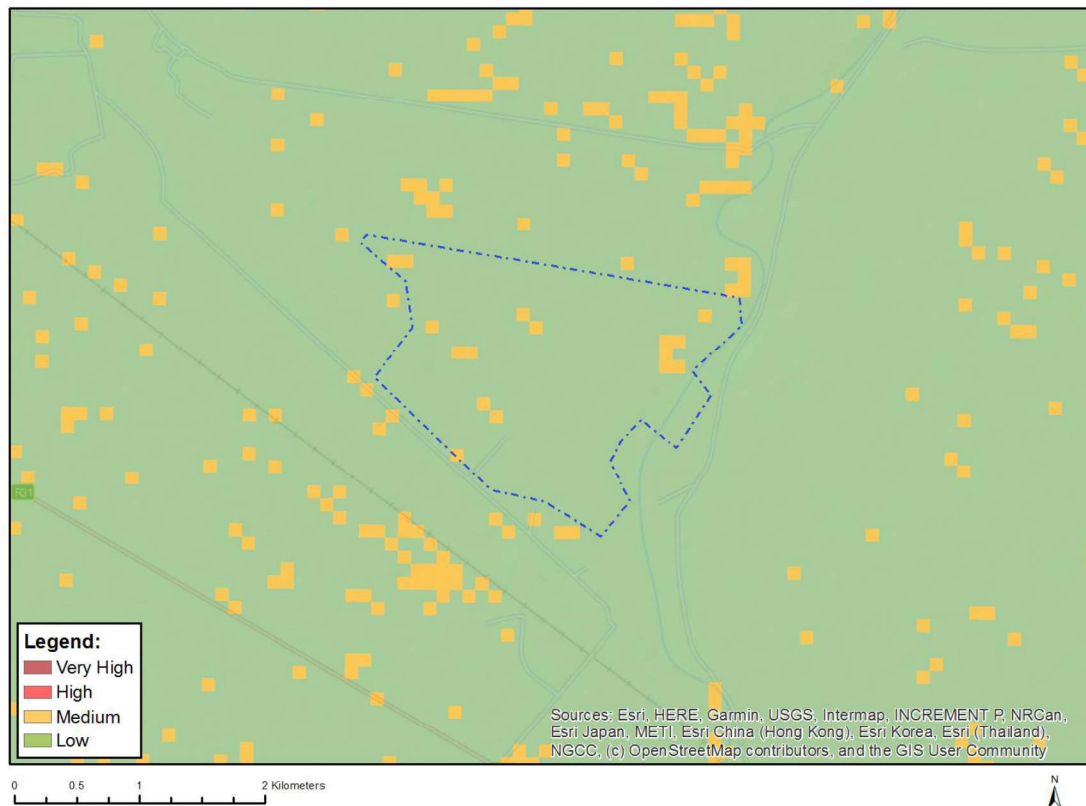
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Hydrology Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
9	Radioactivity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Climate Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
13	Health Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
14	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf

		ssmentProtocols/Gazetted General Requirement Assessment Protocols.pdf
15	Ambient Air Quality Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted General Requirement Assessment Protocols.pdf
16	Seismicity Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted General Requirement Assessment Protocols.pdf
17	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Plant Species Assessment Protocols.pdf
18	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Animal Species Assessment Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



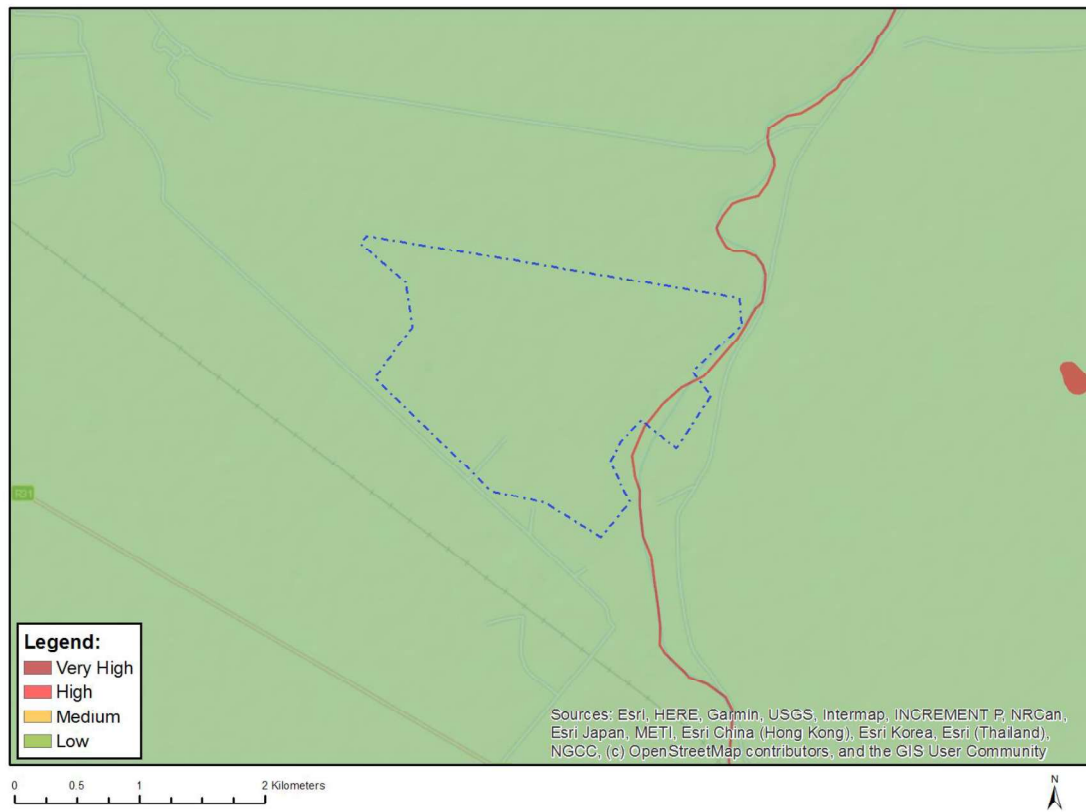
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

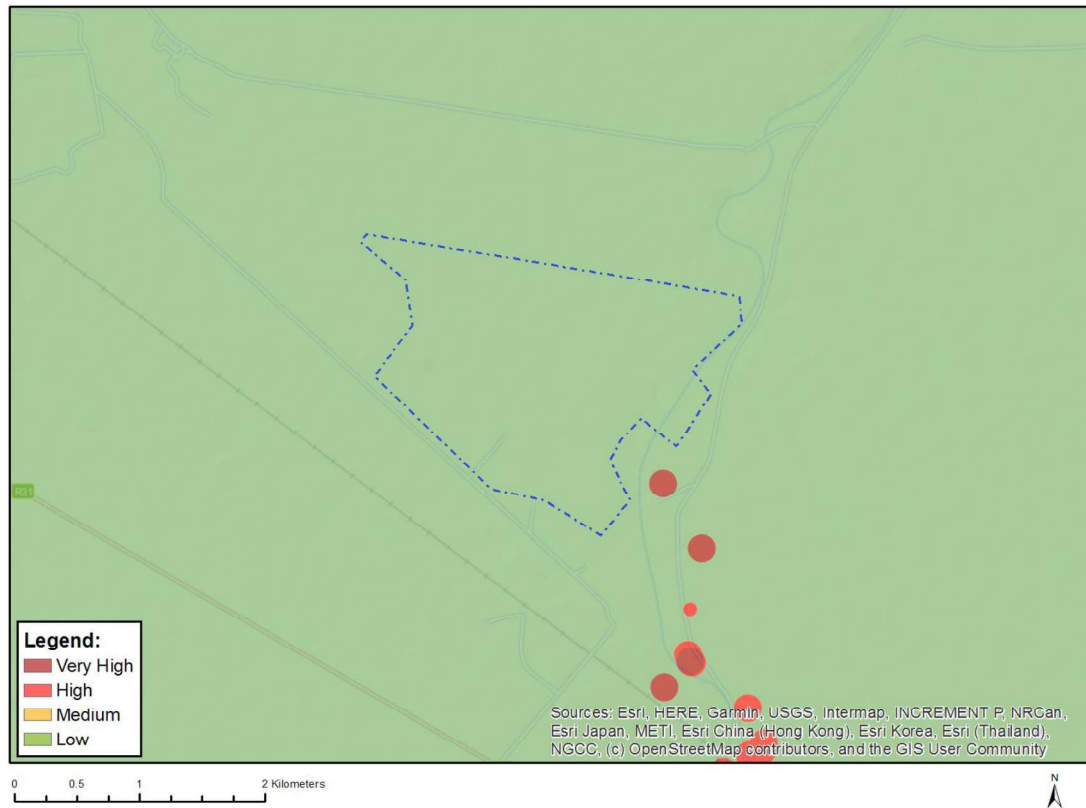


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Rivers_C

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

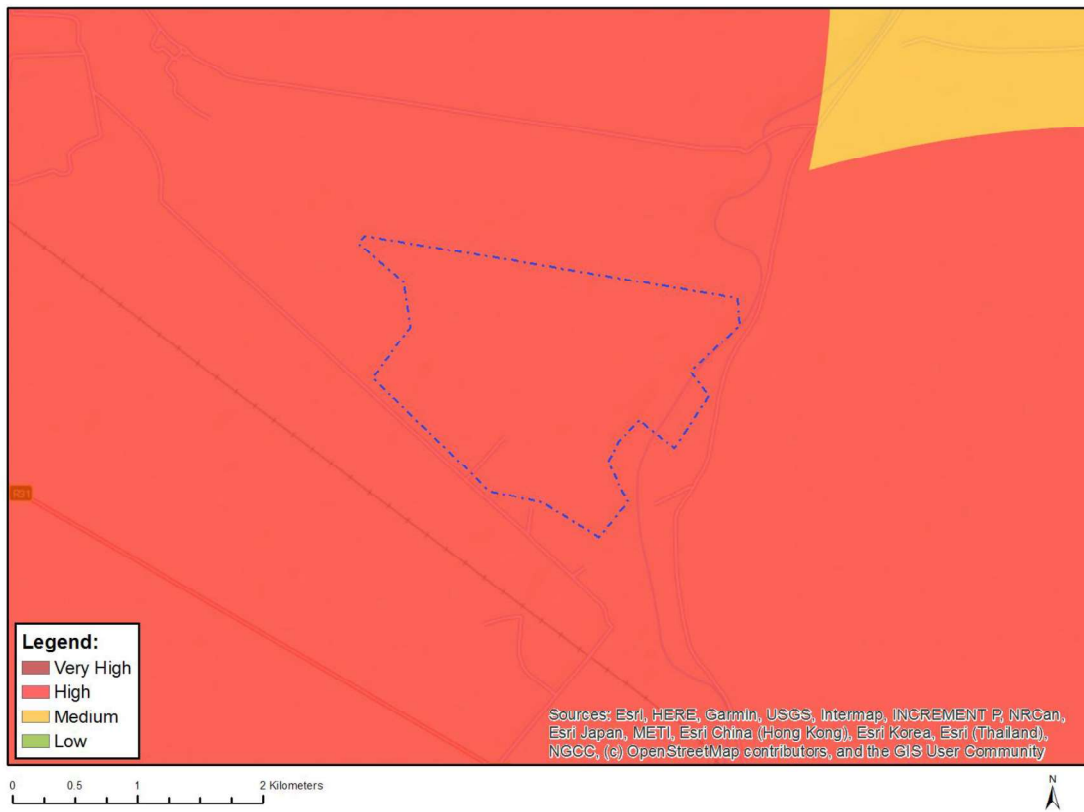


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

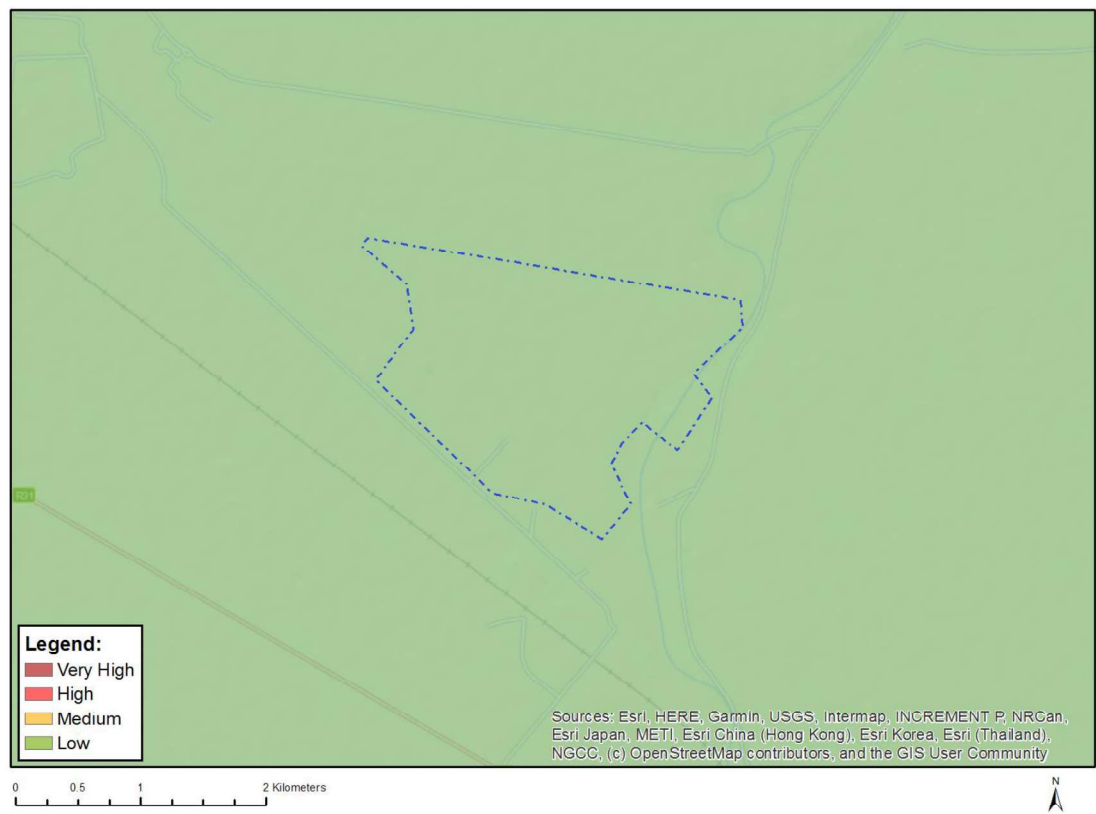


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome

MAP OF RELATIVE DEFENCE THEME SENSITIVITY

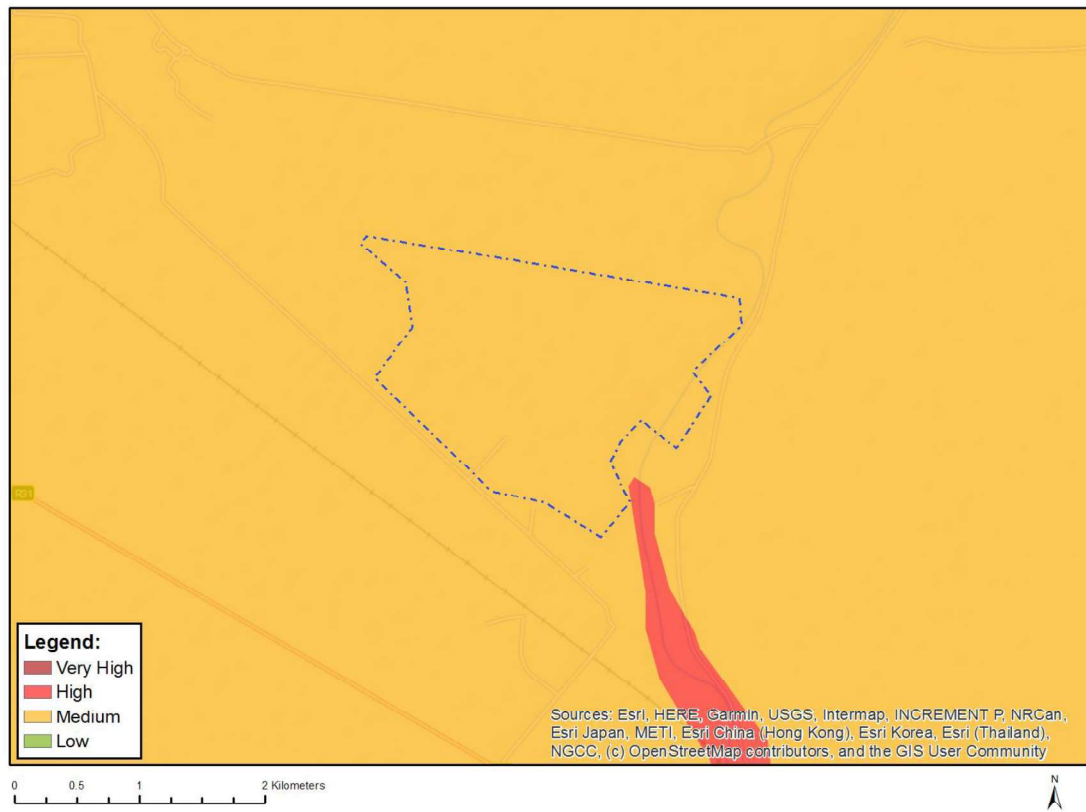


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



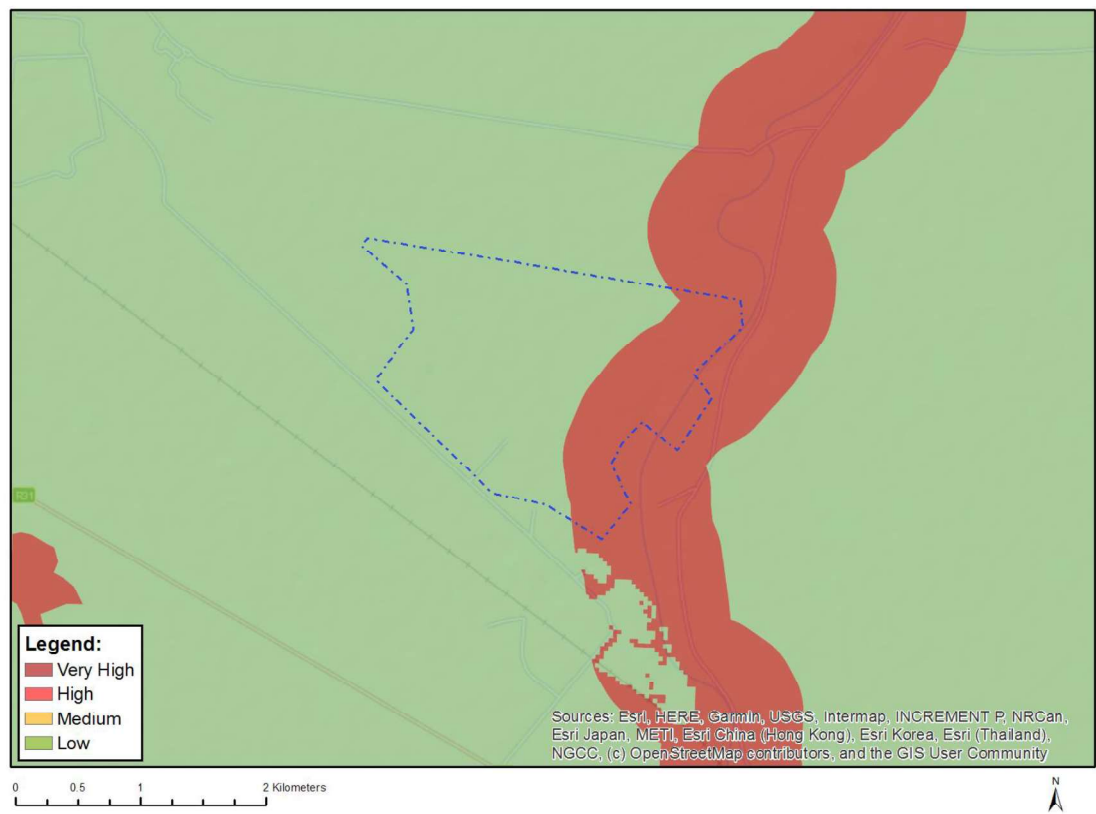
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Ecological support area